STATE MATCH SUPPLEMENT

Missouri Course Level Expectations

Communication Arts, Mathematics, and Science
Grades 9–12

and

EXPLORE®, PLAN®, and the ACT®

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Preface

This document is a supplement to the *State Match Missouri Course Level Expectations Communication Arts, Mathematics, and Science Grades 9–12 and EXPLORE, PLAN, and the ACT (March 2009)*. This supplement identifies specific ACT College Readiness Standards that correspond to each Missouri CLE in a side-by-side format. The left side of each page presents the Missouri CLEs (highlighted if measured by ACT's corresponding testing program). The right side of each page presents the specific ACT College Readiness Standard(s) that correspond to each Missouri CLE.

Missouri CLEs listed here are from the Missouri Course Level Expectations as presented on the Missouri Department of Elementary & Secondary Education website in February 2009.

SUPPLEMENT
TABLES 1A–1E:

COMMUNICATION ARTS

TABLE 1A

MISSOURI English I Course Level Expectations	EXPLORE Reading College Readiness Standards
Strand 1: Reading	
Big Idea 1. Develop and apply skills and strategies to the reading process	
A. Print Concepts No CLE	
B. Phonemic Awareness No CLE	
C. Phonics Apply decoding strategies to "problem-solve" unknown words when reading when needed*	
D. Fluency Read grade-level instructional text* a. with fluency: accuracy, comprehension and appropriate expression b. adjusting reading rate to difficulty and type of text	**Main Ideas and Author's Approach:** Recognize a clear intent of an author or narrator in uncomplicated literary narratives Identify a clear main idea or purpose of straightforward paragraphs in uncomplicated literary narratives Infer the main idea or purpose of straightforward paragraphs in uncomplicated literary narratives Understand the overall approach taken by an author or narrator (e.g., point of view, kinds of evidence used) in uncomplicated passages Identify a clear main idea or purpose of any paragraph or paragraphs in uncomplicated passages Infer the main idea or purpose of straightforward paragraphs in more challenging passages Summarize basic events and ideas in more challenging passages Understand the overall approach taken by an author or narrator (e.g., point of view, kinds of evidence used) in more challenging passages **Supporting Details:** Locate basic facts (e.g., names, dates, events) clearly stated in a passage Locate simple details at the sentence and paragraph level in uncomplicated passages Recognize a clear function of a part of an uncomplicated passage Locate important details in uncomplicated passages Make simple inferences about how details are used in passages Locate important details in more challenging passages Locate and interpret minor or subtly stated details in uncomplicated passages Discern which details, though they may appear in different sections throughout a passage, support important points in more challenging passages

*Locally assessed.

= Measured by EXPLORE English and/or Reading tests

TABLE 1A

MISSOURI English I Course Level Expectations	EXPLORE Reading College Readiness Standards
Strand 1: Reading	
Big Idea 1. Develop and apply skills and strategies to the reading process	
	Sequential, Comparative, and Cause-Effect Relationships: Determine when (e.g., first, last, before, after) or if an event occurred in uncomplicated passages Recognize clear cause-effect relationships described within a single sentence in a passage Identify relationships between main characters in uncomplicated literary narratives Recognize clear cause-effect relationships within a single paragraph in uncomplicated literary narratives Order simple sequences of events in uncomplicated literary narratives Identify clear relationships between people, ideas, and so on in uncomplicated passages Identify clear cause-effect relationships in uncomplicated passages Order sequences of events in uncomplicated passages Understand relationships between people, ideas, and so on in uncomplicated passages Identify clear relationships between characters, ideas, and so on in more challenging literary narratives Understand implied or subtly stated cause-effect relationships in uncomplicated passages Identify clear cause-effect relationships in more challenging passages **Meanings of Words:** Understand the implication of a familiar word or phrase and of simple descriptive language Use context to understand basic figurative language Use context to determine the appropriate meaning of some figurative and nonfigurative words, phrases, and statements in uncomplicated passages Use context to determine the appropriate meaning of virtually any word, phrase, or statement in uncomplicated passages Use context to determine the appropriate meaning of some figurative and nonfigurative words, phrases, and statements in more challenging passages **Generalizations and Conclusions:** Draw simple generalizations and conclusions about the main characters in uncomplicated literary narratives Draw simple generalizations and conclusions about people, ideas, and so on in uncomplicated passages Draw generalizations and conclusions about people, ideas, and so on in uncomplicated passages Draw simple generalizations and conclusions using details that support the main points of more challenging passages

*Locally assessed.

TABLE 1A

MISSOURI English I Course Level Expectations	EXPLORE Reading College Readiness Standards
Strand 1: Reading	
Big Idea 1. Develop and apply skills and strategies to the reading process	
	Draw subtle generalizations and conclusions about characters, ideas, and so on in uncomplicated literary narratives Draw generalizations and conclusions about people, ideas, and so on in more challenging passages
E. Vocabulary Develop vocabulary through text, using a. roots and affixes b. context clues c. glossary, dictionary and thesaurus	**Meanings of Words:** Understand the implication of a familiar word or phrase and of simple descriptive language Use context to understand basic figurative language Use context to determine the appropriate meaning of some figurative and nonfigurative words, phrases, and statements in uncomplicated passages Use context to determine the appropriate meaning of virtually any word, phrase, or statement in uncomplicated passages Use context to determine the appropriate meaning of some figurative and nonfigurative words, phrases, and statements in more challenging passages
F. Pre-Reading Apply pre-reading strategies to aid comprehension* a. access prior knowledge b. preview c. predict with text support or rationale d. set a purpose and rate for reading	
G. During reading During reading, utilize strategies to* a. determine meaning of unknown words b. self-monitor comprehension c. question the text d. infer e. visualize f. paraphrase g. summarize	**Main Ideas and Author's Approach:** Infer the main idea or purpose of straightforward paragraphs in uncomplicated literary narratives Understand the overall approach taken by an author or narrator (e.g., point of view, kinds of evidence used) in uncomplicated passages Infer the main idea or purpose of straightforward paragraphs in more challenging passages Summarize basic events and ideas in more challenging passages Understand the overall approach taken by an author or narrator (e.g., point of view, kinds of evidence used) in more challenging passages **Supporting Details:** Make simple inferences about how details are used in passages Locate and interpret minor or subtly stated details in uncomplicated passages Discern which details, though they may appear in different sections throughout a passage, support important points in more challenging passages

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= Measured by EXPLORE English and/or Reading tests

TABLE 1A

MISSOURI English I Course Level Expectations	EXPLORE Reading College Readiness Standards
Strand 1: Reading	
Big Idea 1. Develop and apply skills and strategies to the reading process	
	Sequential, Comparative, and Cause-Effect Relationships: Determine when (e.g., first, last, before, after) or if an event occurred in uncomplicated passages Order simple sequences of events in uncomplicated literary narratives Order sequences of events in uncomplicated passages Understand relationships between people, ideas, and so on in uncomplicated passages Understand implied or subtly stated cause-effect relationships in uncomplicated passages **Meanings of Words:** Understand the implication of a familiar word or phrase and of simple descriptive language Use context to understand basic figurative language Use context to determine the appropriate meaning of some figurative and nonfigurative words, phrases, and statements in uncomplicated passages Use context to determine the appropriate meaning of virtually any word, phrase, or statement in uncomplicated passages Use context to determine the appropriate meaning of some figurative and nonfigurative words, phrases, and statements in more challenging passages **Generalizations and Conclusions:** Draw simple generalizations and conclusions about the main characters in uncomplicated literary narratives Draw simple generalizations and conclusions about people, ideas, and so on in uncomplicated passages Draw generalizations and conclusions about people, ideas, and so on in uncomplicated passages Draw simple generalizations and conclusions using details that support the main points of more challenging passages Draw subtle generalizations and conclusions about characters, ideas, and so on in uncomplicated literary narratives Draw generalizations and conclusions about people, ideas, and so on in more challenging passages

*Locally assessed.

= Measured by EXPLORE English and/or Reading tests

TABLE 1A

MISSOURI English I Course Level Expectations	EXPLORE Reading College Readiness Standards
Strand 1: Reading	
Big Idea 1. Develop and apply skills and strategies to the reading process	
H. Post-Reading Apply post-reading skills to comprehend, interpret, analyze, and evaluate text: a. identify and explain the relationship between the main idea and supporting details b. question to clarify* c. reflect d. draw conclusions e. paraphrase f. summarize	**Main Ideas and Author's Approach:** Recognize a clear intent of an author or narrator in uncomplicated literary narratives Identify a clear main idea or purpose of straightforward paragraphs in uncomplicated literary narratives Infer the main idea or purpose of straightforward paragraphs in uncomplicated literary narratives Understand the overall approach taken by an author or narrator (e.g., point of view, kinds of evidence used) in uncomplicated passages Identify a clear main idea or purpose of any paragraph or paragraphs in uncomplicated passages Infer the main idea or purpose of straightforward paragraphs in more challenging passages Summarize basic events and ideas in more challenging passages Understand the overall approach taken by an author or narrator (e.g., point of view, kinds of evidence used) in more challenging passages **Supporting Details:** Locate basic facts (e.g., names, dates, events) clearly stated in a passage Locate simple details at the sentence and paragraph level in uncomplicated passages Recognize a clear function of a part of an uncomplicated passage Locate important details in uncomplicated passages Make simple inferences about how details are used in passages Locate important details in more challenging passages Locate and interpret minor or subtly stated details in uncomplicated passages Discern which details, though they may appear in different sections throughout a passage, support important points in more challenging passages **Meanings of Words:** Understand the implication of a familiar word or phrase and of simple descriptive language Use context to understand basic figurative language Use context to determine the appropriate meaning of some figurative and nonfigurative words, phrases, and statements in uncomplicated passages Use context to determine the appropriate meaning of virtually any word, phrase, or statement in uncomplicated passages

*Locally assessed.

= Measured by EXPLORE English and/or Reading tests

TABLE 1A

MISSOURI English I Course Level Expectations	EXPLORE Reading College Readiness Standards
Strand 1: Reading	
Big Idea 1. Develop and apply skills and strategies to the reading process	
	Use context to determine the appropriate meaning of some figurative and nonfigurative words, phrases, and statements in more challenging passages **Generalizations and Conclusions:** Draw simple generalizations and conclusions about the main characters in uncomplicated literary narratives Draw simple generalizations and conclusions about people, ideas, and so on in uncomplicated passages Draw generalizations and conclusions about people, ideas, and so on in uncomplicated passages Draw simple generalizations and conclusions using details that support the main points of more challenging passages Draw subtle generalizations and conclusions about characters, ideas, and so on in uncomplicated literary narratives Draw generalizations and conclusions about people, ideas, and so on in more challenging passages
I. **Making Connections** Compare, contrast, analyze and evaluate connections: a. text to text (information and relationships in various fiction and non-fiction works) b. text to self (text ideas and own experiences)* c. text to world (text ideas and the world by analyzing and evaluating the relationship between literature and its historical period and culture)*	

*Locally assessed.

= Measured by EXPLORE English and/or Reading tests

TABLE 1A

MISSOURI English I Course Level Expectations	EXPLORE Reading College Readiness Standards
Strand 1: Reading	
Big Idea 2. Develop and apply skills and strategies to comprehend, analyze and evaluate fiction, poetry and drama from a variety of cultures and times	
A. Text Features Analyze and evaluate the text features in grade-level text	
B. Literary Techniques Identify and explain literary techniques, in text emphasizing a. irony b. imagery c. repeated sound, line or phrase d. analyze literary techniques previously introduced	**Main Ideas and Author's Approach:** Recognize a clear intent of an author or narrator in uncomplicated literary narratives Identify a clear main idea or purpose of straightforward paragraphs in uncomplicated literary narratives Infer the main idea or purpose of straightforward paragraphs in uncomplicated literary narratives Understand the overall approach taken by an author or narrator (e.g., point of view, kinds of evidence used) in uncomplicated passages Identify a clear main idea or purpose of any paragraph or paragraphs in uncomplicated passages Infer the main idea or purpose of straightforward paragraphs in more challenging passages Summarize basic events and ideas in more challenging passages Understand the overall approach taken by an author or narrator (e.g., point of view, kinds of evidence used) in more challenging passages **Supporting Details:** Locate basic facts (e.g., names, dates, events) clearly stated in a passage Locate simple details at the sentence and paragraph level in uncomplicated passages Recognize a clear function of a part of an uncomplicated passage Locate important details in uncomplicated passages Make simple inferences about how details are used in passages Locate important details in more challenging passages Locate and interpret minor or subtly stated details in uncomplicated passages Discern which details, though they may appear in different sections throughout a passage, support important points in more challenging passages **Sequential, Comparative, and Cause-Effect Relationships:** Determine when (e.g., first, last, before, after) or if an event occurred in uncomplicated passages Recognize clear cause-effect relationships described within a single sentence in a passage

*Locally assessed.

= Measured by EXPLORE English and/or Reading tests

TABLE 1A

MISSOURI English I Course Level Expectations	EXPLORE Reading College Readiness Standards
Strand 1: Reading	
Big Idea 2. Develop and apply skills and strategies to comprehend, analyze and evaluate fiction, poetry and drama from a variety of cultures and times	
	Identify relationships between main characters in uncomplicated literary narratives
	Recognize clear cause-effect relationships within a single paragraph in uncomplicated literary narratives
	Order simple sequences of events in uncomplicated literary narratives
	Identify clear relationships between people, ideas, and so on in uncomplicated passages
	Identify clear cause-effect relationships in uncomplicated passages
	Order sequences of events in uncomplicated passages
	Understand relationships between people, ideas, and so on in uncomplicated passages
	Identify clear relationships between characters, ideas, and so on in more challenging literary narratives
	Understand implied or subtly stated cause-effect relationships in uncomplicated passages
	Identify clear cause-effect relationships in more challenging passages
	Meanings of Words:
	Understand the implication of a familiar word or phrase and of simple descriptive language
	Use context to understand basic figurative language
	Use context to determine the appropriate meaning of some figurative and nonfigurative words, phrases, and statements in uncomplicated passages
	Use context to determine the appropriate meaning of virtually any word, phrase, or statement in uncomplicated passages
	Use context to determine the appropriate meaning of some figurative and nonfigurative words, phrases, and statements in more challenging passages
	Generalizations and Conclusions:
	Draw simple generalizations and conclusions about the main characters in uncomplicated literary narratives
	Draw simple generalizations and conclusions about people, ideas, and so on in uncomplicated passages
	Draw generalizations and conclusions about people, ideas, and so on in uncomplicated passages
	Draw simple generalizations and conclusions using details that support the main points of more challenging passages
	Draw subtle generalizations and conclusions about characters, ideas, and so on in uncomplicated literary narratives
	Draw generalizations and conclusions about people, ideas, and so on in more challenging passages

*Locally assessed.

= Measured by EXPLORE English and/or Reading tests

TABLE 1A

MISSOURI English I Course Level Expectations	EXPLORE Reading College Readiness Standards
Strand 1: Reading	
Big Idea 2. Develop and apply skills and strategies to comprehend, analyze and evaluate fiction, poetry and drama from a variety of cultures and times	
C. Literary Elements Use details from text(s) to a. demonstrate comprehension skills previously introduced b. analyze character, plot, setting, point of view c. analyze the development of a theme across genres d. evaluate the effect of author's style	**Supporting Details:** Recognize a clear function of a part of an uncomplicated passage Make simple inferences about how details are used in passages Discern which details, though they may appear in different sections throughout a passage, support important points in more challenging passages

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= Measured by EXPLORE English and/or Reading tests

TABLE 1A

MISSOURI English I Course Level Expectations	EXPLORE Reading College Readiness Standards
Strand 1: Reading	
Big Idea 3. Develop and apply skills and strategies to comprehend, analyze and evaluate nonfiction (such as biographies, newspapers, technical manuals) from a variety of cultures and times	
A. Text Features Explain, analyze and evaluate the author's use of text features to clarify meaning	
B. Literary Techniques Identify, explain, and analyze literary techniques in non-fiction, emphasizing a. irony b. imagery c. repeated sound, line or phrase d. figurative language and sound devices previously introduced	**Main Ideas and Author's Approach:** Recognize a clear intent of an author or narrator in uncomplicated literary narratives Identify a clear main idea or purpose of straightforward paragraphs in uncomplicated literary narratives Infer the main idea or purpose of straightforward paragraphs in uncomplicated literary narratives Understand the overall approach taken by an author or narrator (e.g., point of view, kinds of evidence used) in uncomplicated passages Identify a clear main idea or purpose of any paragraph or paragraphs in uncomplicated passages Infer the main idea or purpose of straightforward paragraphs in more challenging passages Summarize basic events and ideas in more challenging passages Understand the overall approach taken by an author or narrator (e.g., point of view, kinds of evidence used) in more challenging passages **Supporting Details:** Locate basic facts (e.g., names, dates, events) clearly stated in a passage Locate simple details at the sentence and paragraph level in uncomplicated passages Recognize a clear function of a part of an uncomplicated passage Locate important details in uncomplicated passages Make simple inferences about how details are used in passages Locate important details in more challenging passages Locate and interpret minor or subtly stated details in uncomplicated passages Discern which details, though they may appear in different sections throughout a passage, support important points in more challenging passages **Sequential, Comparative, and Cause-Effect Relationships:** Determine when (e.g., first, last, before, after) or if an event occurred in uncomplicated passages Recognize clear cause-effect relationships described within a single sentence in a passage

*Locally assessed.

= Measured by EXPLORE English and/or Reading tests

TABLE 1A

MISSOURI English I Course Level Expectations	EXPLORE Reading College Readiness Standards
Strand 1: Reading	
Big Idea 3. Develop and apply skills and strategies to comprehend, analyze and evaluate nonfiction (such as biographies, newspapers, technical manuals) from a variety of cultures and times	
	Identify relationships between main characters in uncomplicated literary narratives Recognize clear cause-effect relationships within a single paragraph in uncomplicated literary narratives Order simple sequences of events in uncomplicated literary narratives Identify clear relationships between people, ideas, and so on in uncomplicated passages Identify clear cause-effect relationships in uncomplicated passages Order sequences of events in uncomplicated passages Understand relationships between people, ideas, and so on in uncomplicated passages Identify clear relationships between characters, ideas, and so on in more challenging literary narratives Understand implied or subtly stated cause-effect relationships in uncomplicated passages Identify clear cause-effect relationships in more challenging passages **Meanings of Words:** Understand the implication of a familiar word or phrase and of simple descriptive language Use context to understand basic figurative language Use context to determine the appropriate meaning of some figurative and nonfigurative words, phrases, and statements in uncomplicated passages Use context to determine the appropriate meaning of virtually any word, phrase, or statement in uncomplicated passages Use context to determine the appropriate meaning of some figurative and nonfigurative words, phrases, and statements in more challenging passages **Generalizations and Conclusions:** Draw simple generalizations and conclusions about the main characters in uncomplicated literary narratives Draw simple generalizations and conclusions about people, ideas, and so on in uncomplicated passages Draw generalizations and conclusions about people, ideas, and so on in uncomplicated passages Draw simple generalizations and conclusions using details that support the main points of more challenging passages Draw subtle generalizations and conclusions about characters, ideas, and so on in uncomplicated literary narratives Draw generalizations and conclusions about people, ideas, and so on in more challenging passages

*Locally assessed.

= Measured by EXPLORE English and/or Reading tests

TABLE 1A

MISSOURI English I Course Level Expectations	EXPLORE Reading College Readiness Standards
Strand 1: Reading	
Big Idea 3. Develop and apply skills and strategies to comprehend, analyze and evaluate nonfiction (such as biographies, newspapers, technical manuals) from a variety of cultures and times	
C. Text Structures Use details from informational text to a. identify and explain the organizational pattern b. analyze and evaluate effectiveness of word choice c. analyze and evaluate the accuracy and adequacy of evidence d. analyze and evaluate point of view e. analyze and evaluate author's viewpoint/perspective f. evaluate proposed solutions g. demonstrate comprehension skills previously introduced	**Main Ideas and Author's Approach:** Understand the overall approach taken by an author or narrator (e.g., point of view, kinds of evidence used) in uncomplicated passages Understand the overall approach taken by an author or narrator (e.g., point of view, kinds of evidence used) in more challenging passages **Supporting Details:** Recognize a clear function of a part of an uncomplicated passage Make simple inferences about how details are used in passages Discern which details, though they may appear in different sections throughout a passage, support important points in more challenging passages **Meanings of Words:** Understand the implication of a familiar word or phrase and of simple descriptive language Use context to understand basic figurative language Use context to determine the appropriate meaning of some figurative and nonfigurative words, phrases, and statements in uncomplicated passages Use context to determine the appropriate meaning of virtually any word, phrase, or statement in uncomplicated passages Use context to determine the appropriate meaning of some figurative and nonfigurative words, phrases, and statements in more challenging passages
D. Understanding Directions Read and apply multi-step directions to perform complex procedures and/or tasks*	

*Locally assessed.

= Measured by EXPLORE English and/or Reading tests

TABLE 1A

MISSOURI English I Course Level Expectations	EXPLORE English College Readiness Standards
Strand 2: Writing	
Big Idea 1. Apply a writing process in composing text	
A. Writing Process Follow a writing process to a. use appropriate prewriting strategies as needed b. generate a draft c. revise in response to feedback (peer and/or teacher)* d. edit for conventions* e. share writing*	**Topic Development in Terms of Purpose and Focus:** Identify the basic purpose or role of a specified phrase or sentence Delete a clause or sentence because it is obviously irrelevant to the essay Identify the central idea or main topic of a straightforward piece of writing Determine relevancy when presented with a variety of sentence-level details Identify the focus of a simple essay, applying that knowledge to add a sentence that sharpens that focus or to determine if an essay has met a specified goal Delete material primarily because it disturbs the flow and development of the paragraph Add a sentence to accomplish a fairly straightforward purpose such as illustrating a given statement **Organization, Unity, and Coherence:** Use conjunctive adverbs or phrases to show time relationships in simple narrative essays (e.g., *then*, *this time*) Select the most logical place to add a sentence in a paragraph Use conjunctive adverbs or phrases to express straightforward logical relationships (e.g., *first*, *afterward*, *in response*) Decide the most logical place to add a sentence in an essay Add a sentence that introduces a simple paragraph Determine the need for conjunctive adverbs or phrases to create subtle logical connections between sentences (e.g., *therefore*, *however*, *in addition*) Rearrange the sentences in a fairly uncomplicated paragraph for the sake of logic Add a sentence to introduce or conclude the essay or to provide a transition between paragraphs when the essay is fairly straightforward **Word Choice in Terms of Style, Tone, Clarity, and Economy:** Revise sentences to correct awkward and confusing arrangements of sentence elements Revise vague nouns and pronouns that create obvious logic problems Delete obviously synonymous and wordy material in a sentence Revise expressions that deviate from the style of an essay Delete redundant material when information is repeated in different parts of speech (e.g., "alarmingly startled") Use the word or phrase most consistent with the style and tone of a fairly straightforward essay

*Locally assessed.

= Measured by EXPLORE English and/or Reading tests

TABLE 1A

MISSOURI English I Course Level Expectations	EXPLORE English College Readiness Standards
Strand 2: Writing	
Big Idea 1. Apply a writing process in composing text	
	Determine the clearest and most logical conjunction to link clauses Revise a phrase that is redundant in terms of the meaning and logic of the entire sentence Identify and correct ambiguous pronoun references Use the word or phrase most appropriate in terms of the content of the sentence and tone of the essay **Sentence Structure and Formation:** Use conjunctions or punctuation to join simple clauses Revise shifts in verb tense between simple clauses in a sentence or between simple adjoining sentences Determine the need for punctuation and conjunctions to avoid awkward-sounding sentence fragments and fused sentences Decide the appropriate verb tense and voice by considering the meaning of the entire sentence Recognize and correct marked disturbances of sentence flow and structure (e.g., participial phrase fragments, missing or incorrect relative pronouns, dangling or misplaced modifiers) Revise to avoid faulty placement of phrases and faulty coordination and subordination of clauses in sentences with subtle structural problems Maintain consistent verb tense and pronoun person on the basis of the preceding clause or sentence **Conventions of Usage:** Solve such basic grammatical problems as how to form the past and past participle of irregular but commonly used verbs and how to form comparative and superlative adjectives Solve such grammatical problems as whether to use an adverb or adjective form, how to ensure straightforward subject-verb and pronoun-antecedent agreement, and which preposition to use in simple contexts Recognize and use the appropriate word in frequently confused pairs such as *there* and *their*, *past* and *passed*, and *led* and *lead* Use idiomatically appropriate prepositions, especially in combination with verbs (e.g., *long for*, *appeal to*) Ensure that a verb agrees with its subject when there is some text between the two Ensure that a pronoun agrees with its antecedent when the two occur in separate clauses or sentences Identify the correct past and past participle forms of irregular and infrequently used verbs and form present-perfect verbs by using *have* rather than *of*

*Locally assessed.

= Measured by EXPLORE English and/or Reading tests

TABLE 1A

MISSOURI English I Course Level Expectations	EXPLORE English College Readiness Standards
Strand 2: Writing	
Big Idea 1. Apply a writing process in composing text	
	Conventions of Punctuation: Delete commas that create basic sense problems (e.g., between verb and direct object) Provide appropriate punctuation in straightforward situations (e.g., items in a series) Delete commas that disturb the sentence flow (e.g., between modifier and modified element) Use commas to set off simple parenthetical phrases Delete unnecessary commas when an incorrect reading of the sentence suggests a pause that should be punctuated (e.g., between verb and direct object clause) Use punctuation to set off complex parenthetical phrases Recognize and delete unnecessary commas based on a careful reading of a complicated sentence (e.g., between the elements of a compound subject or compound verb joined by *and*) Use apostrophes to indicate simple possessive nouns Recognize inappropriate uses of colons and semicolons

*Locally assessed.

= Measured by EXPLORE English and/or Reading tests

TABLE 1A

MISSOURI English I Course Level Expectations	EXPLORE English College Readiness Standards
Strand 2: Writing	
Big Idea 2. Compose well-developed text	
A. Audience and purpose Compose text a. showing awareness of audience b. choosing a form and point of view appropriate to purpose and audience	
B. Ideas and Content Compose text with: a. strong controlling idea b. relevant specific details c. complex ideas d. freshness of thought	**Topic Development in Terms of Purpose and Focus:** Identify the basic purpose or role of a specified phrase or sentence Delete a clause or sentence because it is obviously irrelevant to the essay Identify the central idea or main topic of a straightforward piece of writing Determine relevancy when presented with a variety of sentence-level details Identify the focus of a simple essay, applying that knowledge to add a sentence that sharpens that focus or to determine if an essay has met a specified goal Delete material primarily because it disturbs the flow and development of the paragraph Add a sentence to accomplish a fairly straightforward purpose such as illustrating a given statement
C. Organization and Sentence Structure Compose text with a. effective beginning, middle, and end b. a logical order c. effective paragraphing d. cohesive devices e. varied sentence structure f. clarity of expression g. active voice	**Organization, Unity, and Coherence:** Use conjunctive adverbs or phrases to show time relationships in simple narrative essays (e.g., *then*, *this time*) Select the most logical place to add a sentence in a paragraph Use conjunctive adverbs or phrases to express straightforward logical relationships (e.g., *first*, *afterward*, *in response*) Decide the most logical place to add a sentence in an essay Add a sentence that introduces a simple paragraph Determine the need for conjunctive adverbs or phrases to create subtle logical connections between sentences (e.g., *therefore*, *however*, *in addition*) Rearrange the sentences in a fairly uncomplicated paragraph for the sake of logic Add a sentence to introduce or conclude the essay or to provide a transition between paragraphs when the essay is fairly straightforward **Word Choice in Terms of Style, Tone, Clarity, and Economy:** Revise sentences to correct awkward and confusing arrangements of sentence elements Revise expressions that deviate from the style of an essay Use the word or phrase most consistent with the style and tone of a fairly straightforward essay

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TABLE 1A

MISSOURI English I Course Level Expectations	EXPLORE English College Readiness Standards
Strand 2: Writing	
Big Idea 2. Compose well-developed text	
	Use the word or phrase most appropriate in terms of the content of the sentence and tone of the essay **Sentence Structure and Formation:** Decide the appropriate verb tense and voice by considering the meaning of the entire sentence
D. Word Choice Compose text using a. precise and vivid language b. writing techniques such as imagery, humor, voice, and figurative language	**Topic Development in Terms of Purpose and Focus:** Identify the basic purpose or role of a specified phrase or sentence **Word Choice in Terms of Style, Tone, Clarity, and Economy:** Revise vague nouns and pronouns that create obvious logic problems Revise expressions that deviate from the style of an essay Use the word or phrase most consistent with the style and tone of a fairly straightforward essay Determine the clearest and most logical conjunction to link clauses Identify and correct ambiguous pronoun references Use the word or phrase most appropriate in terms of the content of the sentence and tone of the essay
E. Conventions In written text apply a. conventions of capitalization b. conventions of punctuation c. standard usage	**Conventions of Usage:** Solve such basic grammatical problems as how to form the past and past participle of irregular but commonly used verbs and how to form comparative and superlative adjectives Solve such grammatical problems as whether to use an adverb or adjective form, how to ensure straightforward subject-verb and pronoun-antecedent agreement, and which preposition to use in simple contexts Recognize and use the appropriate word in frequently confused pairs such as *there* and *their*, *past* and *passed*, and *led* and *lead* Use idiomatically appropriate prepositions, especially in combination with verbs (e.g., *long for*, *appeal to*) Ensure that a verb agrees with its subject when there is some text between the two Ensure that a pronoun agrees with its antecedent when the two occur in separate clauses or sentences Identify the correct past and past participle forms of irregular and infrequently used verbs and form present-perfect verbs by using *have* rather than *of* **Conventions of Punctuation:** Delete commas that create basic sense problems (e.g., between verb and direct object) Provide appropriate punctuation in straightforward situations (e.g., items in a series)

*Locally assessed.

= Measured by EXPLORE English and/or Reading tests

TABLE 1A

MISSOURI English I Course Level Expectations	EXPLORE English College Readiness Standards
Strand 2: Writing	
Big Idea 2. Compose well-developed text	
	Delete commas that disturb the sentence flow (e.g., between modifier and modified element) Use commas to set off simple parenthetical phrases Delete unnecessary commas when an incorrect reading of the sentence suggests a pause that should be punctuated (e.g., between verb and direct object clause) Use punctuation to set off complex parenthetical phrases Recognize and delete unnecessary commas based on a careful reading of a complicated sentence (e.g., between the elements of a compound subject or compound verb joined by *and*) Use apostrophes to indicate simple possessive nouns Recognize inappropriate uses of colons and semicolons

*Locally assessed.

= Measured by EXPLORE English and/or Reading tests

TABLE 1A

MISSOURI English I Course Level Expectations	EXPLORE English College Readiness Standards
Strand 2: Writing	
Big Idea 3. Write effectively in various forms and types of writing	
A. Forms/Types/Modes of Writing Compose a variety of texts, a. using narrative, descriptive, expository, and/or persuasive features b. in various formats, including workplace communication c. including summary d. including literary analysis e. including reflective writing	**Topic Development in Terms of Purpose and Focus:** Identify the basic purpose or role of a specified phrase or sentence Delete a clause or sentence because it is obviously irrelevant to the essay Identify the central idea or main topic of a straightforward piece of writing Determine relevancy when presented with a variety of sentence-level details Identify the focus of a simple essay, applying that knowledge to add a sentence that sharpens that focus or to determine if an essay has met a specified goal Delete material primarily because it disturbs the flow and development of the paragraph Add a sentence to accomplish a fairly straightforward purpose such as illustrating a given statement **Organization, Unity, and Coherence:** Use conjunctive adverbs or phrases to show time relationships in simple narrative essays (e.g., *then*, *this time*) Select the most logical place to add a sentence in a paragraph Use conjunctive adverbs or phrases to express straightforward logical relationships (e.g., *first*, *afterward*, *in response*) Decide the most logical place to add a sentence in an essay Add a sentence that introduces a simple paragraph Determine the need for conjunctive adverbs or phrases to create subtle logical connections between sentences (e.g., *therefore*, *however*, *in addition*) Rearrange the sentences in a fairly uncomplicated paragraph for the sake of logic Add a sentence to introduce or conclude the essay or to provide a transition between paragraphs when the essay is fairly straightforward **Word Choice in Terms of Style, Tone, Clarity, and Economy:** Revise sentences to correct awkward and confusing arrangements of sentence elements Revise vague nouns and pronouns that create obvious logic problems Delete obviously synonymous and wordy material in a sentence Revise expressions that deviate from the style of an essay Delete redundant material when information is repeated in different parts of speech (e.g., “alarmingly startled”)

*Locally assessed.

= Measured by EXPLORE English and/or Reading tests

TABLE 1A

MISSOURI English I Course Level Expectations	EXPLORE English College Readiness Standards
Strand 2: Writing	
Big Idea 3. Write effectively in various forms and types of writing	
	Use the word or phrase most consistent with the style and tone of a fairly straightforward essay Determine the clearest and most logical conjunction to link clauses Revise a phrase that is redundant in terms of the meaning and logic of the entire sentence Identify and correct ambiguous pronoun references Use the word or phrase most appropriate in terms of the content of the sentence and tone of the essay **Sentence Structure and Formation:** Use conjunctions or punctuation to join simple clauses Revise shifts in verb tense between simple clauses in a sentence or between simple adjoining sentences Determine the need for punctuation and conjunctions to avoid awkward-sounding sentence fragments and fused sentences Decide the appropriate verb tense and voice by considering the meaning of the entire sentence Recognize and correct marked disturbances of sentence flow and structure (e.g., participial phrase fragments, missing or incorrect relative pronouns, dangling or misplaced modifiers) Revise to avoid faulty placement of phrases and faulty coordination and subordination of clauses in sentences with subtle structural problems Maintain consistent verb tense and pronoun person on the basis of the preceding clause or sentence **Conventions of Usage:** Solve such basic grammatical problems as how to form the past and past participle of irregular but commonly used verbs and how to form comparative and superlative adjectives Solve such grammatical problems as whether to use an adverb or adjective form, how to ensure straightforward subject-verb and pronoun-antecedent agreement, and which preposition to use in simple contexts Recognize and use the appropriate word in frequently confused pairs such as *there* and *their*, *past* and *passed*, and *led* and *lead* Use idiomatically appropriate prepositions, especially in combination with verbs (e.g., *long for*, *appeal to*) Ensure that a verb agrees with its subject when there is some text between the two Ensure that a pronoun agrees with its antecedent when the two occur in separate clauses or sentences

*Locally assessed.

= Measured by EXPLORE English and/or Reading tests

TABLE 1A

MISSOURI English I Course Level Expectations	EXPLORE English College Readiness Standards
Strand 2: Writing	
Big Idea 3. Write effectively in various forms and types of writing	
	Identify the correct past and past participle forms of irregular and infrequently used verbs and form present-perfect verbs by using *have* rather than *of* **Conventions of Punctuation:** Delete commas that create basic sense problems (e.g., between verb and direct object) Provide appropriate punctuation in straightforward situations (e.g., items in a series) Delete commas that disturb the sentence flow (e.g., between modifier and modified element) Use commas to set off simple parenthetical phrases Delete unnecessary commas when an incorrect reading of the sentence suggests a pause that should be punctuated (e.g., between verb and direct object clause) Use punctuation to set off complex parenthetical phrases Recognize and delete unnecessary commas based on a careful reading of a complicated sentence (e.g., between the elements of a compound subject or compound verb joined by *and*) Use apostrophes to indicate simple possessive nouns Recognize inappropriate uses of colons and semicolons

*Locally assessed.

= Measured by EXPLORE English and/or Reading tests

TABLE 1A

MISSOURI English I Course Level Expectations	EXPLORE College Readiness Standards
Strand 3: Listening and Speaking	
Big Idea 1. Develop and apply effective listening skills and strategies	
A. Purpose for Listening Listen • for enjoyment • for information • for directions • critically to summarize and evaluate communications that inform, persuade and entertain • to evaluate own and others' effectiveness in presentations and group discussions, using provided criteria • to evaluate the validity and reliability of speaker's message	
B. Listening Behavior Use active-listening behaviors (e.g., asks questions of speaker and uses body language and facial expressions to indicate agreement, disagreement or confusion)	
Big Idea 2. Develop and apply effective speaking skills and strategies for various audiences and purposes	
A. Discussion and Presentation In discussions and presentations, • create concise presentations on a variety of topics • incorporate appropriate media or technology • respond to feedback • defend ideas • demonstrate poise and self-control	
B. Giving Directions Give clear and concise multi-step oral directions to perform complex procedures and/or tasks	

*Locally assessed.

= Measured by EXPLORE English and/or Reading tests

TABLE 1A

MISSOURI English I Course Level Expectations	EXPLORE College Readiness Standards
Strand 4: Information Literacy	
Big Idea 1. Develop and apply effective research process skills to gather, analyze and evaluate information	
A. Research Plan Develop an appropriate research plan to guide investigation and research of focus questions	
B. Acquire information Locate and use multiple primary and secondary sources to • select relevant and credible information • evaluate reliability of information • evaluate reliability of sources	
C. Record Information Record relevant information from multiple primary and secondary sources using a self-selected note-taking or organizational strategy	
D. Sources Consulted Document sources of information using a standard citation format	
Big Idea 2. Develop and apply effective skills and strategies to analyze and evaluate oral and visual media	
A. Media Messages Analyze, describe and evaluate the elements of messages projected in various media (e.g., videos, pictures, web-sites, artwork, plays and/or news programs)	

*Locally assessed.

= Measured by EXPLORE English and/or Reading tests

TABLE 1B

MISSOURI English II Course Level Expectations	PLAN Reading College Readiness Standards
Strand 1: Reading	
Big Idea 1. Develop and apply skills and strategies to the reading process	
A. Print Concepts No CLE	
B. Phonemic Awareness No CLE	
C. Phonics Apply decoding strategies to "problem-solve" unknown words when reading when needed*	
D. Fluency Read grade-level instructional text* a. with fluency: accuracy, comprehension and appropriate expression b. adjusting reading rate to difficulty and type of text	**Main Ideas and Author's Approach:** Recognize a clear intent of an author or narrator in uncomplicated literary narratives Identify a clear main idea or purpose of straightforward paragraphs in uncomplicated literary narratives Infer the main idea or purpose of straightforward paragraphs in uncomplicated literary narratives Understand the overall approach taken by an author or narrator (e.g., point of view, kinds of evidence used) in uncomplicated passages Identify a clear main idea or purpose of any paragraph or paragraphs in uncomplicated passages Infer the main idea or purpose of straightforward paragraphs in more challenging passages Summarize basic events and ideas in more challenging passages Understand the overall approach taken by an author or narrator (e.g., point of view, kinds of evidence used) in more challenging passages Infer the main idea or purpose of more challenging passages or their paragraphs **Supporting Details:** Locate basic facts (e.g., names, dates, events) clearly stated in a passage Locate simple details at the sentence and paragraph level in uncomplicated passages Recognize a clear function of a part of an uncomplicated passage Locate important details in uncomplicated passages Make simple inferences about how details are used in passages Locate important details in more challenging passages Locate and interpret minor or subtly stated details in uncomplicated passages Discern which details, though they may appear in different sections throughout a passage, support important points in more challenging passages

*Locally assessed.

= Measured by PLAN English and/or Reading tests

TABLE 1B

MISSOURI English II Course Level Expectations	PLAN Reading College Readiness Standards
Strand 1: Reading	
Big Idea 1. Develop and apply skills and strategies to the reading process	
	Locate and interpret minor or subtly stated details in more challenging passages
	Sequential, Comparative, and Cause-Effect Relationships:
	Determine when (e.g., first, last, before, after) or if an event occurred in uncomplicated passages
	Recognize clear cause-effect relationships described within a single sentence in a passage
	Identify relationships between main characters in uncomplicated literary narratives
	Recognize clear cause-effect relationships within a single paragraph in uncomplicated literary narratives
	Order simple sequences of events in uncomplicated literary narratives
	Identify clear relationships between people, ideas, and so on in uncomplicated passages
	Identify clear cause-effect relationships in uncomplicated passages
	Order sequences of events in uncomplicated passages
	Understand relationships between people, ideas, and so on in uncomplicated passages
	Identify clear relationships between characters, ideas, and so on in more challenging literary narratives
	Understand implied or subtly stated cause-effect relationships in uncomplicated passages
	Identify clear cause-effect relationships in more challenging passages
	Order sequences of events in more challenging passages
	Understand the dynamics between people, ideas, and so on in more challenging passages
	Understand implied or subtly stated cause-effect relationships in more challenging passages
	Meanings of Words:
	Understand the implication of a familiar word or phrase and of simple descriptive language
	Use context to understand basic figurative language
	Use context to determine the appropriate meaning of some figurative and nonfigurative words, phrases, and statements in uncomplicated passages
	Use context to determine the appropriate meaning of virtually any word, phrase, or statement in uncomplicated passages
	Use context to determine the appropriate meaning of some figurative and nonfigurative words, phrases, and statements in more challenging passages

*Locally assessed.

= Measured by PLAN English and/or Reading tests

TABLE 1B

MISSOURI English II Course Level Expectations	PLAN Reading College Readiness Standards
Strand 1: Reading	
Big Idea 1. Develop and apply skills and strategies to the reading process	
	Determine the appropriate meaning of words, phrases, or statements from figurative or somewhat technical contexts **Generalizations and Conclusions:** Draw simple generalizations and conclusions about the main characters in uncomplicated literary narratives Draw simple generalizations and conclusions about people, ideas, and so on in uncomplicated passages Draw generalizations and conclusions about people, ideas, and so on in uncomplicated passages Draw simple generalizations and conclusions using details that support the main points of more challenging passages Draw subtle generalizations and conclusions about characters, ideas, and so on in uncomplicated literary narratives Draw generalizations and conclusions about people, ideas, and so on in more challenging passages Use information from one or more sections of a more challenging passage to draw generalizations and conclusions about people, ideas, and so on
E. Vocabulary Develop vocabulary through text, using a. roots and affixes b. context clues c. glossary, dictionary and thesaurus	**Meanings of Words:** Understand the implication of a familiar word or phrase and of simple descriptive language Use context to understand basic figurative language Use context to determine the appropriate meaning of some figurative and nonfigurative words, phrases, and statements in uncomplicated passages Use context to determine the appropriate meaning of virtually any word, phrase, or statement in uncomplicated passages Use context to determine the appropriate meaning of some figurative and nonfigurative words, phrases, and statements in more challenging passages Determine the appropriate meaning of words, phrases, or statements from figurative or somewhat technical contexts
F. Pre-Reading Apply pre-reading strategies to aid comprehension* a. access prior knowledge b. preview c. predict with text support or rationale d. set a purpose and rate for reading	

*Locally assessed.

= Measured by PLAN English and/or Reading tests

TABLE 1B

MISSOURI English II Course Level Expectations	PLAN Reading College Readiness Standards
Strand 1: Reading	
Big Idea 1. Develop and apply skills and strategies to the reading process	
G. During reading During reading, utilize strategies to* a. determine meaning of unknown words b. self-monitor comprehension c. question the text d. infer e. visualize f. paraphrase g. summarize	**Main Ideas and Author's Approach:** Infer the main idea or purpose of straightforward paragraphs in uncomplicated literary narratives Understand the overall approach taken by an author or narrator (e.g., point of view, kinds of evidence used) in uncomplicated passages Infer the main idea or purpose of straightforward paragraphs in more challenging passages Summarize basic events and ideas in more challenging passages Understand the overall approach taken by an author or narrator (e.g., point of view, kinds of evidence used) in more challenging passages Infer the main idea or purpose of more challenging passages or their paragraphs **Supporting Details:** Make simple inferences about how details are used in passages Locate and interpret minor or subtly stated details in uncomplicated passages Discern which details, though they may appear in different sections throughout a passage, support important points in more challenging passages Locate and interpret minor or subtly stated details in more challenging passages **Sequential, Comparative, and Cause-Effect Relationships:** Determine when (e.g., first, last, before, after) or if an event occurred in uncomplicated passages Order simple sequences of events in uncomplicated literary narratives Order sequences of events in uncomplicated passages Understand relationships between people, ideas, and so on in uncomplicated passages Understand implied or subtly stated cause-effect relationships in uncomplicated passages Identify clear cause-effect relationships in more challenging passages Order sequences of events in more challenging passages Understand the dynamics between people, ideas, and so on in more challenging passages Understand implied or subtly stated cause-effect relationships in more challenging passages **Meanings of Words:** Understand the implication of a familiar word or phrase and of simple descriptive language

*Locally assessed.

= Measured by PLAN English and/or Reading tests

TABLE 1B

MISSOURI English II Course Level Expectations	PLAN Reading College Readiness Standards
Strand 1: Reading	
Big Idea 1. Develop and apply skills and strategies to the reading process	
	Use context to understand basic figurative language Use context to determine the appropriate meaning of some figurative and nonfigurative words, phrases, and statements in uncomplicated passages Use context to determine the appropriate meaning of virtually any word, phrase, or statement in uncomplicated passages Use context to determine the appropriate meaning of some figurative and nonfigurative words, phrases, and statements in more challenging passages Determine the appropriate meaning of words, phrases, or statements from figurative or somewhat technical contexts **Generalizations and Conclusions:** Draw simple generalizations and conclusions about the main characters in uncomplicated literary narratives Draw simple generalizations and conclusions about people, ideas, and so on in uncomplicated passages Draw generalizations and conclusions about people, ideas, and so on in uncomplicated passages Draw simple generalizations and conclusions using details that support the main points of more challenging passages Draw subtle generalizations and conclusions about characters, ideas, and so on in uncomplicated literary narratives Draw generalizations and conclusions about people, ideas, and so on in more challenging passages Use information from one or more sections of a more challenging passage to draw generalizations and conclusions about people, ideas, and so on
H. Post-Reading Apply post-reading skills to comprehend, interpret, analyze, and evaluate text: a. identify and explain the relationship between the main idea and supporting details b. question to clarify* c. reflect d. draw conclusions e. paraphrase f. summarize	**Main Ideas and Author's Approach:** Recognize a clear intent of an author or narrator in uncomplicated literary narratives Identify a clear main idea or purpose of straightforward paragraphs in uncomplicated literary narratives Infer the main idea or purpose of straightforward paragraphs in uncomplicated literary narratives Understand the overall approach taken by an author or narrator (e.g., point of view, kinds of evidence used) in uncomplicated passages Identify a clear main idea or purpose of any paragraph or paragraphs in uncomplicated passages Infer the main idea or purpose of straightforward paragraphs in more challenging passages Summarize basic events and ideas in more challenging passages Understand the overall approach taken by an author or narrator (e.g., point of view, kinds of evidence used) in more

*Locally assessed.

= Measured by PLAN English and/or Reading tests

TABLE 1B

MISSOURI English II Course Level Expectations	PLAN Reading College Readiness Standards
Strand 1: Reading	
Big Idea 1. Develop and apply skills and strategies to the reading process	
	challenging passages Infer the main idea or purpose of more challenging passages or their paragraphs **Supporting Details:** Locate basic facts (e.g., names, dates, events) clearly stated in a passage Locate simple details at the sentence and paragraph level in uncomplicated passages Recognize a clear function of a part of an uncomplicated passage Locate important details in uncomplicated passages Make simple inferences about how details are used in passages Locate important details in more challenging passages Locate and interpret minor or subtly stated details in uncomplicated passages Discern which details, though they may appear in different sections throughout a passage, support important points in more challenging passages Locate and interpret minor or subtly stated details in more challenging passages **Meanings of Words:** Understand the implication of a familiar word or phrase and of simple descriptive language Use context to understand basic figurative language Use context to determine the appropriate meaning of some figurative and nonfigurative words, phrases, and statements in uncomplicated passages Use context to determine the appropriate meaning of virtually any word, phrase, or statement in uncomplicated passages Use context to determine the appropriate meaning of some figurative and nonfigurative words, phrases, and statements in more challenging passages Determine the appropriate meaning of words, phrases, or statements from figurative or somewhat technical contexts **Generalizations and Conclusions:** Draw simple generalizations and conclusions about the main characters in uncomplicated literary narratives Draw simple generalizations and conclusions about people, ideas, and so on in uncomplicated passages Draw generalizations and conclusions about people, ideas, and so on in uncomplicated passages Draw simple generalizations and conclusions using details that support the main points of more challenging passages Draw subtle generalizations and conclusions about charac-

*Locally assessed.

TABLE 1B

MISSOURI English II Course Level Expectations	PLAN Reading College Readiness Standards
Strand 1: Reading	
Big Idea 1. Develop and apply skills and strategies to the reading process	
	ters, ideas, and so on in uncomplicated literary narratives Draw generalizations and conclusions about people, ideas, and so on in more challenging passages Use information from one or more sections of a more challenging passage to draw generalizations and conclusions about people, ideas, and so on
I. **Making Connections** Compare, contrast, analyze and evaluate connections: a. text to text (information and relationships in various fiction and non-fiction works) b. text to self (text ideas and own experiences)* c. text to world (text ideas and the world by analyzing and evaluating the relationship between literature and its historical period and culture)*	

*Locally assessed.

= Measured by PLAN English and/or Reading tests

TABLE 1B

MISSOURI English II Course Level Expectations	PLAN Reading College Readiness Standards
Strand 1: Reading	
Big Idea 2. Develop and apply skills and strategies to comprehend, analyze and evaluate fiction, poetry and drama from a variety of cultures and times	
A. Text Features Analyze and evaluate the text features in grade-level text	
B. Literary Techniques Identify and explain literary techniques, in text emphasizing a. understatement b. parallelism c. allusion d. analogy e. analyze and evaluate literary techniques previously introduced	**Main Ideas and Author's Approach:** Recognize a clear intent of an author or narrator in uncomplicated literary narratives Identify a clear main idea or purpose of straightforward paragraphs in uncomplicated literary narratives Infer the main idea or purpose of straightforward paragraphs in uncomplicated literary narratives Understand the overall approach taken by an author or narrator (e.g., point of view, kinds of evidence used) in uncomplicated passages Identify a clear main idea or purpose of any paragraph or paragraphs in uncomplicated passages Infer the main idea or purpose of straightforward paragraphs in more challenging passages Summarize basic events and ideas in more challenging passages Understand the overall approach taken by an author or narrator (e.g., point of view, kinds of evidence used) in more challenging passages Infer the main idea or purpose of more challenging passages or their paragraphs **Supporting Details:** Locate basic facts (e.g., names, dates, events) clearly stated in a passage Locate simple details at the sentence and paragraph level in uncomplicated passages Recognize a clear function of a part of an uncomplicated passage Locate important details in uncomplicated passages Make simple inferences about how details are used in passages Locate important details in more challenging passages Locate and interpret minor or subtly stated details in uncomplicated passages Discern which details, though they may appear in different sections throughout a passage, support important points in more challenging passages Locate and interpret minor or subtly stated details in more challenging passages **Sequential, Comparative, and Cause-Effect Relationships:** Determine when (e.g., first, last, before, after) or if an event

*Locally assessed.

= Measured by PLAN English and/or Reading tests

TABLE 1B

MISSOURI English II Course Level Expectations	PLAN Reading College Readiness Standards
Strand 1: Reading	
Big Idea 2. Develop and apply skills and strategies to comprehend, analyze and evaluate fiction, poetry and drama from a variety of cultures and times	
	occurred in uncomplicated passages Recognize clear cause-effect relationships described within a single sentence in a passage Identify relationships between main characters in uncomplicated literary narratives Recognize clear cause-effect relationships within a single paragraph in uncomplicated literary narratives Order simple sequences of events in uncomplicated literary narratives Identify clear relationships between people, ideas, and so on in uncomplicated passages Identify clear cause-effect relationships in uncomplicated passages Order sequences of events in uncomplicated passages Understand relationships between people, ideas, and so on in uncomplicated passages Identify clear relationships between characters, ideas, and so on in more challenging literary narratives Understand implied or subtly stated cause-effect relationships in uncomplicated passages Identify clear cause-effect relationships in more challenging passages Order sequences of events in more challenging passages Understand the dynamics between people, ideas, and so on in more challenging passages Understand implied or subtly stated cause-effect relationships in more challenging passages **Meanings of Words:** Understand the implication of a familiar word or phrase and of simple descriptive language Use context to understand basic figurative language Use context to determine the appropriate meaning of some figurative and nonfigurative words, phrases, and statements in uncomplicated passages Use context to determine the appropriate meaning of virtually any word, phrase, or statement in uncomplicated passages Use context to determine the appropriate meaning of some figurative and nonfigurative words, phrases, and statements in more challenging passages Determine the appropriate meaning of words, phrases, or statements from figurative or somewhat technical contexts **Generalizations and Conclusions:** Draw simple generalizations and conclusions about the main characters in uncomplicated literary narratives

*Locally assessed.

= Measured by PLAN English and/or Reading tests

TABLE 1B

MISSOURI English II Course Level Expectations	PLAN Reading College Readiness Standards
Strand 1: Reading	
Big Idea 2. Develop and apply skills and strategies to comprehend, analyze and evaluate fiction, poetry and drama from a variety of cultures and times	
	Draw simple generalizations and conclusions about people, ideas, and so on in uncomplicated passages Draw generalizations and conclusions about people, ideas, and so on in uncomplicated passages Draw simple generalizations and conclusions using details that support the main points of more challenging passages Draw subtle generalizations and conclusions about characters, ideas, and so on in uncomplicated literary narratives Draw generalizations and conclusions about people, ideas, and so on in more challenging passages Use information from one or more sections of a more challenging passage to draw generalizations and conclusions about people, ideas, and so on
C. Literary Elements Use details from text(s) to a. demonstrate comprehension skills previously introduced b. analyze character, plot, setting, point of view c. analyze the development of a theme across genres d. identify and analyze tone	**Supporting Details:** Recognize a clear function of a part of an uncomplicated passage Make simple inferences about how details are used in passages Discern which details, though they may appear in different sections throughout a passage, support important points in more challenging passages

*Locally assessed.

= Measured by PLAN English and/or Reading tests

TABLE 1B

MISSOURI English II Course Level Expectations	PLAN Reading College Readiness Standards
Strand 1: Reading	
Big Idea 3. Develop and apply skills and strategies to comprehend, analyze and evaluate nonfiction (such as biographies, newspapers, technical manuals) from a variety of cultures and times	
A. Text Features Explain, analyze and evaluate the author's use of text features to clarify meaning	
B. Literary Techniques Identify, explain, and analyze literary techniques in non-fiction, emphasizing a. understatement b. parallelism c. allusion d. analogy e. figurative language and sound devices previously introduced	**Main Ideas and Author's Approach:** Recognize a clear intent of an author or narrator in uncomplicated literary narratives Identify a clear main idea or purpose of straightforward paragraphs in uncomplicated literary narratives Infer the main idea or purpose of straightforward paragraphs in uncomplicated literary narratives Understand the overall approach taken by an author or narrator (e.g., point of view, kinds of evidence used) in uncomplicated passages Identify a clear main idea or purpose of any paragraph or paragraphs in uncomplicated passages Infer the main idea or purpose of straightforward paragraphs in more challenging passages Summarize basic events and ideas in more challenging passages Understand the overall approach taken by an author or narrator (e.g., point of view, kinds of evidence used) in more challenging passages Infer the main idea or purpose of more challenging passages or their paragraphs **Supporting Details:** Locate basic facts (e.g., names, dates, events) clearly stated in a passage Locate simple details at the sentence and paragraph level in uncomplicated passages Recognize a clear function of a part of an uncomplicated passage Locate important details in uncomplicated passages Make simple inferences about how details are used in passages Locate important details in more challenging passages Locate and interpret minor or subtly stated details in uncomplicated passages Discern which details, though they may appear in different sections throughout a passage, support important points in more challenging passages Locate and interpret minor or subtly stated details in more challenging passages

*Locally assessed.

= Measured by PLAN English and/or Reading tests

TABLE 1B

MISSOURI English II Course Level Expectations	PLAN Reading College Readiness Standards
Strand 1: Reading	
Big Idea 3. Develop and apply skills and strategies to comprehend, analyze and evaluate nonfiction (such as biographies, newspapers, technical manuals) from a variety of cultures and times	
	Sequential, Comparative, and Cause-Effect Relationships: Determine when (e.g., first, last, before, after) or if an event occurred in uncomplicated passages Recognize clear cause-effect relationships described within a single sentence in a passage Identify relationships between main characters in uncomplicated literary narratives Recognize clear cause-effect relationships within a single paragraph in uncomplicated literary narratives Order simple sequences of events in uncomplicated literary narratives Identify clear relationships between people, ideas, and so on in uncomplicated passages Identify clear cause-effect relationships in uncomplicated passages Order sequences of events in uncomplicated passages Understand relationships between people, ideas, and so on in uncomplicated passages Identify clear relationships between characters, ideas, and so on in more challenging literary narratives Understand implied or subtly stated cause-effect relationships in uncomplicated passages Identify clear cause-effect relationships in more challenging passages Order sequences of events in more challenging passages Understand the dynamics between people, ideas, and so on in more challenging passages Understand implied or subtly stated cause-effect relationships in more challenging passages **Meanings of Words:** Understand the implication of a familiar word or phrase and of simple descriptive language Use context to understand basic figurative language Use context to determine the appropriate meaning of some figurative and nonfigurative words, phrases, and statements in uncomplicated passages Use context to determine the appropriate meaning of virtually any word, phrase, or statement in uncomplicated passages Use context to determine the appropriate meaning of some figurative and nonfigurative words, phrases, and statements in more challenging passages

*Locally assessed.

= Measured by PLAN English and/or Reading tests

TABLE 1B

MISSOURI English II Course Level Expectations	PLAN Reading College Readiness Standards
Strand 1: Reading	
Big Idea 3. Develop and apply skills and strategies to comprehend, analyze and evaluate nonfiction (such as biographies, newspapers, technical manuals) from a variety of cultures and times	
	Determine the appropriate meaning of words, phrases, or statements from figurative or somewhat technical contexts **Generalizations and Conclusions:** Draw simple generalizations and conclusions about the main characters in uncomplicated literary narratives Draw simple generalizations and conclusions about people, ideas, and so on in uncomplicated passages Draw generalizations and conclusions about people, ideas, and so on in uncomplicated passages Draw simple generalizations and conclusions using details that support the main points of more challenging passages Draw subtle generalizations and conclusions about characters, ideas, and so on in uncomplicated literary narratives Draw generalizations and conclusions about people, ideas, and so on in more challenging passages Use information from one or more sections of a more challenging passage to draw generalizations and conclusions about people, ideas, and so on
C. Text Structures Use details from informational text to a. analyze and evaluate the organizational patterns b. identify and analyze faulty reasoning and unfounded inferences c. evaluate proposed solutions d. evaluate for accuracy and adequacy of evidence e. evaluate effect of tone on the overall meaning of work f. analyze and evaluate point of view g. analyze and evaluate author's viewpoint/perspective h. demonstrate comprehension skills previously introduced	**Main Ideas and Author's Approach:** Understand the overall approach taken by an author or narrator (e.g., point of view, kinds of evidence used) in uncomplicated passages Understand the overall approach taken by an author or narrator (e.g., point of view, kinds of evidence used) in more challenging passages **Supporting Details:** Recognize a clear function of a part of an uncomplicated passage Make simple inferences about how details are used in passages Discern which details, though they may appear in different sections throughout a passage, support important points in more challenging passages **Generalizations and Conclusions:** Draw simple generalizations and conclusions about people, ideas, and so on in uncomplicated passages Draw generalizations and conclusions about people, ideas, and so on in uncomplicated passages Draw simple generalizations and conclusions using details that support the main points of more challenging passages Draw generalizations and conclusions about people, ideas, and so on in more challenging passages Use information from one or more sections of a more challenging passage to draw generalizations and

*Locally assessed.

= Measured by PLAN English and/or Reading tests

TABLE 1B

MISSOURI English II Course Level Expectations	PLAN Reading College Readiness Standards
Strand 1: Reading	
Big Idea 3. Develop and apply skills and strategies to comprehend, analyze and evaluate nonfiction (such as biographies, newspapers, technical manuals) from a variety of cultures and times	
	conclusions about people, ideas, and so on
D. Understanding Directions Read and apply multi-step directions to perform complex procedures and/or tasks*	

*Locally assessed.

= Measured by PLAN English and/or Reading tests

TABLE 1B

MISSOURI English II Course Level Expectations	PLAN English College Readiness Standards
Strand 2: Writing	
Big Idea 1. Apply a writing process in composing text	
A. Writing Process Follow a writing process to a. use appropriate prewriting strategies as needed b. generate a draft c. revise in response to feedback (peer and/or teacher)* d. edit for conventions* e. share writing*	**Topic Development in Terms of Purpose and Focus:** Identify the basic purpose or role of a specified phrase or sentence Delete a clause or sentence because it is obviously irrelevant to the essay Identify the central idea or main topic of a straightforward piece of writing Determine relevancy when presented with a variety of sentence-level details Identify the focus of a simple essay, applying that knowledge to add a sentence that sharpens that focus or to determine if an essay has met a specified goal Delete material primarily because it disturbs the flow and development of the paragraph Add a sentence to accomplish a fairly straightforward purpose such as illustrating a given statement Apply an awareness of the focus and purpose of a fairly involved essay to determine the rhetorical effect and suitability of an existing phrase or sentence, or to determine the need to delete plausible but irrelevant material Add a sentence to accomplish a subtle rhetorical purpose such as to emphasize, to add supporting detail, or to express meaning through connotation **Organization, Unity, and Coherence:** Use conjunctive adverbs or phrases to show time relationships in simple narrative essays (e.g., *then*, *this time*) Select the most logical place to add a sentence in a paragraph Use conjunctive adverbs or phrases to express straightforward logical relationships (e.g., *first*, *afterward*, *in response*) Decide the most logical place to add a sentence in an essay Add a sentence that introduces a simple paragraph Determine the need for conjunctive adverbs or phrases to create subtle logical connections between sentences (e.g., *therefore*, *however*, *in addition*) Rearrange the sentences in a fairly uncomplicated paragraph for the sake of logic Add a sentence to introduce or conclude the essay or to provide a transition between paragraphs when the essay is fairly straightforward **Word Choice in Terms of Style, Tone, Clarity, and Economy:** Revise sentences to correct awkward and confusing arrangements of sentence elements Revise vague nouns and pronouns that create obvious logic problems

*Locally assessed.

= Measured by PLAN English and/or Reading tests

TABLE 1B

MISSOURI English II Course Level Expectations	PLAN English College Readiness Standards
Strand 2: Writing	
Big Idea 1. Apply a writing process in composing text	
	Delete obviously synonymous and wordy material in a sentence Revise expressions that deviate from the style of an essay Delete redundant material when information is repeated in different parts of speech (e.g., “alarmingly startled”) Use the word or phrase most consistent with the style and tone of a fairly straightforward essay Determine the clearest and most logical conjunction to link clauses Revise a phrase that is redundant in terms of the meaning and logic of the entire sentence Identify and correct ambiguous pronoun references Use the word or phrase most appropriate in terms of the content of the sentence and tone of the essay **Sentence Structure and Formation:** Use conjunctions or punctuation to join simple clauses Revise shifts in verb tense between simple clauses in a sentence or between simple adjoining sentences Determine the need for punctuation and conjunctions to avoid awkward-sounding sentence fragments and fused sentences Decide the appropriate verb tense and voice by considering the meaning of the entire sentence Recognize and correct marked disturbances of sentence flow and structure (e.g., participial phrase fragments, missing or incorrect relative pronouns, dangling or misplaced modifiers) Revise to avoid faulty placement of phrases and faulty coordination and subordination of clauses in sentences with subtle structural problems Maintain consistent verb tense and pronoun person on the basis of the preceding clause or sentence Use sentence-combining techniques, effectively avoiding problematic comma splices, run-on sentences, and sentence fragments, especially in sentences containing compound subjects or verbs Maintain a consistent and logical use of verb tense and pronoun person on the basis of information in the paragraph or essay as a whole **Conventions of Usage:** Solve such basic grammatical problems as how to form the past and past participle of irregular but commonly used verbs and how to form comparative and superlative adjectives Solve such grammatical problems as whether to use an adverb or adjective form, how to ensure straightforward subject-verb and pronoun-antecedent agreement, and which preposition to use in simple contexts

*Locally assessed.

 = Measured by PLAN English and/or Reading tests

TABLE 1B

MISSOURI English II Course Level Expectations	PLAN English College Readiness Standards
Strand 2: Writing	
Big Idea 1. Apply a writing process in composing text	
	Recognize and use the appropriate word in frequently confused pairs such as *there* and *their*, *past* and *passed*, and *led* and *lead* Use idiomatically appropriate prepositions, especially in combination with verbs (e.g., *long for*, *appeal to*) Ensure that a verb agrees with its subject when there is some text between the two Ensure that a pronoun agrees with its antecedent when the two occur in separate clauses or sentences Identify the correct past and past participle forms of irregular and infrequently used verbs and form present-perfect verbs by using *have* rather than *of* Correctly use reflexive pronouns, the possessive pronouns *its* and *your*, and the relative pronouns *who* and *whom* Ensure that a verb agrees with its subject in unusual situations (e.g., when the subject-verb order is inverted or when the subject is an indefinite pronoun) **Conventions of Punctuation:** Delete commas that create basic sense problems (e.g., between verb and direct object) Provide appropriate punctuation in straightforward situations (e.g., items in a series) Delete commas that disturb the sentence flow (e.g., between modifier and modified element) Use commas to set off simple parenthetical phrases Delete unnecessary commas when an incorrect reading of the sentence suggests a pause that should be punctuated (e.g., between verb and direct object clause) Use punctuation to set off complex parenthetical phrases Recognize and delete unnecessary commas based on a careful reading of a complicated sentence (e.g., between the elements of a compound subject or compound verb joined by *and*) Use apostrophes to indicate simple possessive nouns Recognize inappropriate uses of colons and semicolons Use commas to set off a nonessential/nonrestrictive appositive or clause

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TABLE 1B

MISSOURI English II Course Level Expectations	PLAN English College Readiness Standards
Strand 2: Writing	
Big Idea 2. Compose well-developed text	
A. Audience and purpose Compose text a. showing awareness of audience b. choosing a form and point of view appropriate to purpose and audience	
B. Ideas and Content Compose text with: a. strong controlling idea b. relevant specific details c. complex ideas d. freshness of thought	**Topic Development in Terms of Purpose and Focus:** Identify the basic purpose or role of a specified phrase or sentence Delete a clause or sentence because it is obviously irrelevant to the essay Identify the central idea or main topic of a straightforward piece of writing Determine relevancy when presented with a variety of sentence-level details Identify the focus of a simple essay, applying that knowledge to add a sentence that sharpens that focus or to determine if an essay has met a specified goal Delete material primarily because it disturbs the flow and development of the paragraph Add a sentence to accomplish a fairly straightforward purpose such as illustrating a given statement Apply an awareness of the focus and purpose of a fairly involved essay to determine the rhetorical effect and suitability of an existing phrase or sentence, or to determine the need to delete plausible but irrelevant material Add a sentence to accomplish a subtle rhetorical purpose such as to emphasize, to add supporting detail, or to express meaning through connotation
C. Organization and Sentence Structure Compose text with a. effective beginning, middle, and end b. a logical order c. effective paragraphing d. cohesive devices e. varied sentence structure f. clarity of expression g. active voice	**Organization, Unity, and Coherence:** Use conjunctive adverbs or phrases to show time relationships in simple narrative essays (e.g., *then*, *this time*) Select the most logical place to add a sentence in a paragraph Use conjunctive adverbs or phrases to express straightforward logical relationships (e.g., *first*, *afterward*, *in response*) Decide the most logical place to add a sentence in an essay Add a sentence that introduces a simple paragraph Determine the need for conjunctive adverbs or phrases to create subtle logical connections between sentences (e.g., *therefore*, *however*, *in addition*) Rearrange the sentences in a fairly uncomplicated paragraph for the sake of logic Add a sentence to introduce or conclude the essay or to provide a transition between paragraphs when the essay is fairly straightforward

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TABLE 1B

MISSOURI English II Course Level Expectations	PLAN English College Readiness Standards
Strand 2: Writing	
Big Idea 2. Compose well-developed text	
	Word Choice in Terms of Style, Tone, Clarity, and Economy: Revise sentences to correct awkward and confusing arrangements of sentence elements Revise expressions that deviate from the style of an essay Use the word or phrase most consistent with the style and tone of a fairly straightforward essay Use the word or phrase most appropriate in terms of the content of the sentence and tone of the essay **Sentence Structure and Formation:** Decide the appropriate verb tense and voice by considering the meaning of the entire sentence
D. Word Choice Compose text using a. precise and vivid language b. writing techniques such as imagery, humor, voice, and figurative language	**Topic Development in Terms of Purpose and Focus:** Identify the basic purpose or role of a specified phrase or sentence Apply an awareness of the focus and purpose of a fairly involved essay to determine the rhetorical effect and suitability of an existing phrase or sentence, or to determine the need to delete plausible but irrelevant material **Word Choice in Terms of Style, Tone, Clarity, and Economy:** Revise vague nouns and pronouns that create obvious logic problems Revise expressions that deviate from the style of an essay Use the word or phrase most consistent with the style and tone of a fairly straightforward essay Determine the clearest and most logical conjunction to link clauses Identify and correct ambiguous pronoun references Use the word or phrase most appropriate in terms of the content of the sentence and tone of the essay
E. Conventions In written text apply a. conventions of capitalization b. conventions of punctuation c. standard usage	**Conventions of Usage:** Solve such basic grammatical problems as how to form the past and past participle of irregular but commonly used verbs and how to form comparative and superlative adjectives Solve such grammatical problems as whether to use an adverb or adjective form, how to ensure straightforward subject-verb and pronoun-antecedent agreement, and which preposition to use in simple contexts Recognize and use the appropriate word in frequently confused pairs such as *there* and *their*, *past* and *passed*, and *led* and *lead* Use idiomatically appropriate prepositions, especially in combination with verbs (e.g., *long for*, *appeal to*) Ensure that a verb agrees with its subject when there is some text between the two

*Locally assessed.

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TABLE 1B

MISSOURI English II Course Level Expectations	PLAN English College Readiness Standards
Strand 2: Writing	
Big Idea 2. Compose well-developed text	
	Ensure that a pronoun agrees with its antecedent when the two occur in separate clauses or sentences Identify the correct past and past participle forms of irregular and infrequently used verbs and form present-perfect verbs by using *have* rather than *of* Correctly use reflexive pronouns, the possessive pronouns *its* and *your*, and the relative pronouns *who* and *whom* Ensure that a verb agrees with its subject in unusual situations (e.g., when the subject-verb order is inverted or when the subject is an indefinite pronoun) **Conventions of Punctuation:** Delete commas that create basic sense problems (e.g., between verb and direct object) Provide appropriate punctuation in straightforward situations (e.g., items in a series) Delete commas that disturb the sentence flow (e.g., between modifier and modified element) Use commas to set off simple parenthetical phrases Delete unnecessary commas when an incorrect reading of the sentence suggests a pause that should be punctuated (e.g., between verb and direct object clause) Use punctuation to set off complex parenthetical phrases Recognize and delete unnecessary commas based on a careful reading of a complicated sentence (e.g., between the elements of a compound subject or compound verb joined by *and*) Use apostrophes to indicate simple possessive nouns Recognize inappropriate uses of colons and semicolons Use commas to set off a nonessential/nonrestrictive appositive or clause

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TABLE 1B

MISSOURI English II Course Level Expectations	PLAN English College Readiness Standards
Strand 2: Writing	
Big Idea 3. Write effectively in various forms and types of writing	
A. Forms/Types/Modes of Writing Compose a variety of texts, a. using narrative, descriptive, expository, and/or persuasive features b. in various formats, including workplace communication c. including summary d. including literary analysis e. including reflective writing	**Topic Development in Terms of Purpose and Focus:** Identify the basic purpose or role of a specified phrase or sentence Delete a clause or sentence because it is obviously irrelevant to the essay Identify the central idea or main topic of a straightforward piece of writing Determine relevancy when presented with a variety of sentence-level details Identify the focus of a simple essay, applying that knowledge to add a sentence that sharpens that focus or to determine if an essay has met a specified goal Delete material primarily because it disturbs the flow and development of the paragraph Add a sentence to accomplish a fairly straightforward purpose such as illustrating a given statement Apply an awareness of the focus and purpose of a fairly involved essay to determine the rhetorical effect and suitability of an existing phrase or sentence, or to determine the need to delete plausible but irrelevant material Add a sentence to accomplish a subtle rhetorical purpose such as to emphasize, to add supporting detail, or to express meaning through connotation **Organization, Unity, and Coherence:** Use conjunctive adverbs or phrases to show time relationships in simple narrative essays (e.g., *then*, *this time*) Select the most logical place to add a sentence in a paragraph Use conjunctive adverbs or phrases to express straightforward logical relationships (e.g., *first*, *afterward*, *in response*) Decide the most logical place to add a sentence in an essay Add a sentence that introduces a simple paragraph Determine the need for conjunctive adverbs or phrases to create subtle logical connections between sentences (e.g., *therefore*, *however*, *in addition*) Rearrange the sentences in a fairly uncomplicated paragraph for the sake of logic Add a sentence to introduce or conclude the essay or to provide a transition between paragraphs when the essay is fairly straightforward **Word Choice in Terms of Style, Tone, Clarity, and Economy:** Revise sentences to correct awkward and confusing arrangements of sentence elements Revise vague nouns and pronouns that create obvious logic

*Locally assessed.

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TABLE 1B

MISSOURI English II Course Level Expectations	PLAN English College Readiness Standards
Strand 2: Writing	
Big Idea 3. Write effectively in various forms and types of writing	
	problems Delete obviously synonymous and wordy material in a sentence Revise expressions that deviate from the style of an essay Delete redundant material when information is repeated in different parts of speech (e.g., “alarmingly startled”) Use the word or phrase most consistent with the style and tone of a fairly straightforward essay Determine the clearest and most logical conjunction to link clauses Revise a phrase that is redundant in terms of the meaning and logic of the entire sentence Identify and correct ambiguous pronoun references Use the word or phrase most appropriate in terms of the content of the sentence and tone of the essay **Sentence Structure and Formation:** Use conjunctions or punctuation to join simple clauses Revise shifts in verb tense between simple clauses in a sentence or between simple adjoining sentences Determine the need for punctuation and conjunctions to avoid awkward-sounding sentence fragments and fused sentences Decide the appropriate verb tense and voice by considering the meaning of the entire sentence Recognize and correct marked disturbances of sentence flow and structure (e.g., participial phrase fragments, missing or incorrect relative pronouns, dangling or misplaced modifiers) Revise to avoid faulty placement of phrases and faulty coordination and subordination of clauses in sentences with subtle structural problems Maintain consistent verb tense and pronoun person on the basis of the preceding clause or sentence Use sentence-combining techniques, effectively avoiding problematic comma splices, run-on sentences, and sentence fragments, especially in sentences containing compound subjects or verbs Maintain a consistent and logical use of verb tense and pronoun person on the basis of information in the paragraph or essay as a whole **Conventions of Usage:** Solve such basic grammatical problems as how to form the past and past participle of irregular but commonly used verbs and how to form comparative and superlative adjectives Solve such grammatical problems as whether to use an adverb or adjective form, how to ensure straightforward subject-verb and pronoun-antecedent agreement, and which

*Locally assessed.

TABLE 1B

MISSOURI English II Course Level Expectations	PLAN English College Readiness Standards
Strand 2: Writing	
Big Idea 3. Write effectively in various forms and types of writing	
	preposition to use in simple contexts Recognize and use the appropriate word in frequently confused pairs such as *there* and *their*, *past* and *passed*, and *led* and *lead* Use idiomatically appropriate prepositions, especially in combination with verbs (e.g., *long for*, *appeal to*) Ensure that a verb agrees with its subject when there is some text between the two Ensure that a pronoun agrees with its antecedent when the two occur in separate clauses or sentences Identify the correct past and past participle forms of irregular and infrequently used verbs and form present-perfect verbs by using *have* rather than *of* Correctly use reflexive pronouns, the possessive pronouns *its* and *your*, and the relative pronouns *who* and *whom* Ensure that a verb agrees with its subject in unusual situations (e.g., when the subject-verb order is inverted or when the subject is an indefinite pronoun) **Conventions of Punctuation:** Delete commas that create basic sense problems (e.g., between verb and direct object) Provide appropriate punctuation in straightforward situations (e.g., items in a series) Delete commas that disturb the sentence flow (e.g., between modifier and modified element) Use commas to set off simple parenthetical phrases Delete unnecessary commas when an incorrect reading of the sentence suggests a pause that should be punctuated (e.g., between verb and direct object clause) Use punctuation to set off complex parenthetical phrases Recognize and delete unnecessary commas based on a careful reading of a complicated sentence (e.g., between the elements of a compound subject or compound verb joined by *and*) Use apostrophes to indicate simple possessive nouns Recognize inappropriate uses of colons and semicolons Use commas to set off a nonessential/nonrestrictive appositive or clause

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TABLE 1B

MISSOURI English II Course Level Expectations	PLAN College Readiness Standards
Strand 3: Listening and Speaking	
Big Idea 1. Develop and apply effective listening skills and strategies	
A. Purpose for Listening Listen • for enjoyment • for information • for directions • critically to summarize and evaluate communications that inform, persuade and entertain • to evaluate own and others' effectiveness in presentations and group discussions, using provided criteria • to evaluate the validity and reliability of speaker's message	
B. Listening Behavior Use active-listening behaviors (e.g., asks questions of speaker and uses body language and facial expressions to indicate agreement, disagreement or confusion)	
Big Idea 2. Develop and apply effective speaking skills and strategies for various audiences and purposes	
A. Discussion and Presentation In discussions and presentations, • create concise presentations on a variety of topics • incorporate appropriate media or technology • respond to feedback • defend ideas • demonstrate poise and self-control	
B. Giving Directions Give clear and concise multi-step oral directions to perform complex procedures and/or tasks	

*Locally assessed.

= Measured by PLAN English and/or Reading tests

TABLE 1B

MISSOURI English II Course Level Expectations	PLAN College Readiness Standards
Strand 4: Information Literacy	
Big Idea 1. Develop and apply effective research process skills to gather, analyze and evaluate information	
A. Research Plan Develop an appropriate research plan to guide investigation and research of focus questions	
B. Acquire information Locate and use multiple primary and secondary sources to • select relevant and credible information • evaluate reliability of information • evaluate reliability of sources	
C. Record Information Record relevant information from multiple primary and secondary sources using a self-selected note-taking or organizational strategy	
D. Sources Consulted Document sources of information using a standard citation format	
Big Idea 2. Develop and apply effective skills and strategies to analyze and evaluate oral and visual media	
A. Media Messages Analyze, describe and evaluate the elements of messages projected in various media (e.g., videos, pictures, web-sites, artwork, plays and/or news programs)	

*Locally assessed.

= Measured by PLAN English and/or Reading tests

TABLE 1C

MISSOURI English III Course Level Expectations	PLAN Reading College Readiness Standards
Strand 1: Reading	
Big Idea 1. Develop and apply skills and strategies to the reading process	
A. Print Concepts No CLE	
B. Phonemic Awareness No CLE	
C. Phonics Apply decoding strategies to "problem-solve" unknown words when reading when needed*	
D. Fluency Read grade-level instructional text* a. with fluency: accuracy, comprehension and appropriate expression b. adjusting reading rate to difficulty and type of text	**Main Ideas and Author's Approach:** Recognize a clear intent of an author or narrator in uncomplicated literary narratives Identify a clear main idea or purpose of straightforward paragraphs in uncomplicated literary narratives Infer the main idea or purpose of straightforward paragraphs in uncomplicated literary narratives Understand the overall approach taken by an author or narrator (e.g., point of view, kinds of evidence used) in uncomplicated passages Identify a clear main idea or purpose of any paragraph or paragraphs in uncomplicated passages Infer the main idea or purpose of straightforward paragraphs in more challenging passages Summarize basic events and ideas in more challenging passages Understand the overall approach taken by an author or narrator (e.g., point of view, kinds of evidence used) in more challenging passages Infer the main idea or purpose of more challenging passages or their paragraphs **Supporting Details:** Locate basic facts (e.g., names, dates, events) clearly stated in a passage Locate simple details at the sentence and paragraph level in uncomplicated passages Recognize a clear function of a part of an uncomplicated passage Locate important details in uncomplicated passages Make simple inferences about how details are used in passages Locate important details in more challenging passages Locate and interpret minor or subtly stated details in uncomplicated passages Discern which details, though they may appear in different sections throughout a passage, support important points in more challenging passages

*Locally assessed.

= Measured by PLAN English and/or Reading tests

TABLE 1C

MISSOURI English III Course Level Expectations	PLAN Reading College Readiness Standards
Strand 1: Reading	
Big Idea 1. Develop and apply skills and strategies to the reading process	
	Locate and interpret minor or subtly stated details in more challenging passages
	Sequential, Comparative, and Cause-Effect Relationships:
	Determine when (e.g., first, last, before, after) or if an event occurred in uncomplicated passages
	Recognize clear cause-effect relationships described within a single sentence in a passage
	Identify relationships between main characters in uncomplicated literary narratives
	Recognize clear cause-effect relationships within a single paragraph in uncomplicated literary narratives
	Order simple sequences of events in uncomplicated literary narratives
	Identify clear relationships between people, ideas, and so on in uncomplicated passages
	Identify clear cause-effect relationships in uncomplicated passages
	Order sequences of events in uncomplicated passages
	Understand relationships between people, ideas, and so on in uncomplicated passages
	Identify clear relationships between characters, ideas, and so on in more challenging literary narratives
	Understand implied or subtly stated cause-effect relationships in uncomplicated passages
	Identify clear cause-effect relationships in more challenging passages
	Order sequences of events in more challenging passages
	Understand the dynamics between people, ideas, and so on in more challenging passages
	Understand implied or subtly stated cause-effect relationships in more challenging passages
	Meanings of Words:
	Understand the implication of a familiar word or phrase and of simple descriptive language
	Use context to understand basic figurative language
	Use context to determine the appropriate meaning of some figurative and nonfigurative words, phrases, and statements in uncomplicated passages
	Use context to determine the appropriate meaning of virtually any word, phrase, or statement in uncomplicated passages
	Use context to determine the appropriate meaning of some figurative and nonfigurative words, phrases, and statements in more challenging passages

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TABLE 1C

MISSOURI English III Course Level Expectations	PLAN Reading College Readiness Standards
Strand 1: Reading	
Big Idea 1. Develop and apply skills and strategies to the reading process	
	Determine the appropriate meaning of words, phrases, or statements from figurative or somewhat technical contexts **Generalizations and Conclusions:** Draw simple generalizations and conclusions about the main characters in uncomplicated literary narratives Draw simple generalizations and conclusions about people, ideas, and so on in uncomplicated passages Draw generalizations and conclusions about people, ideas, and so on in uncomplicated passages Draw simple generalizations and conclusions using details that support the main points of more challenging passages Draw subtle generalizations and conclusions about characters, ideas, and so on in uncomplicated literary narratives Draw generalizations and conclusions about people, ideas, and so on in more challenging passages Use information from one or more sections of a more challenging passage to draw generalizations and conclusions about people, ideas, and so on
E. Vocabulary Develop vocabulary through text, using a. roots and affixes b. context clues c. glossary, dictionary and thesaurus	**Meanings of Words:** Understand the implication of a familiar word or phrase and of simple descriptive language Use context to understand basic figurative language Use context to determine the appropriate meaning of some figurative and nonfigurative words, phrases, and statements in uncomplicated passages Use context to determine the appropriate meaning of virtually any word, phrase, or statement in uncomplicated passages Use context to determine the appropriate meaning of some figurative and nonfigurative words, phrases, and statements in more challenging passages Determine the appropriate meaning of words, phrases, or statements from figurative or somewhat technical contexts
F. Pre-Reading Apply pre-reading strategies to aid comprehension* a. access prior knowledge b. preview c. predict with text support or rationale d. set a purpose and rate for reading	

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TABLE 1C

MISSOURI English III Course Level Expectations	PLAN Reading College Readiness Standards
Strand 1: Reading	
Big Idea 1. Develop and apply skills and strategies to the reading process	
G. During reading During reading, utilize strategies to* a. determine meaning of unknown words b. self-monitor comprehension c. question the text d. infer e. visualize f. paraphrase g. summarize	**Main Ideas and Author's Approach:** Infer the main idea or purpose of straightforward paragraphs in uncomplicated literary narratives Understand the overall approach taken by an author or narrator (e.g., point of view, kinds of evidence used) in uncomplicated passages Infer the main idea or purpose of straightforward paragraphs in more challenging passages Summarize basic events and ideas in more challenging passages Understand the overall approach taken by an author or narrator (e.g., point of view, kinds of evidence used) in more challenging passages Infer the main idea or purpose of more challenging passages or their paragraphs **Supporting Details:** Make simple inferences about how details are used in passages Locate and interpret minor or subtly stated details in uncomplicated passages Discern which details, though they may appear in different sections throughout a passage, support important points in more challenging passages Locate and interpret minor or subtly stated details in more challenging passages **Sequential, Comparative, and Cause-Effect Relationships:** Determine when (e.g., first, last, before, after) or if an event occurred in uncomplicated passages Order simple sequences of events in uncomplicated literary narratives Order sequences of events in uncomplicated passages Understand relationships between people, ideas, and so on in uncomplicated passages Understand implied or subtly stated cause-effect relationships in uncomplicated passages Identify clear cause-effect relationships in more challenging passages Order sequences of events in more challenging passages Understand the dynamics between people, ideas, and so on in more challenging passages Understand implied or subtly stated cause-effect relationships in more challenging passages **Meanings of Words:** Understand the implication of a familiar word or phrase and of simple descriptive language

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TABLE 1C

MISSOURI English III Course Level Expectations	PLAN Reading College Readiness Standards
Strand 1: Reading	
Big Idea 1. Develop and apply skills and strategies to the reading process	
	Use context to understand basic figurative language Use context to determine the appropriate meaning of some figurative and nonfigurative words, phrases, and statements in uncomplicated passages Use context to determine the appropriate meaning of virtually any word, phrase, or statement in uncomplicated passages Use context to determine the appropriate meaning of some figurative and nonfigurative words, phrases, and statements in more challenging passages Determine the appropriate meaning of words, phrases, or statements from figurative or somewhat technical contexts **Generalizations and Conclusions:** Draw simple generalizations and conclusions about the main characters in uncomplicated literary narratives Draw simple generalizations and conclusions about people, ideas, and so on in uncomplicated passages Draw generalizations and conclusions about people, ideas, and so on in uncomplicated passages Draw simple generalizations and conclusions using details that support the main points of more challenging passages Draw subtle generalizations and conclusions about characters, ideas, and so on in uncomplicated literary narratives Draw generalizations and conclusions about people, ideas, and so on in more challenging passages Use information from one or more sections of a more challenging passage to draw generalizations and conclusions about people, ideas, and so on
H. Post-Reading Apply post-reading skills to comprehend, interpret, analyze, and evaluate text: a. identify and explain the relationship between the main idea and supporting details b. question to clarify* c. reflect d. draw conclusions e. paraphrase f. summarize	**Main Ideas and Author's Approach:** Recognize a clear intent of an author or narrator in uncomplicated literary narratives Identify a clear main idea or purpose of straightforward paragraphs in uncomplicated literary narratives Infer the main idea or purpose of straightforward paragraphs in uncomplicated literary narratives Understand the overall approach taken by an author or narrator (e.g., point of view, kinds of evidence used) in uncomplicated passages Identify a clear main idea or purpose of any paragraph or paragraphs in uncomplicated passages Infer the main idea or purpose of straightforward paragraphs in more challenging passages Summarize basic events and ideas in more challenging passages Understand the overall approach taken by an author or narrator (e.g., point of view, kinds of evidence used) in more

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TABLE 1C

MISSOURI English III Course Level Expectations	PLAN Reading College Readiness Standards
Strand 1: Reading	
Big Idea 1. Develop and apply skills and strategies to the reading process	
	challenging passages Infer the main idea or purpose of more challenging passages or their paragraphs **Supporting Details:** Locate basic facts (e.g., names, dates, events) clearly stated in a passage Locate simple details at the sentence and paragraph level in uncomplicated passages Recognize a clear function of a part of an uncomplicated passage Locate important details in uncomplicated passages Make simple inferences about how details are used in passages Locate important details in more challenging passages Locate and interpret minor or subtly stated details in uncomplicated passages Discern which details, though they may appear in different sections throughout a passage, support important points in more challenging passages Locate and interpret minor or subtly stated details in more challenging passages **Meanings of Words:** Understand the implication of a familiar word or phrase and of simple descriptive language Use context to understand basic figurative language Use context to determine the appropriate meaning of some figurative and nonfigurative words, phrases, and statements in uncomplicated passages Use context to determine the appropriate meaning of virtually any word, phrase, or statement in uncomplicated passages Use context to determine the appropriate meaning of some figurative and nonfigurative words, phrases, and statements in more challenging passages Determine the appropriate meaning of words, phrases, or statements from figurative or somewhat technical contexts **Generalizations and Conclusions:** Draw simple generalizations and conclusions about the main characters in uncomplicated literary narratives Draw simple generalizations and conclusions about people, ideas, and so on in uncomplicated passages Draw generalizations and conclusions about people, ideas, and so on in uncomplicated passages Draw simple generalizations and conclusions using details that support the main points of more challenging passages Draw subtle generalizations and conclusions about charac-

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TABLE 1C

MISSOURI English III Course Level Expectations	PLAN Reading College Readiness Standards
Strand 1: Reading	
Big Idea 1. Develop and apply skills and strategies to the reading process	
	ters, ideas, and so on in uncomplicated literary narratives Draw generalizations and conclusions about people, ideas, and so on in more challenging passages Use information from one or more sections of a more challenging passage to draw generalizations and conclusions about people, ideas, and so on
I. **Making Connections** Compare, contrast, analyze and evaluate connections: a. text to text (information and relationships in various fiction and non-fiction works) b. text to self (text ideas and own experiences)* c. text to world (text ideas and the world by analyzing and evaluating the relationship between literature and its historical period and culture)*	

*Locally assessed.

= Measured by PLAN English and/or Reading tests

TABLE 1C

MISSOURI English III Course Level Expectations	PLAN Reading College Readiness Standards
Strand 1: Reading	
Big Idea 2. Develop and apply skills and strategies to comprehend, analyze and evaluate fiction, poetry and drama from a variety of cultures and times	
A. Text Features Analyze and evaluate the text features in grade-level text	
B. Literary Techniques Identify and explain literary techniques, in text emphasizing a. euphemism b. satire c. analyze and evaluate literary techniques previously introduced	**Main Ideas and Author's Approach:** Recognize a clear intent of an author or narrator in uncomplicated literary narratives Identify a clear main idea or purpose of straightforward paragraphs in uncomplicated literary narratives Infer the main idea or purpose of straightforward paragraphs in uncomplicated literary narratives Understand the overall approach taken by an author or narrator (e.g., point of view, kinds of evidence used) in uncomplicated passages Identify a clear main idea or purpose of any paragraph or paragraphs in uncomplicated passages Infer the main idea or purpose of straightforward paragraphs in more challenging passages Summarize basic events and ideas in more challenging passages Understand the overall approach taken by an author or narrator (e.g., point of view, kinds of evidence used) in more challenging passages Infer the main idea or purpose of more challenging passages or their paragraphs **Supporting Details:** Locate basic facts (e.g., names, dates, events) clearly stated in a passage Locate simple details at the sentence and paragraph level in uncomplicated passages Recognize a clear function of a part of an uncomplicated passage Locate important details in uncomplicated passages Make simple inferences about how details are used in passages Locate important details in more challenging passages Locate and interpret minor or subtly stated details in uncomplicated passages Discern which details, though they may appear in different sections throughout a passage, support important points in more challenging passages Locate and interpret minor or subtly stated details in more challenging passages

*Locally assessed.

= Measured by PLAN English and/or Reading tests

TABLE 1C

MISSOURI English III Course Level Expectations	PLAN Reading College Readiness Standards
Strand 1: Reading	
Big Idea 2. Develop and apply skills and strategies to comprehend, analyze and evaluate fiction, poetry and drama from a variety of cultures and times	
	Sequential, Comparative, and Cause-Effect Relationships: Determine when (e.g., first, last, before, after) or if an event occurred in uncomplicated passages Recognize clear cause-effect relationships described within a single sentence in a passage Identify relationships between main characters in uncomplicated literary narratives Recognize clear cause-effect relationships within a single paragraph in uncomplicated literary narratives Order simple sequences of events in uncomplicated literary narratives Identify clear relationships between people, ideas, and so on in uncomplicated passages Identify clear cause-effect relationships in uncomplicated passages Order sequences of events in uncomplicated passages Understand relationships between people, ideas, and so on in uncomplicated passages Identify clear relationships between characters, ideas, and so on in more challenging literary narratives Understand implied or subtly stated cause-effect relationships in uncomplicated passages Identify clear cause-effect relationships in more challenging passages Order sequences of events in more challenging passages Understand the dynamics between people, ideas, and so on in more challenging passages Understand implied or subtly stated cause-effect relationships in more challenging passages **Meanings of Words:** Understand the implication of a familiar word or phrase and of simple descriptive language Use context to understand basic figurative language Use context to determine the appropriate meaning of some figurative and nonfigurative words, phrases, and statements in uncomplicated passages Use context to determine the appropriate meaning of virtually any word, phrase, or statement in uncomplicated passages Use context to determine the appropriate meaning of some figurative and nonfigurative words, phrases, and statements in more challenging passages Determine the appropriate meaning of words, phrases, or statements from figurative or somewhat technical contexts

*Locally assessed.

= Measured by PLAN English and/or Reading tests

TABLE 1C

MISSOURI English III Course Level Expectations	PLAN Reading College Readiness Standards
Strand 1: Reading	
Big Idea 2. Develop and apply skills and strategies to comprehend, analyze and evaluate fiction, poetry and drama from a variety of cultures and times	
	Generalizations and Conclusions: Draw simple generalizations and conclusions about the main characters in uncomplicated literary narratives Draw simple generalizations and conclusions about people, ideas, and so on in uncomplicated passages Draw generalizations and conclusions about people, ideas, and so on in uncomplicated passages Draw simple generalizations and conclusions using details that support the main points of more challenging passages Draw subtle generalizations and conclusions about characters, ideas, and so on in uncomplicated literary narratives Draw generalizations and conclusions about people, ideas, and so on in more challenging passages Use information from one or more sections of a more challenging passage to draw generalizations and conclusions about people, ideas, and so on
C. Literary Elements Use details from text(s) to a. demonstrate comprehension skills previously introduced b. analyze character, plot, setting, point of view c. analyze the development of a theme across genres d. evaluate the effect of tone on the overall meaning of work	**Supporting Details:** Recognize a clear function of a part of an uncomplicated passage Make simple inferences about how details are used in passages Discern which details, though they may appear in different sections throughout a passage, support important points in more challenging passages

*Locally assessed.

= Measured by PLAN English and/or Reading tests

TABLE 1C

MISSOURI English III Course Level Expectations	PLAN Reading College Readiness Standards
Strand 1: Reading	
Big Idea 3. Develop and apply skills and strategies to comprehend, analyze and evaluate nonfiction (such as biographies, newspapers, technical manuals) from a variety of cultures and times	
A. Text Features Explain, analyze and evaluate the author's use of text features to clarify meaning	
B. Literary Techniques Identify, explain, and analyze literary techniques in non-fiction, emphasizing a. euphemism b. satire c. figurative language and sound devices previously introduced	**Main Ideas and Author's Approach:** Recognize a clear intent of an author or narrator in uncomplicated literary narratives Identify a clear main idea or purpose of straightforward paragraphs in uncomplicated literary narratives Infer the main idea or purpose of straightforward paragraphs in uncomplicated literary narratives Understand the overall approach taken by an author or narrator (e.g., point of view, kinds of evidence used) in uncomplicated passages Identify a clear main idea or purpose of any paragraph or paragraphs in uncomplicated passages Infer the main idea or purpose of straightforward paragraphs in more challenging passages Summarize basic events and ideas in more challenging passages Understand the overall approach taken by an author or narrator (e.g., point of view, kinds of evidence used) in more challenging passages Infer the main idea or purpose of more challenging passages or their paragraphs **Supporting Details:** Locate basic facts (e.g., names, dates, events) clearly stated in a passage Locate simple details at the sentence and paragraph level in uncomplicated passages Recognize a clear function of a part of an uncomplicated passage Locate important details in uncomplicated passages Make simple inferences about how details are used in passages Locate important details in more challenging passages Locate and interpret minor or subtly stated details in uncomplicated passages Discern which details, though they may appear in different sections throughout a passage, support important points in more challenging passages Locate and interpret minor or subtly stated details in more challenging passages

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TABLE 1C

MISSOURI English III Course Level Expectations	PLAN Reading College Readiness Standards
Strand 1: Reading	
Big Idea 3. Develop and apply skills and strategies to comprehend, analyze and evaluate nonfiction (such as biographies, newspapers, technical manuals) from a variety of cultures and times	
	Sequential, Comparative, and Cause-Effect Relationships: Determine when (e.g., first, last, before, after) or if an event occurred in uncomplicated passages Recognize clear cause-effect relationships described within a single sentence in a passage Identify relationships between main characters in uncomplicated literary narratives Recognize clear cause-effect relationships within a single paragraph in uncomplicated literary narratives Order simple sequences of events in uncomplicated literary narratives Identify clear relationships between people, ideas, and so on in uncomplicated passages Identify clear cause-effect relationships in uncomplicated passages Order sequences of events in uncomplicated passages Understand relationships between people, ideas, and so on in uncomplicated passages Identify clear relationships between characters, ideas, and so on in more challenging literary narratives Understand implied or subtly stated cause-effect relationships in uncomplicated passages Identify clear cause-effect relationships in more challenging passages Order sequences of events in more challenging passages Understand the dynamics between people, ideas, and so on in more challenging passages Understand implied or subtly stated cause-effect relationships in more challenging passages **Meanings of Words:** Understand the implication of a familiar word or phrase and of simple descriptive language Use context to understand basic figurative language Use context to determine the appropriate meaning of some figurative and nonfigurative words, phrases, and statements in uncomplicated passages Use context to determine the appropriate meaning of virtually any word, phrase, or statement in uncomplicated passages Use context to determine the appropriate meaning of some figurative and nonfigurative words, phrases, and statements in more challenging passages

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TABLE 1C

MISSOURI English III Course Level Expectations	PLAN Reading College Readiness Standards
Strand 1: Reading	
Big Idea 3. Develop and apply skills and strategies to comprehend, analyze and evaluate nonfiction (such as biographies, newspapers, technical manuals) from a variety of cultures and times	
	Determine the appropriate meaning of words, phrases, or statements from figurative or somewhat technical contexts **Generalizations and Conclusions:** Draw simple generalizations and conclusions about the main characters in uncomplicated literary narratives Draw simple generalizations and conclusions about people, ideas, and so on in uncomplicated passages Draw generalizations and conclusions about people, ideas, and so on in uncomplicated passages Draw simple generalizations and conclusions using details that support the main points of more challenging passages Draw subtle generalizations and conclusions about characters, ideas, and so on in uncomplicated literary narratives Draw generalizations and conclusions about people, ideas, and so on in more challenging passages Use information from one or more sections of a more challenging passage to draw generalizations and conclusions about people, ideas, and so on
C. Text Structures Use details from informational text to a. analyze and evaluate the organizational patterns b. identify and analyze faulty reasoning and unfounded inferences c. evaluate proposed solutions d. evaluate for accuracy and adequacy of evidence e. analyze and evaluate the type of appeal (emotional, ethical, and logical) f. evaluate effect of tone on the overall meaning of work g. analyze and evaluate point of view h. analyze and evaluate author's viewpoint/perspective i. demonstrate comprehension skills previously introduced	**Main Ideas and Author's Approach:** Understand the overall approach taken by an author or narrator (e.g., point of view, kinds of evidence used) in uncomplicated passages Understand the overall approach taken by an author or narrator (e.g., point of view, kinds of evidence used) in more challenging passages **Supporting Details:** Recognize a clear function of a part of an uncomplicated passage Make simple inferences about how details are used in passages Discern which details, though they may appear in different sections throughout a passage, support important points in more challenging passages **Generalizations and Conclusions:** Draw simple generalizations and conclusions about people, ideas, and so on in uncomplicated passages Draw generalizations and conclusions about people, ideas, and so on in uncomplicated passages Draw simple generalizations and conclusions using details that support the main points of more challenging passages Draw generalizations and conclusions about people, ideas, and so on in more challenging passages Use information from one or more sections of a more challenging passage to draw generalizations and

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= Measured by PLAN English and/or Reading tests

TABLE 1C

MISSOURI English III Course Level Expectations	PLAN Reading College Readiness Standards
Strand 1: Reading	
Big Idea 3. Develop and apply skills and strategies to comprehend, analyze and evaluate nonfiction (such as biographies, newspapers, technical manuals) from a variety of cultures and times	
	conclusions about people, ideas, and so on
D. Understanding Directions Read and apply multi-step directions to perform complex procedures and/or tasks*	

*Locally assessed.

= Measured by PLAN English and/or Reading tests

TABLE 1C

MISSOURI English III Course Level Expectations	PLAN English College Readiness Standards
Strand 2: Writing	
Big Idea 1. Apply a writing process in composing text	
A. Writing Process Follow a writing process to a. use appropriate prewriting strategies as needed b. generate a draft c. revise in response to feedback (peer and/or teacher)* d. edit for conventions* e. share writing*	**Topic Development in Terms of Purpose and Focus:** Identify the basic purpose or role of a specified phrase or sentence Delete a clause or sentence because it is obviously irrelevant to the essay Identify the central idea or main topic of a straightforward piece of writing Determine relevancy when presented with a variety of sentence-level details Identify the focus of a simple essay, applying that knowledge to add a sentence that sharpens that focus or to determine if an essay has met a specified goal Delete material primarily because it disturbs the flow and development of the paragraph Add a sentence to accomplish a fairly straightforward purpose such as illustrating a given statement Apply an awareness of the focus and purpose of a fairly involved essay to determine the rhetorical effect and suitability of an existing phrase or sentence, or to determine the need to delete plausible but irrelevant material Add a sentence to accomplish a subtle rhetorical purpose such as to emphasize, to add supporting detail, or to express meaning through connotation **Organization, Unity, and Coherence:** Use conjunctive adverbs or phrases to show time relationships in simple narrative essays (e.g., *then*, *this time*) Select the most logical place to add a sentence in a paragraph Use conjunctive adverbs or phrases to express straightforward logical relationships (e.g., *first*, *afterward*, *in response*) Decide the most logical place to add a sentence in an essay Add a sentence that introduces a simple paragraph Determine the need for conjunctive adverbs or phrases to create subtle logical connections between sentences (e.g., *therefore*, *however*, *in addition*) Rearrange the sentences in a fairly uncomplicated paragraph for the sake of logic Add a sentence to introduce or conclude the essay or to provide a transition between paragraphs when the essay is fairly straightforward **Word Choice in Terms of Style, Tone, Clarity, and Economy:** Revise sentences to correct awkward and confusing arrangements of sentence elements Revise vague nouns and pronouns that create obvious logic problems

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= Measured by PLAN English and/or Reading tests

TABLE 1C

MISSOURI English III Course Level Expectations	PLAN English College Readiness Standards
Strand 2: Writing	
Big Idea 1. Apply a writing process in composing text	
	Delete obviously synonymous and wordy material in a sentence
	Revise expressions that deviate from the style of an essay
	Delete redundant material when information is repeated in different parts of speech (e.g., “alarmingly startled”)
	Use the word or phrase most consistent with the style and tone of a fairly straightforward essay
	Determine the clearest and most logical conjunction to link clauses
	Revise a phrase that is redundant in terms of the meaning and logic of the entire sentence
	Identify and correct ambiguous pronoun references
	Use the word or phrase most appropriate in terms of the content of the sentence and tone of the essay
	Sentence Structure and Formation:
	Use conjunctions or punctuation to join simple clauses
	Revise shifts in verb tense between simple clauses in a sentence or between simple adjoining sentences
	Determine the need for punctuation and conjunctions to avoid awkward-sounding sentence fragments and fused sentences
	Decide the appropriate verb tense and voice by considering the meaning of the entire sentence
	Recognize and correct marked disturbances of sentence flow and structure (e.g., participial phrase fragments, missing or incorrect relative pronouns, dangling or misplaced modifiers)
	Revise to avoid faulty placement of phrases and faulty coordination and subordination of clauses in sentences with subtle structural problems
	Maintain consistent verb tense and pronoun person on the basis of the preceding clause or sentence
	Use sentence-combining techniques, effectively avoiding problematic comma splices, run-on sentences, and sentence fragments, especially in sentences containing compound subjects or verbs
	Maintain a consistent and logical use of verb tense and pronoun person on the basis of information in the paragraph or essay as a whole
	Conventions of Usage:
	Solve such basic grammatical problems as how to form the past and past participle of irregular but commonly used verbs and how to form comparative and superlative adjectives
	Solve such grammatical problems as whether to use an adverb or adjective form, how to ensure straightforward subject-verb and pronoun-antecedent agreement, and which preposition to use in simple contexts

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TABLE 1C

MISSOURI English III Course Level Expectations	PLAN English College Readiness Standards
Strand 2: Writing	
Big Idea 1. Apply a writing process in composing text	
	Recognize and use the appropriate word in frequently confused pairs such as *there* and *their*, *past* and *passed*, and *led* and *lead*
	Use idiomatically appropriate prepositions, especially in combination with verbs (e.g., *long for*, *appeal to*)
	Ensure that a verb agrees with its subject when there is some text between the two
	Ensure that a pronoun agrees with its antecedent when the two occur in separate clauses or sentences
	Identify the correct past and past participle forms of irregular and infrequently used verbs and form present-perfect verbs by using *have* rather than *of*
	Correctly use reflexive pronouns, the possessive pronouns *its* and *your*, and the relative pronouns *who* and *whom*
	Ensure that a verb agrees with its subject in unusual situations (e.g., when the subject-verb order is inverted or when the subject is an indefinite pronoun)
	Conventions of Punctuation:
	Delete commas that create basic sense problems (e.g., between verb and direct object)
	Provide appropriate punctuation in straightforward situations (e.g., items in a series)
	Delete commas that disturb the sentence flow (e.g., between modifier and modified element)
	Use commas to set off simple parenthetical phrases
	Delete unnecessary commas when an incorrect reading of the sentence suggests a pause that should be punctuated (e.g., between verb and direct object clause)
	Use punctuation to set off complex parenthetical phrases
	Recognize and delete unnecessary commas based on a careful reading of a complicated sentence (e.g., between the elements of a compound subject or compound verb joined by *and*)
	Use apostrophes to indicate simple possessive nouns
	Recognize inappropriate uses of colons and semicolons
	Use commas to set off a nonessential/nonrestrictive appositive or clause

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TABLE 1C

MISSOURI English III Course Level Expectations	PLAN English College Readiness Standards
Strand 2: Writing	
Big Idea 2. Compose well-developed text	
A. Audience and purpose Compose text a. showing awareness of audience b. choosing a form and point of view appropriate to purpose and audience	
B. Ideas and Content Compose text with: a. strong controlling idea b. relevant specific details c. complex ideas d. freshness of thought	**Topic Development in Terms of Purpose and Focus:** Identify the basic purpose or role of a specified phrase or sentence Delete a clause or sentence because it is obviously irrelevant to the essay Identify the central idea or main topic of a straightforward piece of writing Determine relevancy when presented with a variety of sentence-level details Identify the focus of a simple essay, applying that knowledge to add a sentence that sharpens that focus or to determine if an essay has met a specified goal Delete material primarily because it disturbs the flow and development of the paragraph Add a sentence to accomplish a fairly straightforward purpose such as illustrating a given statement Apply an awareness of the focus and purpose of a fairly involved essay to determine the rhetorical effect and suitability of an existing phrase or sentence, or to determine the need to delete plausible but irrelevant material Add a sentence to accomplish a subtle rhetorical purpose such as to emphasize, to add supporting detail, or to express meaning through connotation
C. Organization and Sentence Structure Compose text with a. effective beginning, middle, and end b. a logical order c. effective paragraphing d. cohesive devices e. varied sentence structure f. clarity of expression g. active voice	**Organization, Unity, and Coherence:** Use conjunctive adverbs or phrases to show time relationships in simple narrative essays (e.g., *then*, *this time*) Select the most logical place to add a sentence in a paragraph Use conjunctive adverbs or phrases to express straightforward logical relationships (e.g., *first*, *afterward*, *in response*) Decide the most logical place to add a sentence in an essay Add a sentence that introduces a simple paragraph Determine the need for conjunctive adverbs or phrases to create subtle logical connections between sentences (e.g., *therefore*, *however*, *in addition*) Rearrange the sentences in a fairly uncomplicated paragraph for the sake of logic Add a sentence to introduce or conclude the essay or to provide a transition between paragraphs when the essay is fairly straightforward

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TABLE 1C

MISSOURI English III Course Level Expectations	PLAN English College Readiness Standards
Strand 2: Writing	
Big Idea 2. Compose well-developed text	
	Word Choice in Terms of Style, Tone, Clarity, and Economy: Revise sentences to correct awkward and confusing arrangements of sentence elements Revise expressions that deviate from the style of an essay Use the word or phrase most consistent with the style and tone of a fairly straightforward essay Use the word or phrase most appropriate in terms of the content of the sentence and tone of the essay **Sentence Structure and Formation:** Decide the appropriate verb tense and voice by considering the meaning of the entire sentence
D. Word Choice Compose text using a. precise and vivid language b. writing techniques such as imagery, humor, voice, figurative language, and rhetorical devices	**Topic Development in Terms of Purpose and Focus:** Identify the basic purpose or role of a specified phrase or sentence Apply an awareness of the focus and purpose of a fairly involved essay to determine the rhetorical effect and suitability of an existing phrase or sentence, or to determine the need to delete plausible but irrelevant material **Word Choice in Terms of Style, Tone, Clarity, and Economy:** Revise vague nouns and pronouns that create obvious logic problems Revise expressions that deviate from the style of an essay Use the word or phrase most consistent with the style and tone of a fairly straightforward essay Determine the clearest and most logical conjunction to link clauses Identify and correct ambiguous pronoun references Use the word or phrase most appropriate in terms of the content of the sentence and tone of the essay
E. Conventions In written text apply a. conventions of capitalization b. conventions of punctuation c. standard usage	**Conventions of Usage:** Solve such basic grammatical problems as how to form the past and past participle of irregular but commonly used verbs and how to form comparative and superlative adjectives Solve such grammatical problems as whether to use an adverb or adjective form, how to ensure straightforward subject-verb and pronoun-antecedent agreement, and which preposition to use in simple contexts Recognize and use the appropriate word in frequently confused pairs such as *there* and *their*, *past* and *passed*, and *led* and *lead* Use idiomatically appropriate prepositions, especially in combination with verbs (e.g., *long for*, *appeal to*) Ensure that a verb agrees with its subject when there is some text between the two

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TABLE 1C

MISSOURI English III Course Level Expectations	PLAN English College Readiness Standards
Strand 2: Writing	
Big Idea 2. Compose well-developed text	
	Ensure that a pronoun agrees with its antecedent when the two occur in separate clauses or sentences Identify the correct past and past participle forms of irregular and infrequently used verbs and form present-perfect verbs by using *have* rather than *of* Correctly use reflexive pronouns, the possessive pronouns *its* and *your*, and the relative pronouns *who* and *whom* Ensure that a verb agrees with its subject in unusual situations (e.g., when the subject-verb order is inverted or when the subject is an indefinite pronoun) **Conventions of Punctuation:** Delete commas that create basic sense problems (e.g., between verb and direct object) Provide appropriate punctuation in straightforward situations (e.g., items in a series) Delete commas that disturb the sentence flow (e.g., between modifier and modified element) Use commas to set off simple parenthetical phrases Delete unnecessary commas when an incorrect reading of the sentence suggests a pause that should be punctuated (e.g., between verb and direct object clause) Use punctuation to set off complex parenthetical phrases Recognize and delete unnecessary commas based on a careful reading of a complicated sentence (e.g., between the elements of a compound subject or compound verb joined by *and*) Use apostrophes to indicate simple possessive nouns Recognize inappropriate uses of colons and semicolons Use commas to set off a nonessential/nonrestrictive appositive or clause

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TABLE 1C

MISSOURI English III Course Level Expectations	PLAN English College Readiness Standards
Strand 2: Writing	
Big Idea 3. Write effectively in various forms and types of writing	
A. Forms/Types/Modes of Writing Compose a variety of texts, a. using narrative, descriptive, expository, and/or persuasive features b. in various formats, including workplace communications (resume, letter of application, follow-up letter) c. including summary d. including literary analysis e. including reflective writing	**Topic Development in Terms of Purpose and Focus:** Identify the basic purpose or role of a specified phrase or sentence Delete a clause or sentence because it is obviously irrelevant to the essay Identify the central idea or main topic of a straightforward piece of writing Determine relevancy when presented with a variety of sentence-level details Identify the focus of a simple essay, applying that knowledge to add a sentence that sharpens that focus or to determine if an essay has met a specified goal Delete material primarily because it disturbs the flow and development of the paragraph Add a sentence to accomplish a fairly straightforward purpose such as illustrating a given statement Apply an awareness of the focus and purpose of a fairly involved essay to determine the rhetorical effect and suitability of an existing phrase or sentence, or to determine the need to delete plausible but irrelevant material Add a sentence to accomplish a subtle rhetorical purpose such as to emphasize, to add supporting detail, or to express meaning through connotation **Organization, Unity, and Coherence:** Use conjunctive adverbs or phrases to show time relationships in simple narrative essays (e.g., *then*, *this time*) Select the most logical place to add a sentence in a paragraph Use conjunctive adverbs or phrases to express straightforward logical relationships (e.g., *first*, *afterward*, *in response*) Decide the most logical place to add a sentence in an essay Add a sentence that introduces a simple paragraph Determine the need for conjunctive adverbs or phrases to create subtle logical connections between sentences (e.g., *therefore*, *however*, *in addition*) Rearrange the sentences in a fairly uncomplicated paragraph for the sake of logic Add a sentence to introduce or conclude the essay or to provide a transition between paragraphs when the essay is fairly straightforward **Word Choice in Terms of Style, Tone, Clarity, and Economy:** Revise sentences to correct awkward and confusing arrangements of sentence elements Revise vague nouns and pronouns that create obvious logic

*Locally assessed.

= Measured by PLAN English and/or Reading tests

MISSOURI English III Course Level Expectations	PLAN English College Readiness Standards
Strand 2: Writing	
Big Idea 3. Write effectively in various forms and types of writing	
	problems Delete obviously synonymous and wordy material in a sentence Revise expressions that deviate from the style of an essay Delete redundant material when information is repeated in different parts of speech (e.g., “alarmingly startled”) Use the word or phrase most consistent with the style and tone of a fairly straightforward essay Determine the clearest and most logical conjunction to link clauses Revise a phrase that is redundant in terms of the meaning and logic of the entire sentence Identify and correct ambiguous pronoun references Use the word or phrase most appropriate in terms of the content of the sentence and tone of the essay **Sentence Structure and Formation:** Use conjunctions or punctuation to join simple clauses Revise shifts in verb tense between simple clauses in a sentence or between simple adjoining sentences Determine the need for punctuation and conjunctions to avoid awkward-sounding sentence fragments and fused sentences Decide the appropriate verb tense and voice by considering the meaning of the entire sentence Recognize and correct marked disturbances of sentence flow and structure (e.g., participial phrase fragments, missing or incorrect relative pronouns, dangling or misplaced modifiers) Revise to avoid faulty placement of phrases and faulty coordination and subordination of clauses in sentences with subtle structural problems Maintain consistent verb tense and pronoun person on the basis of the preceding clause or sentence Use sentence-combining techniques, effectively avoiding problematic comma splices, run-on sentences, and sentence fragments, especially in sentences containing compound subjects or verbs Maintain a consistent and logical use of verb tense and pronoun person on the basis of information in the paragraph or essay as a whole **Conventions of Usage:** Solve such basic grammatical problems as how to form the past and past participle of irregular but commonly used verbs and how to form comparative and superlative adjectives Solve such grammatical problems as whether to use an adverb or adjective form, how to ensure straightforward

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 = Measured by PLAN English and/or Reading tests

TABLE 1C

MISSOURI English III Course Level Expectations	PLAN English College Readiness Standards
Strand 2: Writing	
Big Idea 3. Write effectively in various forms and types of writing	
	subject-verb and pronoun-antecedent agreement, and which preposition to use in simple contexts Recognize and use the appropriate word in frequently confused pairs such as *there* and *their*, *past* and *passed*, and *led* and *lead* Use idiomatically appropriate prepositions, especially in combination with verbs (e.g., *long for*, *appeal to*) Ensure that a verb agrees with its subject when there is some text between the two Ensure that a pronoun agrees with its antecedent when the two occur in separate clauses or sentences Identify the correct past and past participle forms of irregular and infrequently used verbs and form present-perfect verbs by using *have* rather than *of* Correctly use reflexive pronouns, the possessive pronouns *its* and *your*, and the relative pronouns *who* and *whom* Ensure that a verb agrees with its subject in unusual situations (e.g., when the subject-verb order is inverted or when the subject is an indefinite pronoun) **Conventions of Punctuation:** Delete commas that create basic sense problems (e.g., between verb and direct object) Provide appropriate punctuation in straightforward situations (e.g., items in a series) Delete commas that disturb the sentence flow (e.g., between modifier and modified element) Use commas to set off simple parenthetical phrases Delete unnecessary commas when an incorrect reading of the sentence suggests a pause that should be punctuated (e.g., between verb and direct object clause) Use punctuation to set off complex parenthetical phrases Recognize and delete unnecessary commas based on a careful reading of a complicated sentence (e.g., between the elements of a compound subject or compound verb joined by *and*) Use apostrophes to indicate simple possessive nouns Recognize inappropriate uses of colons and semicolons Use commas to set off a nonessential/nonrestrictive appositive or clause

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TABLE 1C

MISSOURI English III Course Level Expectations	PLAN College Readiness Standards
Strand 3: Listening and Speaking	
Big Idea 1. Develop and apply effective listening skills and strategies	
A. Purpose for Listening Listen • for enjoyment • for information • for directions • critically to summarize and evaluate communications that inform, persuade and entertain • to evaluate own and others' effectiveness in presentations and group discussions, using provided criteria • to evaluate the validity and reliability of speaker's message	
B. Listening Behavior Use active-listening behaviors (e.g., asks questions of speaker and uses body language and facial expressions to indicate agreement, disagreement or confusion)	
Big Idea 2. Develop and apply effective speaking skills and strategies for various audiences and purposes	
A. Discussion and Presentation In discussions and presentations, • create concise presentations on a variety of topics • incorporate appropriate media or technology • respond to feedback • defend ideas • demonstrate poise and self-control	
B. Giving Directions Give clear and concise multi-step oral directions to perform complex procedures and/or tasks	

*Locally assessed.

= Measured by PLAN English and/or Reading tests

TABLE 1C

MISSOURI English III Course Level Expectations	PLAN College Readiness Standards
Strand 4: Information Literacy	
Big Idea 1. Develop and apply effective research process skills to gather, analyze and evaluate information	
A. Research Plan Develop an appropriate research plan to guide investigation and research of focus questions	
B. Acquire information Locate and use multiple primary and secondary sources to • select relevant and credible information • evaluate reliability of information • evaluate reliability of sources	
C. Record Information Record relevant information from multiple primary and secondary sources using a self-selected note-taking or organizational strategy	
D. Sources Consulted Document sources of information using a standard citation format	
Big Idea 2. Develop and apply effective skills and strategies to analyze and evaluate oral and visual media	
A. Media Messages Analyze, describe and evaluate the elements of messages projected in various media (e.g., videos, pictures, web-sites, artwork, plays and/or news programs)	

*Locally assessed.

= Measured by PLAN English and/or Reading tests

TABLE 1D

MISSOURI English III Course Level Expectations	ACT Reading College Readiness Standards
Strand 1: Reading	
Big Idea 1. Develop and apply skills and strategies to the reading process	
A. Print Concepts No CLE	
B. Phonemic Awareness No CLE	
C. Phonics Apply decoding strategies to "problem-solve" unknown words when reading when needed*	
D. Fluency Read grade-level instructional text* a. with fluency: accuracy, comprehension and appropriate expression b. adjusting reading rate to difficulty and type of text	**Main Ideas and Author's Approach:** Recognize a clear intent of an author or narrator in uncomplicated literary narratives Identify a clear main idea or purpose of straightforward paragraphs in uncomplicated literary narratives Infer the main idea or purpose of straightforward paragraphs in uncomplicated literary narratives Understand the overall approach taken by an author or narrator (e.g., point of view, kinds of evidence used) in uncomplicated passages Identify a clear main idea or purpose of any paragraph or paragraphs in uncomplicated passages Infer the main idea or purpose of straightforward paragraphs in more challenging passages Summarize basic events and ideas in more challenging passages Understand the overall approach taken by an author or narrator (e.g., point of view, kinds of evidence used) in more challenging passages Infer the main idea or purpose of more challenging passages or their paragraphs **Supporting Details:** Locate basic facts (e.g., names, dates, events) clearly stated in a passage Locate simple details at the sentence and paragraph level in uncomplicated passages Recognize a clear function of a part of an uncomplicated passage Locate important details in uncomplicated passages Make simple inferences about how details are used in passages Locate important details in more challenging passages Locate and interpret minor or subtly stated details in uncomplicated passages Discern which details, though they may appear in different sections throughout a passage, support important points in more challenging passages

*Locally assessed.

= Measured by ACT English, Reading, and/or Writing tests

TABLE 1D

MISSOURI English III Course Level Expectations	ACT Reading College Readiness Standards
Strand 1: Reading	
Big Idea 1. Develop and apply skills and strategies to the reading process	
	Locate and interpret minor or subtly stated details in more challenging passages
	Sequential, Comparative, and Cause-Effect Relationships:
	Determine when (e.g., first, last, before, after) or if an event occurred in uncomplicated passages
	Recognize clear cause-effect relationships described within a single sentence in a passage
	Identify relationships between main characters in uncomplicated literary narratives
	Recognize clear cause-effect relationships within a single paragraph in uncomplicated literary narratives
	Order simple sequences of events in uncomplicated literary narratives
	Identify clear relationships between people, ideas, and so on in uncomplicated passages
	Identify clear cause-effect relationships in uncomplicated passages
	Order sequences of events in uncomplicated passages
	Understand relationships between people, ideas, and so on in uncomplicated passages
	Identify clear relationships between characters, ideas, and so on in more challenging literary narratives
	Understand implied or subtly stated cause-effect relationships in uncomplicated passages
	Identify clear cause-effect relationships in more challenging passages
	Order sequences of events in more challenging passages
	Understand the dynamics between people, ideas, and so on in more challenging passages
	Understand implied or subtly stated cause-effect relationships in more challenging passages
	Meanings of Words:
	Understand the implication of a familiar word or phrase and of simple descriptive language
	Use context to understand basic figurative language
	Use context to determine the appropriate meaning of some figurative and nonfigurative words, phrases, and statements in uncomplicated passages
	Use context to determine the appropriate meaning of virtually any word, phrase, or statement in uncomplicated passages
	Use context to determine the appropriate meaning of some figurative and nonfigurative words, phrases, and statements in more challenging passages

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TABLE 1D

MISSOURI English III Course Level Expectations	ACT Reading College Readiness Standards
Strand 1: Reading	
Big Idea 1. Develop and apply skills and strategies to the reading process	
	Determine the appropriate meaning of words, phrases, or statements from figurative or somewhat technical contexts **Generalizations and Conclusions:** Draw simple generalizations and conclusions about the main characters in uncomplicated literary narratives Draw simple generalizations and conclusions about people, ideas, and so on in uncomplicated passages Draw generalizations and conclusions about people, ideas, and so on in uncomplicated passages Draw simple generalizations and conclusions using details that support the main points of more challenging passages Draw subtle generalizations and conclusions about characters, ideas, and so on in uncomplicated literary narratives Draw generalizations and conclusions about people, ideas, and so on in more challenging passages Use information from one or more sections of a more challenging passage to draw generalizations and conclusions about people, ideas, and so on
E. Vocabulary Develop vocabulary through text, using a. roots and affixes b. context clues c. glossary, dictionary and thesaurus	**Meanings of Words:** Understand the implication of a familiar word or phrase and of simple descriptive language Use context to understand basic figurative language Use context to determine the appropriate meaning of some figurative and nonfigurative words, phrases, and statements in uncomplicated passages Use context to determine the appropriate meaning of virtually any word, phrase, or statement in uncomplicated passages Use context to determine the appropriate meaning of some figurative and nonfigurative words, phrases, and statements in more challenging passages Determine the appropriate meaning of words, phrases, or statements from figurative or somewhat technical contexts
F. Pre-Reading Apply pre-reading strategies to aid comprehension* a. access prior knowledge b. preview c. predict with text support or rationale d. set a purpose and rate for reading	

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TABLE 1D

MISSOURI English III Course Level Expectations	ACT Reading College Readiness Standards
Strand 1: Reading	
Big Idea 1. Develop and apply skills and strategies to the reading process	
G. During reading During reading, utilize strategies to* a. determine meaning of unknown words b. self-monitor comprehension c. question the text d. infer e. visualize f. paraphrase g. summarize	**Main Ideas and Author's Approach:** Infer the main idea or purpose of straightforward paragraphs in uncomplicated literary narratives Understand the overall approach taken by an author or narrator (e.g., point of view, kinds of evidence used) in uncomplicated passages Infer the main idea or purpose of straightforward paragraphs in more challenging passages Summarize basic events and ideas in more challenging passages Understand the overall approach taken by an author or narrator (e.g., point of view, kinds of evidence used) in more challenging passages Infer the main idea or purpose of more challenging passages or their paragraphs **Supporting Details:** Make simple inferences about how details are used in passages Locate and interpret minor or subtly stated details in uncomplicated passages Discern which details, though they may appear in different sections throughout a passage, support important points in more challenging passages Locate and interpret minor or subtly stated details in more challenging passages **Sequential, Comparative, and Cause-Effect Relationships:** Determine when (e.g., first, last, before, after) or if an event occurred in uncomplicated passages Order simple sequences of events in uncomplicated literary narratives Order sequences of events in uncomplicated passages Understand relationships between people, ideas, and so on in uncomplicated passages Understand implied or subtly stated cause-effect relationships in uncomplicated passages Identify clear cause-effect relationships in more challenging passages Order sequences of events in more challenging passages Understand the dynamics between people, ideas, and so on in more challenging passages Understand implied or subtly stated cause-effect relationships in more challenging passages **Meanings of Words:** Understand the implication of a familiar word or phrase and of simple descriptive language

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= Measured by ACT English, Reading, and/or Writing tests

TABLE 1D

MISSOURI English III Course Level Expectations	ACT Reading College Readiness Standards
Strand 1: Reading	
Big Idea 1. Develop and apply skills and strategies to the reading process	
	Use context to understand basic figurative language Use context to determine the appropriate meaning of some figurative and nonfigurative words, phrases, and statements in uncomplicated passages Use context to determine the appropriate meaning of virtually any word, phrase, or statement in uncomplicated passages Use context to determine the appropriate meaning of some figurative and nonfigurative words, phrases, and statements in more challenging passages Determine the appropriate meaning of words, phrases, or statements from figurative or somewhat technical contexts **Generalizations and Conclusions:** Draw simple generalizations and conclusions about the main characters in uncomplicated literary narratives Draw simple generalizations and conclusions about people, ideas, and so on in uncomplicated passages Draw generalizations and conclusions about people, ideas, and so on in uncomplicated passages Draw simple generalizations and conclusions using details that support the main points of more challenging passages Draw subtle generalizations and conclusions about characters, ideas, and so on in uncomplicated literary narratives Draw generalizations and conclusions about people, ideas, and so on in more challenging passages Use information from one or more sections of a more challenging passage to draw generalizations and conclusions about people, ideas, and so on
H. Post-Reading Apply post-reading skills to comprehend, interpret, analyze, and evaluate text: a. identify and explain the relationship between the main idea and supporting details b. question to clarify* c. reflect d. draw conclusions e. paraphrase f. summarize	**Main Ideas and Author's Approach:** Recognize a clear intent of an author or narrator in uncomplicated literary narratives Identify a clear main idea or purpose of straightforward paragraphs in uncomplicated literary narratives Infer the main idea or purpose of straightforward paragraphs in uncomplicated literary narratives Understand the overall approach taken by an author or narrator (e.g., point of view, kinds of evidence used) in uncomplicated passages Identify a clear main idea or purpose of any paragraph or paragraphs in uncomplicated passages Infer the main idea or purpose of straightforward paragraphs in more challenging passages Summarize basic events and ideas in more challenging passages Understand the overall approach taken by an author or narrator (e.g., point of view, kinds of evidence used) in more

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MISSOURI English III Course Level Expectations	ACT Reading College Readiness Standards
Strand 1: Reading	
Big Idea 1. Develop and apply skills and strategies to the reading process	
	challenging passages Infer the main idea or purpose of more challenging passages or their paragraphs **Supporting Details:** Locate basic facts (e.g., names, dates, events) clearly stated in a passage Locate simple details at the sentence and paragraph level in uncomplicated passages Recognize a clear function of a part of an uncomplicated passage Locate important details in uncomplicated passages Make simple inferences about how details are used in passages Locate important details in more challenging passages Locate and interpret minor or subtly stated details in uncomplicated passages Discern which details, though they may appear in different sections throughout a passage, support important points in more challenging passages Locate and interpret minor or subtly stated details in more challenging passages **Meanings of Words:** Understand the implication of a familiar word or phrase and of simple descriptive language Use context to understand basic figurative language Use context to determine the appropriate meaning of some figurative and nonfigurative words, phrases, and statements in uncomplicated passages Use context to determine the appropriate meaning of virtually any word, phrase, or statement in uncomplicated passages Use context to determine the appropriate meaning of some figurative and nonfigurative words, phrases, and statements in more challenging passages Determine the appropriate meaning of words, phrases, or statements from figurative or somewhat technical contexts **Generalizations and Conclusions:** Draw simple generalizations and conclusions about the main characters in uncomplicated literary narratives Draw simple generalizations and conclusions about people, ideas, and so on in uncomplicated passages Draw generalizations and conclusions about people, ideas, and so on in uncomplicated passages Draw simple generalizations and conclusions using details that support the main points of more challenging passages Draw subtle generalizations and conclusions about charac-

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TABLE 1D

MISSOURI English III Course Level Expectations	ACT Reading College Readiness Standards
Strand 1: Reading	
Big Idea 1. Develop and apply skills and strategies to the reading process	
	ters, ideas, and so on in uncomplicated literary narratives Draw generalizations and conclusions about people, ideas, and so on in more challenging passages Use information from one or more sections of a more challenging passage to draw generalizations and conclusions about people, ideas, and so on
I. **Making Connections** Compare, contrast, analyze and evaluate connections: a. text to text (information and relationships in various fiction and non-fiction works) b. text to self (text ideas and own experiences)* c. text to world (text ideas and the world by analyzing and evaluating the relationship between literature and its historical period and culture)*	

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= Measured by ACT English, Reading, and/or Writing tests

TABLE 1D

MISSOURI English III Course Level Expectations	ACT Reading College Readiness Standards
Strand 1: Reading	
Big Idea 2. Develop and apply skills and strategies to comprehend, analyze and evaluate fiction, poetry and drama from a variety of cultures and times	
A. Text Features Analyze and evaluate the text features in grade-level text	
B. Literary Techniques Identify and explain literary techniques, in text emphasizing a. euphemism b. satire c. analyze and evaluate literary techniques previously introduced	**Main Ideas and Author's Approach:** Recognize a clear intent of an author or narrator in uncomplicated literary narratives Identify a clear main idea or purpose of straightforward paragraphs in uncomplicated literary narratives Infer the main idea or purpose of straightforward paragraphs in uncomplicated literary narratives Understand the overall approach taken by an author or narrator (e.g., point of view, kinds of evidence used) in uncomplicated passages Identify a clear main idea or purpose of any paragraph or paragraphs in uncomplicated passages Infer the main idea or purpose of straightforward paragraphs in more challenging passages Summarize basic events and ideas in more challenging passages Understand the overall approach taken by an author or narrator (e.g., point of view, kinds of evidence used) in more challenging passages Infer the main idea or purpose of more challenging passages or their paragraphs **Supporting Details:** Locate basic facts (e.g., names, dates, events) clearly stated in a passage Locate simple details at the sentence and paragraph level in uncomplicated passages Recognize a clear function of a part of an uncomplicated passage Locate important details in uncomplicated passages Make simple inferences about how details are used in passages Locate important details in more challenging passages Locate and interpret minor or subtly stated details in uncomplicated passages Discern which details, though they may appear in different sections throughout a passage, support important points in more challenging passages Locate and interpret minor or subtly stated details in more challenging passages

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TABLE 1D

MISSOURI English III Course Level Expectations	ACT Reading College Readiness Standards
Strand 1: Reading	
Big Idea 2. Develop and apply skills and strategies to comprehend, analyze and evaluate fiction, poetry and drama from a variety of cultures and times	
	Sequential, Comparative, and Cause-Effect Relationships: Determine when (e.g., first, last, before, after) or if an event occurred in uncomplicated passages Recognize clear cause-effect relationships described within a single sentence in a passage Identify relationships between main characters in uncomplicated literary narratives Recognize clear cause-effect relationships within a single paragraph in uncomplicated literary narratives Order simple sequences of events in uncomplicated literary narratives Identify clear relationships between people, ideas, and so on in uncomplicated passages Identify clear cause-effect relationships in uncomplicated passages Order sequences of events in uncomplicated passages Understand relationships between people, ideas, and so on in uncomplicated passages Identify clear relationships between characters, ideas, and so on in more challenging literary narratives Understand implied or subtly stated cause-effect relationships in uncomplicated passages Identify clear cause-effect relationships in more challenging passages Order sequences of events in more challenging passages Understand the dynamics between people, ideas, and so on in more challenging passages Understand implied or subtly stated cause-effect relationships in more challenging passages **Meanings of Words:** Understand the implication of a familiar word or phrase and of simple descriptive language Use context to understand basic figurative language Use context to determine the appropriate meaning of some figurative and nonfigurative words, phrases, and statements in uncomplicated passages Use context to determine the appropriate meaning of virtually any word, phrase, or statement in uncomplicated passages Use context to determine the appropriate meaning of some figurative and nonfigurative words, phrases, and statements in more challenging passages Determine the appropriate meaning of words, phrases, or statements from figurative or somewhat technical contexts

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TABLE 1D

MISSOURI English III Course Level Expectations	ACT Reading College Readiness Standards
Strand 1: Reading	
Big Idea 2. Develop and apply skills and strategies to comprehend, analyze and evaluate fiction, poetry and drama from a variety of cultures and times	
	Generalizations and Conclusions: Draw simple generalizations and conclusions about the main characters in uncomplicated literary narratives Draw simple generalizations and conclusions about people, ideas, and so on in uncomplicated passages Draw generalizations and conclusions about people, ideas, and so on in uncomplicated passages Draw simple generalizations and conclusions using details that support the main points of more challenging passages Draw subtle generalizations and conclusions about characters, ideas, and so on in uncomplicated literary narratives Draw generalizations and conclusions about people, ideas, and so on in more challenging passages Use information from one or more sections of a more challenging passage to draw generalizations and conclusions about people, ideas, and so on
C. Literary Elements Use details from text(s) to a. demonstrate comprehension skills previously introduced b. analyze character, plot, setting, point of view c. analyze the development of a theme across genres d. evaluate the effect of tone on the overall meaning of work	**Supporting Details:** Recognize a clear function of a part of an uncomplicated passage Make simple inferences about how details are used in passages Discern which details, though they may appear in different sections throughout a passage, support important points in more challenging passages

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TABLE 1D

MISSOURI English III Course Level Expectations	ACT Reading College Readiness Standards
Strand 1: Reading	
Big Idea 3. Develop and apply skills and strategies to comprehend, analyze and evaluate nonfiction (such as biographies, newspapers, technical manuals) from a variety of cultures and times	
A. Text Features Explain, analyze and evaluate the author's use of text features to clarify meaning	
B. Literary Techniques Identify, explain, and analyze literary techniques in non-fiction, emphasizing a. euphemism b. satire c. figurative language and sound devices previously introduced	**Main Ideas and Author's Approach:** Recognize a clear intent of an author or narrator in uncomplicated literary narratives Identify a clear main idea or purpose of straightforward paragraphs in uncomplicated literary narratives Infer the main idea or purpose of straightforward paragraphs in uncomplicated literary narratives Understand the overall approach taken by an author or narrator (e.g., point of view, kinds of evidence used) in uncomplicated passages Identify a clear main idea or purpose of any paragraph or paragraphs in uncomplicated passages Infer the main idea or purpose of straightforward paragraphs in more challenging passages Summarize basic events and ideas in more challenging passages Understand the overall approach taken by an author or narrator (e.g., point of view, kinds of evidence used) in more challenging passages Infer the main idea or purpose of more challenging passages or their paragraphs **Supporting Details:** Locate basic facts (e.g., names, dates, events) clearly stated in a passage Locate simple details at the sentence and paragraph level in uncomplicated passages Recognize a clear function of a part of an uncomplicated passage Locate important details in uncomplicated passages Make simple inferences about how details are used in passages Locate important details in more challenging passages Locate and interpret minor or subtly stated details in uncomplicated passages Discern which details, though they may appear in different sections throughout a passage, support important points in more challenging passages Locate and interpret minor or subtly stated details in more challenging passages

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TABLE 1D

MISSOURI English III Course Level Expectations	ACT Reading College Readiness Standards
Strand 1: Reading	
Big Idea 3. Develop and apply skills and strategies to comprehend, analyze and evaluate nonfiction (such as biographies, newspapers, technical manuals) from a variety of cultures and times	
	Sequential, Comparative, and Cause-Effect Relationships: Determine when (e.g., first, last, before, after) or if an event occurred in uncomplicated passages Recognize clear cause-effect relationships described within a single sentence in a passage Identify relationships between main characters in uncomplicated literary narratives Recognize clear cause-effect relationships within a single paragraph in uncomplicated literary narratives Order simple sequences of events in uncomplicated literary narratives Identify clear relationships between people, ideas, and so on in uncomplicated passages Identify clear cause-effect relationships in uncomplicated passages Order sequences of events in uncomplicated passages Understand relationships between people, ideas, and so on in uncomplicated passages Identify clear relationships between characters, ideas, and so on in more challenging literary narratives Understand implied or subtly stated cause-effect relationships in uncomplicated passages Identify clear cause-effect relationships in more challenging passages Order sequences of events in more challenging passages Understand the dynamics between people, ideas, and so on in more challenging passages Understand implied or subtly stated cause-effect relationships in more challenging passages **Meanings of Words:** Understand the implication of a familiar word or phrase and of simple descriptive language Use context to understand basic figurative language Use context to determine the appropriate meaning of some figurative and nonfigurative words, phrases, and statements in uncomplicated passages Use context to determine the appropriate meaning of virtually any word, phrase, or statement in uncomplicated passages Use context to determine the appropriate meaning of some figurative and nonfigurative words, phrases, and statements in more challenging passages

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TABLE 1D

MISSOURI English III Course Level Expectations	ACT Reading College Readiness Standards
Strand 1: Reading	
Big Idea 3. Develop and apply skills and strategies to comprehend, analyze and evaluate nonfiction (such as biographies, newspapers, technical manuals) from a variety of cultures and times	
	Determine the appropriate meaning of words, phrases, or statements from figurative or somewhat technical contexts **Generalizations and Conclusions:** Draw simple generalizations and conclusions about the main characters in uncomplicated literary narratives Draw simple generalizations and conclusions about people, ideas, and so on in uncomplicated passages Draw generalizations and conclusions about people, ideas, and so on in uncomplicated passages Draw simple generalizations and conclusions using details that support the main points of more challenging passages Draw subtle generalizations and conclusions about characters, ideas, and so on in uncomplicated literary narratives Draw generalizations and conclusions about people, ideas, and so on in more challenging passages Use information from one or more sections of a more challenging passage to draw generalizations and conclusions about people, ideas, and so on
C. Text Structures Use details from informational text to a. analyze and evaluate the organizational patterns b. identify and analyze faulty reasoning and unfounded inferences c. evaluate proposed solutions d. evaluate for accuracy and adequacy of evidence e. analyze and evaluate the type of appeal (emotional, ethical, and logical) f. evaluate effect of tone on the overall meaning of work g. analyze and evaluate point of view h. analyze and evaluate author's viewpoint/perspective i. demonstrate comprehension skills previously introduced	**Main Ideas and Author's Approach:** Understand the overall approach taken by an author or narrator (e.g., point of view, kinds of evidence used) in uncomplicated passages Understand the overall approach taken by an author or narrator (e.g., point of view, kinds of evidence used) in more challenging passages **Supporting Details:** Recognize a clear function of a part of an uncomplicated passage Make simple inferences about how details are used in passages Discern which details, though they may appear in different sections throughout a passage, support important points in more challenging passages **Generalizations and Conclusions:** Draw simple generalizations and conclusions about people, ideas, and so on in uncomplicated passages Draw generalizations and conclusions about people, ideas, and so on in uncomplicated passages Draw simple generalizations and conclusions using details that support the main points of more challenging passages Draw generalizations and conclusions about people, ideas, and so on in more challenging passages Use information from one or more sections of a more challenging passage to draw generalizations and

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TABLE 1D

MISSOURI English III Course Level Expectations	ACT Reading College Readiness Standards
Strand 1: Reading	
Big Idea 3. Develop and apply skills and strategies to comprehend, analyze and evaluate nonfiction (such as biographies, newspapers, technical manuals) from a variety of cultures and times	
	conclusions about people, ideas, and so on
D. Understanding Directions Read and apply multi-step directions to perform complex procedures and/or tasks*	

*Locally assessed.

= Measured by ACT English, Reading, and/or Writing tests

TABLE 1D

MISSOURI English III Course Level Expectations	ACT English and Writing College Readiness Standards
Strand 2: Writing	
Big Idea 1. Apply a writing process in composing text	
A. Writing Process Follow a writing process to a. use appropriate prewriting strategies as needed b. generate a draft c. revise in response to feedback (peer and/or teacher)* d. edit for conventions* e. share writing*	**English** College Readiness Standards **Topic Development in Terms of Purpose and Focus:** Identify the basic purpose or role of a specified phrase or sentence Delete a clause or sentence because it is obviously irrelevant to the essay Identify the central idea or main topic of a straightforward piece of writing Determine relevancy when presented with a variety of sentence-level details Identify the focus of a simple essay, applying that knowledge to add a sentence that sharpens that focus or to determine if an essay has met a specified goal Delete material primarily because it disturbs the flow and development of the paragraph Add a sentence to accomplish a fairly straightforward purpose such as illustrating a given statement Apply an awareness of the focus and purpose of a fairly involved essay to determine the rhetorical effect and suitability of an existing phrase or sentence, or to determine the need to delete plausible but irrelevant material Add a sentence to accomplish a subtle rhetorical purpose such as to emphasize, to add supporting detail, or to express meaning through connotation **Organization, Unity, and Coherence:** Use conjunctive adverbs or phrases to show time relationships in simple narrative essays (e.g., *then*, *this time*) Select the most logical place to add a sentence in a paragraph Use conjunctive adverbs or phrases to express straightforward logical relationships (e.g., *first*, *afterward*, *in response*) Decide the most logical place to add a sentence in an essay Add a sentence that introduces a simple paragraph Determine the need for conjunctive adverbs or phrases to create subtle logical connections between sentences (e.g., *therefore*, *however*, *in addition*) Rearrange the sentences in a fairly uncomplicated paragraph for the sake of logic Add a sentence to introduce or conclude the essay or to provide a transition between paragraphs when the essay is fairly straightforward **Word Choice in Terms of Style, Tone, Clarity, and Economy:** Revise sentences to correct awkward and confusing arrangements of sentence elements Revise vague nouns and pronouns that create obvious logic problems

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TABLE 1D

MISSOURI English III Course Level Expectations	ACT English and Writing College Readiness Standards
Strand 2: Writing	
Big Idea 1. Apply a writing process in composing text	
	Delete obviously synonymous and wordy material in a sentence Revise expressions that deviate from the style of an essay Delete redundant material when information is repeated in different parts of speech (e.g., “alarmingly startled”) Use the word or phrase most consistent with the style and tone of a fairly straightforward essay Determine the clearest and most logical conjunction to link clauses Revise a phrase that is redundant in terms of the meaning and logic of the entire sentence Identify and correct ambiguous pronoun references Use the word or phrase most appropriate in terms of the content of the sentence and tone of the essay **Sentence Structure and Formation:** Use conjunctions or punctuation to join simple clauses Revise shifts in verb tense between simple clauses in a sentence or between simple adjoining sentences Determine the need for punctuation and conjunctions to avoid awkward-sounding sentence fragments and fused sentences Decide the appropriate verb tense and voice by considering the meaning of the entire sentence Recognize and correct marked disturbances of sentence flow and structure (e.g., participial phrase fragments, missing or incorrect relative pronouns, dangling or misplaced modifiers) Revise to avoid faulty placement of phrases and faulty coordination and subordination of clauses in sentences with subtle structural problems Maintain consistent verb tense and pronoun person on the basis of the preceding clause or sentence Use sentence-combining techniques, effectively avoiding problematic comma splices, run-on sentences, and sentence fragments, especially in sentences containing compound subjects or verbs Maintain a consistent and logical use of verb tense and pronoun person on the basis of information in the paragraph or essay as a whole **Conventions of Usage:** Solve such basic grammatical problems as how to form the past and past participle of irregular but commonly used verbs and how to form comparative and superlative adjectives Solve such grammatical problems as whether to use an adverb or adjective form, how to ensure straightforward subject-verb and pronoun-antecedent agreement, and which preposition to use in simple contexts

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TABLE 1D

MISSOURI English III Course Level Expectations	ACT English and Writing College Readiness Standards
Strand 2: Writing	
Big Idea 1. Apply a writing process in composing text	
	Recognize and use the appropriate word in frequently confused pairs such as *there* and *their*, *past* and *passed*, and *led* and *lead*
	Use idiomatically appropriate prepositions, especially in combination with verbs (e.g., *long for*, *appeal to*)
	Ensure that a verb agrees with its subject when there is some text between the two
	Ensure that a pronoun agrees with its antecedent when the two occur in separate clauses or sentences
	Identify the correct past and past participle forms of irregular and infrequently used verbs and form present-perfect verbs by using *have* rather than *of*
	Correctly use reflexive pronouns, the possessive pronouns *its* and *your*, and the relative pronouns *who* and *whom*
	Ensure that a verb agrees with its subject in unusual situations (e.g., when the subject-verb order is inverted or when the subject is an indefinite pronoun)
	Conventions of Punctuation:
	Delete commas that create basic sense problems (e.g., between verb and direct object)
	Provide appropriate punctuation in straightforward situations (e.g., items in a series)
	Delete commas that disturb the sentence flow (e.g., between modifier and modified element)
	Use commas to set off simple parenthetical phrases
	Delete unnecessary commas when an incorrect reading of the sentence suggests a pause that should be punctuated (e.g., between verb and direct object clause)
	Use punctuation to set off complex parenthetical phrases
	Recognize and delete unnecessary commas based on a careful reading of a complicated sentence (e.g., between the elements of a compound subject or compound verb joined by *and*)
	Use apostrophes to indicate simple possessive nouns
	Recognize inappropriate uses of colons and semicolons
	Use commas to set off a nonessential/nonrestrictive appositive or clause

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TABLE 1D

MISSOURI English III Course Level Expectations	ACT English and Writing College Readiness Standards
Strand 2: Writing	
Big Idea 2. Compose well-developed text	
A. Audience and purpose Compose text a. showing awareness of audience b. choosing a form and point of view appropriate to purpose and audience	**Writing** College Readiness Standards **Expressing Judgments:** Show understanding of the persuasive purpose of the task by taking a position on the issue in the prompt Show clear understanding of the persuasive purpose of the task by taking a position on the specific issue in the prompt and offering a broad context for discussion Show clear understanding of the persuasive purpose of the task by taking a position on the specific issue in the prompt and offering a critical context for discussion **Focusing on the Topic:** Present a thesis that establishes a focus on the writer's position on the issue Present a critical thesis that clearly establishes the focus on the writer's position on the issue
B. Ideas and Content Compose text with: a. strong controlling idea b. relevant specific details c. complex ideas d. freshness of thought	**English** College Readiness Standards **Topic Development in Terms of Purpose and Focus:** Identify the basic purpose or role of a specified phrase or sentence Delete a clause or sentence because it is obviously irrelevant to the essay Identify the central idea or main topic of a straightforward piece of writing Determine relevancy when presented with a variety of sentence-level details Identify the focus of a simple essay, applying that knowledge to add a sentence that sharpens that focus or to determine if an essay has met a specified goal Delete material primarily because it disturbs the flow and development of the paragraph Add a sentence to accomplish a fairly straightforward purpose such as illustrating a given statement Apply an awareness of the focus and purpose of a fairly involved essay to determine the rhetorical effect and suitability of an existing phrase or sentence, or to determine the need to delete plausible but irrelevant material Add a sentence to accomplish a subtle rhetorical purpose such as to emphasize, to add supporting detail, or to express meaning through connotation **Writing** College Readiness Standards **Developing a Position:** Develop most ideas fully, using some specific and relevant reasons, details, and examples Show clear movement between general and specific ideas and examples Develop several ideas fully, using specific and relevant reasons, details, and examples

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TABLE 1D

MISSOURI English III Course Level Expectations	ACT English and Writing College Readiness Standards
Strand 2: Writing	
Big Idea 2. Compose well-developed text	
	Show effective movement between general and specific ideas and examples
C. Organization and Sentence Structure Compose text with a. effective beginning, middle, and end b. a logical order c. effective paragraphing d. cohesive devices e. varied sentence structure f. clarity of expression g. active voice	**English** College Readiness Standards **Organization, Unity, and Coherence:** Use conjunctive adverbs or phrases to show time relationships in simple narrative essays (e.g., *then*, *this time*) Select the most logical place to add a sentence in a paragraph Use conjunctive adverbs or phrases to express straightforward logical relationships (e.g., *first*, *afterward*, *in response*) Decide the most logical place to add a sentence in an essay Add a sentence that introduces a simple paragraph Determine the need for conjunctive adverbs or phrases to create subtle logical connections between sentences (e.g., *therefore*, *however*, *in addition*) Rearrange the sentences in a fairly uncomplicated paragraph for the sake of logic Add a sentence to introduce or conclude the essay or to provide a transition between paragraphs when the essay is fairly straightforward **Word Choice in Terms of Style, Tone, Clarity, and Economy:** Revise sentences to correct awkward and confusing arrangements of sentence elements Revise expressions that deviate from the style of an essay Use the word or phrase most consistent with the style and tone of a fairly straightforward essay Use the word or phrase most appropriate in terms of the content of the sentence and tone of the essay **Sentence Structure and Formation:** Decide the appropriate verb tense and voice by considering the meaning of the entire sentence **Writing** College Readiness Standards **Organizing Ideas:** Provide unity and coherence throughout the essay, sometimes with a logical progression of ideas Use relevant, though at times simple and obvious, transitional words and phrases to convey logical relationships between ideas Present a somewhat developed introduction and conclusion Provide unity and coherence throughout the essay, often with a logical progression of ideas Use relevant transitional words, phrases, and sentences to convey logical relationships between ideas Present a well-developed introduction and conclusion

*Locally assessed.

= Measured by ACT English, Reading, and/or Writing tests

TABLE 1D

MISSOURI English III Course Level Expectations	ACT English and Writing College Readiness Standards
Strand 2: Writing	
Big Idea 2. Compose well-developed text	
D. Word Choice Compose text using a. precise and vivid language b. writing techniques such as imagery, humor, voice, figurative language, and rhetorical devices	**English** College Readiness Standards **Topic Development in Terms of Purpose and Focus:** Identify the basic purpose or role of a specified phrase or sentence Apply an awareness of the focus and purpose of a fairly involved essay to determine the rhetorical effect and suitability of an existing phrase or sentence, or to determine the need to delete plausible but irrelevant material **Word Choice in Terms of Style, Tone, Clarity, and Economy:** Revise vague nouns and pronouns that create obvious logic problems Revise expressions that deviate from the style of an essay Use the word or phrase most consistent with the style and tone of a fairly straightforward essay Determine the clearest and most logical conjunction to link clauses Identify and correct ambiguous pronoun references Use the word or phrase most appropriate in terms of the content of the sentence and tone of the essay **Writing** College Readiness Standards **Using Language:** Show competent use of language to communicate ideas by • correctly employing most conventions of standard English grammar, usage, and mechanics, with a few distracting errors but none that impede understanding • using some precise and varied vocabulary • using several kinds of sentence structures to vary pace and to support meaning Show effective use of language to clearly communicate ideas by • correctly employing most conventions of standard English grammar, usage, and mechanics, with just a few, if any, errors • using precise and varied vocabulary • using a variety of kinds of sentence structures to vary pace and to support meaning
E. Conventions In written text apply a. conventions of capitalization b. conventions of punctuation c. standard usage	**English** College Readiness Standards **Conventions of Usage:** Solve such basic grammatical problems as how to form the past and past participle of irregular but commonly used verbs and how to form comparative and superlative adjectives Solve such grammatical problems as whether to use an adverb or adjective form, how to ensure straightforward subject-verb and pronoun-antecedent agreement, and which preposition to use in simple contexts

*Locally assessed.

= Measured by ACT English, Reading, and/or Writing tests

TABLE 1D

MISSOURI English III Course Level Expectations	ACT English and Writing College Readiness Standards
Strand 2: Writing	
Big Idea 2. Compose well-developed text	
	Recognize and use the appropriate word in frequently confused pairs such as *there* and *their*, *past* and *passed*, and *led* and *lead* Use idiomatically appropriate prepositions, especially in combination with verbs (e.g., *long for*, *appeal to*) Ensure that a verb agrees with its subject when there is some text between the two Ensure that a pronoun agrees with its antecedent when the two occur in separate clauses or sentences Identify the correct past and past participle forms of irregular and infrequently used verbs and form present-perfect verbs by using *have* rather than *of* Correctly use reflexive pronouns, the possessive pronouns *its* and *your*, and the relative pronouns *who* and *whom* Ensure that a verb agrees with its subject in unusual situations (e.g., when the subject-verb order is inverted or when the subject is an indefinite pronoun) **Conventions of Punctuation:** Delete commas that create basic sense problems (e.g., between verb and direct object) Provide appropriate punctuation in straightforward situations (e.g., items in a series) Delete commas that disturb the sentence flow (e.g., between modifier and modified element) Use commas to set off simple parenthetical phrases Delete unnecessary commas when an incorrect reading of the sentence suggests a pause that should be punctuated (e.g., between verb and direct object clause) Use punctuation to set off complex parenthetical phrases Recognize and delete unnecessary commas based on a careful reading of a complicated sentence (e.g., between the elements of a compound subject or compound verb joined by *and*) Use apostrophes to indicate simple possessive nouns Recognize inappropriate uses of colons and semicolons Use commas to set off a nonessential/nonrestrictive appositive or clause **Writing** College Readiness Standards **Using Language:** Show adequate use of language to communicate by • correctly employing many of the conventions of standard English grammar, usage, and mechanics, but with some distracting errors that may occasionally impede understanding • using appropriate vocabulary • using some varied kinds of sentence structures to vary pace

*Locally assessed.

 = Measured by ACT English, Reading, and/or Writing tests

TABLE 1D

MISSOURI English III Course Level Expectations	ACT English and Writing College Readiness Standards
Strand 2: Writing	
Big Idea 2. Compose well-developed text	
	Show competent use of language to communicate ideas by • correctly employing most conventions of standard English grammar, usage, and mechanics, with a few distracting errors but none that impede understanding • using some precise and varied vocabulary • using several kinds of sentence structures to vary pace and to support meaning Show effective use of language to clearly communicate ideas by • correctly employing most conventions of standard English grammar, usage, and mechanics, with just a few, if any, errors • using precise and varied vocabulary • using a variety of kinds of sentence structures to vary pace and to support meaning

*Locally assessed.

= Measured by ACT English, Reading, and/or Writing tests

TABLE 1D

MISSOURI English III Course Level Expectations	**ACT English and Writing College Readiness Standards**
Strand 2: Writing	
Big Idea 3. Write effectively in various forms and types of writing	
A. Forms/Types/Modes of Writing Compose a variety of texts, a. using narrative, descriptive, expository, and/or persuasive features b. in various formats, including workplace communications (resume, letter of application, follow-up letter) c. including summary d. including literary analysis e. including reflective writing	**English** College Readiness Standards **Topic Development in Terms of Purpose and Focus:** Identify the basic purpose or role of a specified phrase or sentence Delete a clause or sentence because it is obviously irrelevant to the essay Identify the central idea or main topic of a straightforward piece of writing Determine relevancy when presented with a variety of sentence-level details Identify the focus of a simple essay, applying that knowledge to add a sentence that sharpens that focus or to determine if an essay has met a specified goal Delete material primarily because it disturbs the flow and development of the paragraph Add a sentence to accomplish a fairly straightforward purpose such as illustrating a given statement Apply an awareness of the focus and purpose of a fairly involved essay to determine the rhetorical effect and suitability of an existing phrase or sentence, or to determine the need to delete plausible but irrelevant material Add a sentence to accomplish a subtle rhetorical purpose such as to emphasize, to add supporting detail, or to express meaning through connotation **Organization, Unity, and Coherence:** Use conjunctive adverbs or phrases to show time relationships in simple narrative essays (e.g., *then*, *this time*) Select the most logical place to add a sentence in a paragraph Use conjunctive adverbs or phrases to express straightforward logical relationships (e.g., *first*, *afterward*, *in response*) Decide the most logical place to add a sentence in an essay Add a sentence that introduces a simple paragraph Determine the need for conjunctive adverbs or phrases to create subtle logical connections between sentences (e.g., *therefore*, *however*, *in addition*) Rearrange the sentences in a fairly uncomplicated paragraph for the sake of logic Add a sentence to introduce or conclude the essay or to provide a transition between paragraphs when the essay is fairly straightforward **Word Choice in Terms of Style, Tone, Clarity, and Economy:** Revise sentences to correct awkward and confusing arrangements of sentence elements

*Locally assessed.

 = Measured by ACT English, Reading, and/or Writing tests

TABLE 1D

MISSOURI English III Course Level Expectations	ACT English and Writing College Readiness Standards
Strand 2: Writing	
Big Idea 3. Write effectively in various forms and types of writing	
	Revise vague nouns and pronouns that create obvious logic problems Delete obviously synonymous and wordy material in a sentence Revise expressions that deviate from the style of an essay Delete redundant material when information is repeated in different parts of speech (e.g., “alarmingly startled”) Use the word or phrase most consistent with the style and tone of a fairly straightforward essay Determine the clearest and most logical conjunction to link clauses Revise a phrase that is redundant in terms of the meaning and logic of the entire sentence Identify and correct ambiguous pronoun references Use the word or phrase most appropriate in terms of the content of the sentence and tone of the essay **Sentence Structure and Formation:** Use conjunctions or punctuation to join simple clauses Revise shifts in verb tense between simple clauses in a sentence or between simple adjoining sentences Determine the need for punctuation and conjunctions to avoid awkward-sounding sentence fragments and fused sentences Decide the appropriate verb tense and voice by considering the meaning of the entire sentence Recognize and correct marked disturbances of sentence flow and structure (e.g., participial phrase fragments, missing or incorrect relative pronouns, dangling or misplaced modifiers) Revise to avoid faulty placement of phrases and faulty coordination and subordination of clauses in sentences with subtle structural problems Maintain consistent verb tense and pronoun person on the basis of the preceding clause or sentence Use sentence-combining techniques, effectively avoiding problematic comma splices, run-on sentences, and sentence fragments, especially in sentences containing compound subjects or verbs Maintain a consistent and logical use of verb tense and pronoun person on the basis of information in the paragraph or essay as a whole **Conventions of Usage:** Solve such basic grammatical problems as how to form the past and past participle of irregular but commonly used verbs and how to form comparative and superlative adjectives

*Locally assessed.

= Measured by ACT English, Reading, and/or Writing tests

TABLE 1D

MISSOURI English III Course Level Expectations	ACT English and Writing College Readiness Standards
Strand 2: Writing	
Big Idea 3. Write effectively in various forms and types of writing	
	Solve such grammatical problems as whether to use an adverb or adjective form, how to ensure straightforward subject-verb and pronoun-antecedent agreement, and which preposition to use in simple contexts Recognize and use the appropriate word in frequently confused pairs such as *there* and *their*, *past* and *passed*, and *led* and *lead* Use idiomatically appropriate prepositions, especially in combination with verbs (e.g., *long for*, *appeal to*) Ensure that a verb agrees with its subject when there is some text between the two Ensure that a pronoun agrees with its antecedent when the two occur in separate clauses or sentences Identify the correct past and past participle forms of irregular and infrequently used verbs and form present-perfect verbs by using *have* rather than *of* Correctly use reflexive pronouns, the possessive pronouns *its* and *your*, and the relative pronouns *who* and *whom* Ensure that a verb agrees with its subject in unusual situations (e.g., when the subject-verb order is inverted or when the subject is an indefinite pronoun) **Conventions of Punctuation:** Delete commas that create basic sense problems (e.g., between verb and direct object) Provide appropriate punctuation in straightforward situations (e.g., items in a series) Delete commas that disturb the sentence flow (e.g., between modifier and modified element) Use commas to set off simple parenthetical phrases Delete unnecessary commas when an incorrect reading of the sentence suggests a pause that should be punctuated (e.g., between verb and direct object clause) Use punctuation to set off complex parenthetical phrases Recognize and delete unnecessary commas based on a careful reading of a complicated sentence (e.g., between the elements of a compound subject or compound verb joined by *and*) Use apostrophes to indicate simple possessive nouns Recognize inappropriate uses of colons and semicolons Use commas to set off a nonessential/nonrestrictive appositive or clause **Writing** College Readiness Standards **Expressing Judgments:** Show clear understanding of the persuasive purpose of the task by taking a position on the specific issue in the prompt and offering a broad context for discussion

*Locally assessed.

 = Measured by ACT English, Reading, and/or Writing tests

TABLE 1D

MISSOURI English III Course Level Expectations	ACT English and Writing College Readiness Standards
Strand 2: Writing	
Big Idea 3. Write effectively in various forms and types of writing	
	Show clear understanding of the persuasive purpose of the task by taking a position on the specific issue in the prompt and offering a critical context for discussion

*Locally assessed.

= Measured by ACT English, Reading, and/or Writing tests

TABLE 1D

MISSOURI English III Course Level Expectations	ACT College Readiness Standards
Strand 3: Listening and Speaking	
Big Idea 1. Develop and apply effective listening skills and strategies	
A. Purpose for Listening Listen • for enjoyment • for information • for directions • critically to summarize and evaluate communications that inform, persuade and entertain • to evaluate own and others' effectiveness in presentations and group discussions, using provided criteria • to evaluate the validity and reliability of speaker's message	
B. Listening Behavior Use active-listening behaviors (e.g., asks questions of speaker and uses body language and facial expressions to indicate agreement, disagreement or confusion)	
Big Idea 2. Develop and apply effective speaking skills and strategies for various audiences and purposes	
A. Discussion and Presentation In discussions and presentations, • create concise presentations on a variety of topics • incorporate appropriate media or technology • respond to feedback • defend ideas • demonstrate poise and self-control	
B. Giving Directions Give clear and concise multi-step oral directions to perform complex procedures and/or tasks	

*Locally assessed.

= Measured by ACT English, Reading, and/or Writing tests

TABLE 1D

MISSOURI English III **Course Level Expectations**	**ACT** **College Readiness Standards**
Strand 4: Information Literacy	
Big Idea 1. Develop and apply effective research process skills to gather, analyze and evaluate information	
A. Research Plan Develop an appropriate research plan to guide investigation and research of focus questions	
B. Acquire information Locate and use multiple primary and secondary sources to • select relevant and credible information • evaluate reliability of information • evaluate reliability of sources	
C. Record Information Record relevant information from multiple primary and secondary sources using a self-selected note-taking or organizational strategy	
D. Sources Consulted Document sources of information using a standard citation format	
Big Idea 2. Develop and apply effective skills and strategies to analyze and evaluate oral and visual media	
A. Media Messages Analyze, describe and evaluate the elements of messages projected in various media (e.g., videos, pictures, web-sites, artwork, plays and/or news programs)	

*Locally assessed.

= Measured by ACT English, Reading, and/or Writing tests

TABLE 1E

MISSOURI English IV Course Level Expectations	ACT Reading College Readiness Standards
Strand 1: Reading	
Big Idea 1. Develop and apply skills and strategies to the reading process	
A. Print Concepts No CLE	
B. Phonemic Awareness No CLE	
C. Phonics Apply decoding strategies to "problem-solve" unknown words when reading when needed*	
D. Fluency Read grade-level instructional text* a. with fluency: accuracy, comprehension and appropriate expression b. adjusting reading rate to difficulty and type of text	**Main Ideas and Author's Approach:** Recognize a clear intent of an author or narrator in uncomplicated literary narratives Identify a clear main idea or purpose of straightforward paragraphs in uncomplicated literary narratives Infer the main idea or purpose of straightforward paragraphs in uncomplicated literary narratives Understand the overall approach taken by an author or narrator (e.g., point of view, kinds of evidence used) in uncomplicated passages Identify a clear main idea or purpose of any paragraph or paragraphs in uncomplicated passages Infer the main idea or purpose of straightforward paragraphs in more challenging passages Summarize basic events and ideas in more challenging passages Understand the overall approach taken by an author or narrator (e.g., point of view, kinds of evidence used) in more challenging passages Infer the main idea or purpose of more challenging passages or their paragraphs **Supporting Details:** Locate basic facts (e.g., names, dates, events) clearly stated in a passage Locate simple details at the sentence and paragraph level in uncomplicated passages Recognize a clear function of a part of an uncomplicated passage Locate important details in uncomplicated passages Make simple inferences about how details are used in passages Locate important details in more challenging passages Locate and interpret minor or subtly stated details in uncomplicated passages Discern which details, though they may appear in different sections throughout a passage, support important points in more challenging passages

*Locally assessed.

 = Measured by ACT English, Reading, and/or Writing tests

TABLE 1E

MISSOURI English IV Course Level Expectations	ACT Reading College Readiness Standards
Strand 1: Reading	
Big Idea 1. Develop and apply skills and strategies to the reading process	
	Locate and interpret minor or subtly stated details in more challenging passages
	Sequential, Comparative, and Cause-Effect Relationships:
	Determine when (e.g., first, last, before, after) or if an event occurred in uncomplicated passages
	Recognize clear cause-effect relationships described within a single sentence in a passage
	Identify relationships between main characters in uncomplicated literary narratives
	Recognize clear cause-effect relationships within a single paragraph in uncomplicated literary narratives
	Order simple sequences of events in uncomplicated literary narratives
	Identify clear relationships between people, ideas, and so on in uncomplicated passages
	Identify clear cause-effect relationships in uncomplicated passages
	Order sequences of events in uncomplicated passages
	Understand relationships between people, ideas, and so on in uncomplicated passages
	Identify clear relationships between characters, ideas, and so on in more challenging literary narratives
	Understand implied or subtly stated cause-effect relationships in uncomplicated passages
	Identify clear cause-effect relationships in more challenging passages
	Order sequences of events in more challenging passages
	Understand the dynamics between people, ideas, and so on in more challenging passages
	Understand implied or subtly stated cause-effect relationships in more challenging passages
	Meanings of Words:
	Understand the implication of a familiar word or phrase and of simple descriptive language
	Use context to understand basic figurative language
	Use context to determine the appropriate meaning of some figurative and nonfigurative words, phrases, and statements in uncomplicated passages
	Use context to determine the appropriate meaning of virtually any word, phrase, or statement in uncomplicated passages
	Use context to determine the appropriate meaning of some figurative and nonfigurative words, phrases, and statements in more challenging passages

*Locally assessed.

 = Measured by ACT English, Reading, and/or Writing tests

TABLE 1E

MISSOURI English IV Course Level Expectations	ACT Reading College Readiness Standards
Strand 1: Reading	
Big Idea 1. Develop and apply skills and strategies to the reading process	
	Determine the appropriate meaning of words, phrases, or statements from figurative or somewhat technical contexts **Generalizations and Conclusions:** Draw simple generalizations and conclusions about the main characters in uncomplicated literary narratives Draw simple generalizations and conclusions about people, ideas, and so on in uncomplicated passages Draw generalizations and conclusions about people, ideas, and so on in uncomplicated passages Draw simple generalizations and conclusions using details that support the main points of more challenging passages Draw subtle generalizations and conclusions about characters, ideas, and so on in uncomplicated literary narratives Draw generalizations and conclusions about people, ideas, and so on in more challenging passages Use information from one or more sections of a more challenging passage to draw generalizations and conclusions about people, ideas, and so on
E. Vocabulary Develop vocabulary through text, using a. roots and affixes b. context clues c. glossary, dictionary and thesaurus	**Meanings of Words:** Understand the implication of a familiar word or phrase and of simple descriptive language Use context to understand basic figurative language Use context to determine the appropriate meaning of some figurative and nonfigurative words, phrases, and statements in uncomplicated passages Use context to determine the appropriate meaning of virtually any word, phrase, or statement in uncomplicated passages Use context to determine the appropriate meaning of some figurative and nonfigurative words, phrases, and statements in more challenging passages Determine the appropriate meaning of words, phrases, or statements from figurative or somewhat technical contexts
F. Pre-Reading Apply pre-reading strategies to aid comprehension* a. access prior knowledge b. preview c. predict with text support or rationale d. set a purpose and rate for reading	

*Locally assessed.

= Measured by ACT English, Reading, and/or Writing tests

TABLE 1E

MISSOURI English IV Course Level Expectations	ACT Reading College Readiness Standards
Strand 1: Reading	
Big Idea 1. Develop and apply skills and strategies to the reading process	
G. During reading During reading, utilize strategies to* a. determine meaning of unknown words b. self-monitor comprehension c. question the text d. infer e. visualize f. paraphrase g. summarize	**Main Ideas and Author's Approach:** Infer the main idea or purpose of straightforward paragraphs in uncomplicated literary narratives Understand the overall approach taken by an author or narrator (e.g., point of view, kinds of evidence used) in uncomplicated passages Infer the main idea or purpose of straightforward paragraphs in more challenging passages Summarize basic events and ideas in more challenging passages Understand the overall approach taken by an author or narrator (e.g., point of view, kinds of evidence used) in more challenging passages Infer the main idea or purpose of more challenging passages or their paragraphs **Supporting Details:** Make simple inferences about how details are used in passages Locate and interpret minor or subtly stated details in uncomplicated passages Discern which details, though they may appear in different sections throughout a passage, support important points in more challenging passages Locate and interpret minor or subtly stated details in more challenging passages **Sequential, Comparative, and Cause-Effect Relationships:** Determine when (e.g., first, last, before, after) or if an event occurred in uncomplicated passages Order simple sequences of events in uncomplicated literary narratives Order sequences of events in uncomplicated passages Understand relationships between people, ideas, and so on in uncomplicated passages Understand implied or subtly stated cause-effect relationships in uncomplicated passages Identify clear cause-effect relationships in more challenging passages Order sequences of events in more challenging passages Understand the dynamics between people, ideas, and so on in more challenging passages Understand implied or subtly stated cause-effect relationships in more challenging passages **Meanings of Words:** Understand the implication of a familiar word or phrase and of simple descriptive language

*Locally assessed.

 = Measured by ACT English, Reading, and/or Writing tests

TABLE 1E

MISSOURI English IV Course Level Expectations	ACT Reading College Readiness Standards
Strand 1: Reading	
Big Idea 1. Develop and apply skills and strategies to the reading process	
	Use context to understand basic figurative language Use context to determine the appropriate meaning of some figurative and nonfigurative words, phrases, and statements in uncomplicated passages Use context to determine the appropriate meaning of virtually any word, phrase, or statement in uncomplicated passages Use context to determine the appropriate meaning of some figurative and nonfigurative words, phrases, and statements in more challenging passages Determine the appropriate meaning of words, phrases, or statements from figurative or somewhat technical contexts **Generalizations and Conclusions:** Draw simple generalizations and conclusions about the main characters in uncomplicated literary narratives Draw simple generalizations and conclusions about people, ideas, and so on in uncomplicated passages Draw generalizations and conclusions about people, ideas, and so on in uncomplicated passages Draw simple generalizations and conclusions using details that support the main points of more challenging passages Draw subtle generalizations and conclusions about characters, ideas, and so on in uncomplicated literary narratives Draw generalizations and conclusions about people, ideas, and so on in more challenging passages Use information from one or more sections of a more challenging passage to draw generalizations and conclusions about people, ideas, and so on
H. Post-Reading Apply post-reading skills to comprehend, interpret, analyze, and evaluate text: a. identify and explain the relationship between the main idea and supporting details b. question to clarify* c. reflect d. draw conclusions e. paraphrase f. summarize	**Main Ideas and Author's Approach:** Recognize a clear intent of an author or narrator in uncomplicated literary narratives Identify a clear main idea or purpose of straightforward paragraphs in uncomplicated literary narratives Infer the main idea or purpose of straightforward paragraphs in uncomplicated literary narratives Understand the overall approach taken by an author or narrator (e.g., point of view, kinds of evidence used) in uncomplicated passages Identify a clear main idea or purpose of any paragraph or paragraphs in uncomplicated passages Infer the main idea or purpose of straightforward paragraphs in more challenging passages Summarize basic events and ideas in more challenging passages Understand the overall approach taken by an author or narrator (e.g., point of view, kinds of evidence used) in more

*Locally assessed.

= Measured by ACT English, Reading, and/or Writing tests

MISSOURI English IV Course Level Expectations	ACT Reading College Readiness Standards
Strand 1: Reading	
Big Idea 1. Develop and apply skills and strategies to the reading process	
	challenging passages Infer the main idea or purpose of more challenging passages or their paragraphs **Supporting Details:** Locate basic facts (e.g., names, dates, events) clearly stated in a passage Locate simple details at the sentence and paragraph level in uncomplicated passages Recognize a clear function of a part of an uncomplicated passage Locate important details in uncomplicated passages Make simple inferences about how details are used in passages Locate important details in more challenging passages Locate and interpret minor or subtly stated details in uncomplicated passages Discern which details, though they may appear in different sections throughout a passage, support important points in more challenging passages Locate and interpret minor or subtly stated details in more challenging passages **Meanings of Words:** Understand the implication of a familiar word or phrase and of simple descriptive language Use context to understand basic figurative language Use context to determine the appropriate meaning of some figurative and nonfigurative words, phrases, and statements in uncomplicated passages Use context to determine the appropriate meaning of virtually any word, phrase, or statement in uncomplicated passages Use context to determine the appropriate meaning of some figurative and nonfigurative words, phrases, and statements in more challenging passages Determine the appropriate meaning of words, phrases, or statements from figurative or somewhat technical contexts **Generalizations and Conclusions:** Draw simple generalizations and conclusions about the main characters in uncomplicated literary narratives Draw simple generalizations and conclusions about people, ideas, and so on in uncomplicated passages Draw generalizations and conclusions about people, ideas, and so on in uncomplicated passages Draw simple generalizations and conclusions using details that support the main points of more challenging passages Draw subtle generalizations and conclusions about charac-

*Locally assessed.

TABLE 1E

MISSOURI English IV Course Level Expectations	ACT Reading College Readiness Standards
Strand 1: Reading	
Big Idea 1. Develop and apply skills and strategies to the reading process	
	ters, ideas, and so on in uncomplicated literary narratives Draw generalizations and conclusions about people, ideas, and so on in more challenging passages Use information from one or more sections of a more challenging passage to draw generalizations and conclusions about people, ideas, and so on
I. **Making Connections** Compare, contrast, analyze and evaluate connections: a. text to text (information and relationships in various fiction and non-fiction works) b. text to self (text ideas and own experiences)* c. text to world (text ideas and the world by analyzing and evaluating the relationship between literature and its historical period and culture)*	

*Locally assessed.

= Measured by ACT English, Reading, and/or Writing tests

TABLE 1E

MISSOURI English IV Course Level Expectations	ACT Reading College Readiness Standards
Strand 1: Reading	
Big Idea 2. Develop and apply skills and strategies to comprehend, analyze and evaluate fiction, poetry and drama from a variety of cultures and times	
A. Text Features Analyze and evaluate the text features in grade-level text	
B. Literary Techniques Analyze and evaluate literary techniques previously introduced	
C. Literary Elements Use details from text(s) to a. demonstrate comprehension skills previously introduced b. analyze character, plot, setting, point of view c. analyze the development of a theme across genres d. evaluate the effect of tone on the overall meaning of work	**Supporting Details:** Recognize a clear function of a part of an uncomplicated passage Make simple inferences about how details are used in passages Discern which details, though they may appear in different sections throughout a passage, support important points in more challenging passages

*Locally assessed.

= Measured by ACT English, Reading, and/or Writing tests

TABLE 1E

MISSOURI English IV Course Level Expectations	ACT Reading College Readiness Standards
Strand 1: Reading	
Big Idea 3. Develop and apply skills and strategies to comprehend, analyze and evaluate nonfiction (such as biographies, newspapers, technical manuals) from a variety of cultures and times	
A. Text Features Explain, analyze and evaluate the author's use of text features to clarify meaning	
B. Literary Techniques Analyze and evaluate literary techniques in non-fiction including figurative language and sound devices previously introduced	
C. Text Structures Use details from informational text to a. analyze and evaluate the organizational patterns b. identify and analyze faulty reasoning and unfounded inferences c. evaluate proposed solutions d. evaluate for accuracy and adequacy of evidence e. analyze and evaluate the type of appeal (emotional, ethical, and logical) f. evaluate effect of tone on the overall meaning of work g. analyze and evaluate point of view h. analyze and evaluate author's viewpoint/perspective i. demonstrate comprehension skills previously introduced	**Main Ideas and Author's Approach:** Understand the overall approach taken by an author or narrator (e.g., point of view, kinds of evidence used) in uncomplicated passages Understand the overall approach taken by an author or narrator (e.g., point of view, kinds of evidence used) in more challenging passages **Supporting Details:** Recognize a clear function of a part of an uncomplicated passage Make simple inferences about how details are used in passages Discern which details, though they may appear in different sections throughout a passage, support important points in more challenging passages **Generalizations and Conclusions:** Draw simple generalizations and conclusions about people, ideas, and so on in uncomplicated passages Draw generalizations and conclusions about people, ideas, and so on in uncomplicated passages Draw simple generalizations and conclusions using details that support the main points of more challenging passages Draw generalizations and conclusions about people, ideas, and so on in more challenging passages Use information from one or more sections of a more challenging passage to draw generalizations and conclusions about people, ideas, and so on
D. Understanding Directions Read and apply multi-step directions to perform complex procedures and/or tasks*	

*Locally assessed.

= Measured by ACT English, Reading, and/or Writing tests

TABLE 1E

MISSOURI English IV Course Level Expectations	ACT English and Writing College Readiness Standards
Strand 2: Writing	
Big Idea 1. Apply a writing process in composing text	
A. Writing Process Follow a writing process to a. use appropriate prewriting strategies as needed b. generate a draft c. revise in response to feedback (peer and/or teacher)* d. edit for conventions* e. share writing*	**English** College Readiness Standards **Topic Development in Terms of Purpose and Focus:** Identify the basic purpose or role of a specified phrase or sentence Delete a clause or sentence because it is obviously irrelevant to the essay Identify the central idea or main topic of a straightforward piece of writing Determine relevancy when presented with a variety of sentence-level details Identify the focus of a simple essay, applying that knowledge to add a sentence that sharpens that focus or to determine if an essay has met a specified goal Delete material primarily because it disturbs the flow and development of the paragraph Add a sentence to accomplish a fairly straightforward purpose such as illustrating a given statement Apply an awareness of the focus and purpose of a fairly involved essay to determine the rhetorical effect and suitability of an existing phrase or sentence, or to determine the need to delete plausible but irrelevant material Add a sentence to accomplish a subtle rhetorical purpose such as to emphasize, to add supporting detail, or to express meaning through connotation **Organization, Unity, and Coherence:** Use conjunctive adverbs or phrases to show time relationships in simple narrative essays (e.g., *then*, *this time*) Select the most logical place to add a sentence in a paragraph Use conjunctive adverbs or phrases to express straightforward logical relationships (e.g., *first*, *afterward*, *in response*) Decide the most logical place to add a sentence in an essay Add a sentence that introduces a simple paragraph Determine the need for conjunctive adverbs or phrases to create subtle logical connections between sentences (e.g., *therefore*, *however*, *in addition*) Rearrange the sentences in a fairly uncomplicated paragraph for the sake of logic Add a sentence to introduce or conclude the essay or to provide a transition between paragraphs when the essay is fairly straightforward **Word Choice in Terms of Style, Tone, Clarity, and Economy:** Revise sentences to correct awkward and confusing arrangements of sentence elements Revise vague nouns and pronouns that create obvious logic problems

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TABLE 1E

MISSOURI English IV Course Level Expectations	ACT English and Writing College Readiness Standards
Strand 2: Writing	
Big Idea 1. Apply a writing process in composing text	
	Delete obviously synonymous and wordy material in a sentence Revise expressions that deviate from the style of an essay Delete redundant material when information is repeated in different parts of speech (e.g., “alarmingly startled”) Use the word or phrase most consistent with the style and tone of a fairly straightforward essay Determine the clearest and most logical conjunction to link clauses Revise a phrase that is redundant in terms of the meaning and logic of the entire sentence Identify and correct ambiguous pronoun references Use the word or phrase most appropriate in terms of the content of the sentence and tone of the essay **Sentence Structure and Formation:** Use conjunctions or punctuation to join simple clauses Revise shifts in verb tense between simple clauses in a sentence or between simple adjoining sentences Determine the need for punctuation and conjunctions to avoid awkward-sounding sentence fragments and fused sentences Decide the appropriate verb tense and voice by considering the meaning of the entire sentence Recognize and correct marked disturbances of sentence flow and structure (e.g., participial phrase fragments, missing or incorrect relative pronouns, dangling or misplaced modifiers) Revise to avoid faulty placement of phrases and faulty coordination and subordination of clauses in sentences with subtle structural problems Maintain consistent verb tense and pronoun person on the basis of the preceding clause or sentence Use sentence-combining techniques, effectively avoiding problematic comma splices, run-on sentences, and sentence fragments, especially in sentences containing compound subjects or verbs Maintain a consistent and logical use of verb tense and pronoun person on the basis of information in the paragraph or essay as a whole **Conventions of Usage:** Solve such basic grammatical problems as how to form the past and past participle of irregular but commonly used verbs and how to form comparative and superlative adjectives Solve such grammatical problems as whether to use an adverb or adjective form, how to ensure straightforward subject-verb and pronoun-antecedent agreement, and which preposition to use in simple contexts

*Locally assessed.

 = Measured by ACT English, Reading, and/or Writing tests

TABLE 1E

MISSOURI English IV Course Level Expectations	ACT English and Writing College Readiness Standards
Strand 2: Writing	
Big Idea 1. Apply a writing process in composing text	
	Recognize and use the appropriate word in frequently confused pairs such as *there* and *their*, *past* and *passed*, and *led* and *lead*
	Use idiomatically appropriate prepositions, especially in combination with verbs (e.g., *long for*, *appeal to*)
	Ensure that a verb agrees with its subject when there is some text between the two
	Ensure that a pronoun agrees with its antecedent when the two occur in separate clauses or sentences
	Identify the correct past and past participle forms of irregular and infrequently used verbs and form present-perfect verbs by using *have* rather than *of*
	Correctly use reflexive pronouns, the possessive pronouns *its* and *your*, and the relative pronouns *who* and *whom*
	Ensure that a verb agrees with its subject in unusual situations (e.g., when the subject-verb order is inverted or when the subject is an indefinite pronoun)
	Conventions of Punctuation:
	Delete commas that create basic sense problems (e.g., between verb and direct object)
	Provide appropriate punctuation in straightforward situations (e.g., items in a series)
	Delete commas that disturb the sentence flow (e.g., between modifier and modified element)
	Use commas to set off simple parenthetical phrases
	Delete unnecessary commas when an incorrect reading of the sentence suggests a pause that should be punctuated (e.g., between verb and direct object clause)
	Use punctuation to set off complex parenthetical phrases
	Recognize and delete unnecessary commas based on a careful reading of a complicated sentence (e.g., between the elements of a compound subject or compound verb joined by *and*)
	Use apostrophes to indicate simple possessive nouns
	Recognize inappropriate uses of colons and semicolons
	Use commas to set off a nonessential/nonrestrictive appositive or clause

*Locally assessed.

= Measured by ACT English, Reading, and/or Writing tests

TABLE 1E

MISSOURI English IV Course Level Expectations	ACT English and Writing College Readiness Standards
Strand 2: Writing	
Big Idea 2. Compose well-developed text	
A. Audience and purpose Compose text a. showing awareness of audience b. choosing a form and point of view appropriate to purpose and audience	**Writing** College Readiness Standards **Expressing Judgments:** Show understanding of the persuasive purpose of the task by taking a position on the issue in the prompt Show clear understanding of the persuasive purpose of the task by taking a position on the specific issue in the prompt and offering a broad context for discussion Show clear understanding of the persuasive purpose of the task by taking a position on the specific issue in the prompt and offering a critical context for discussion **Focusing on the Topic:** Present a thesis that establishes a focus on the writer's position on the issue Present a critical thesis that clearly establishes the focus on the writer's position on the issue
B. Ideas and Content Compose text with: a. strong controlling idea b. relevant specific details c. complex ideas d. freshness of thought	**English** College Readiness Standards **Topic Development in Terms of Purpose and Focus:** Identify the basic purpose or role of a specified phrase or sentence Delete a clause or sentence because it is obviously irrelevant to the essay Identify the central idea or main topic of a straightforward piece of writing Determine relevancy when presented with a variety of sentence-level details Identify the focus of a simple essay, applying that knowledge to add a sentence that sharpens that focus or to determine if an essay has met a specified goal Delete material primarily because it disturbs the flow and development of the paragraph Add a sentence to accomplish a fairly straightforward purpose such as illustrating a given statement Apply an awareness of the focus and purpose of a fairly involved essay to determine the rhetorical effect and suitability of an existing phrase or sentence, or to determine the need to delete plausible but irrelevant material Add a sentence to accomplish a subtle rhetorical purpose such as to emphasize, to add supporting detail, or to express meaning through connotation **Writing** College Readiness Standards **Developing a Position:** Develop most ideas fully, using some specific and relevant reasons, details, and examples Show clear movement between general and specific ideas and examples Develop several ideas fully, using specific and relevant reasons, details, and examples

*Locally assessed.

 = Measured by ACT English, Reading, and/or Writing tests

TABLE 1E

MISSOURI English IV Course Level Expectations	ACT English and Writing College Readiness Standards
Strand 2: Writing	
Big Idea 2. Compose well-developed text	
	Show effective movement between general and specific ideas and examples
C. Organization and Sentence Structure Compose text with a. effective beginning, middle, and end b. a logical order c. effective paragraphing d. cohesive devices e. varied sentence structure f. clarity of expression g. active voice	**English** College Readiness Standards **Organization, Unity, and Coherence:** Use conjunctive adverbs or phrases to show time relationships in simple narrative essays (e.g., *then*, *this time*) Select the most logical place to add a sentence in a paragraph Use conjunctive adverbs or phrases to express straightforward logical relationships (e.g., *first*, *afterward*, *in response*) Decide the most logical place to add a sentence in an essay Add a sentence that introduces a simple paragraph Determine the need for conjunctive adverbs or phrases to create subtle logical connections between sentences (e.g., *therefore*, *however*, *in addition*) Rearrange the sentences in a fairly uncomplicated paragraph for the sake of logic Add a sentence to introduce or conclude the essay or to provide a transition between paragraphs when the essay is fairly straightforward **Word Choice in Terms of Style, Tone, Clarity, and Economy:** Revise sentences to correct awkward and confusing arrangements of sentence elements Revise expressions that deviate from the style of an essay Use the word or phrase most consistent with the style and tone of a fairly straightforward essay Use the word or phrase most appropriate in terms of the content of the sentence and tone of the essay **Sentence Structure and Formation:** Decide the appropriate verb tense and voice by considering the meaning of the entire sentence **Writing** College Readiness Standards **Organizing Ideas:** Provide unity and coherence throughout the essay, sometimes with a logical progression of ideas Use relevant, though at times simple and obvious, transitional words and phrases to convey logical relationships between ideas Present a somewhat developed introduction and conclusion Provide unity and coherence throughout the essay, often with a logical progression of ideas Use relevant transitional words, phrases, and sentences to convey logical relationships between ideas Present a well-developed introduction and conclusion

*Locally assessed.

= Measured by ACT English, Reading, and/or Writing tests

TABLE 1E

MISSOURI English IV Course Level Expectations	ACT English and Writing College Readiness Standards
Strand 2: Writing	
Big Idea 2. Compose well-developed text	
D. Word Choice Compose text using a. precise and vivid language b. writing techniques such as imagery, humor, voice, figurative language, and rhetorical devices	**English** College Readiness Standards **Topic Development in Terms of Purpose and Focus:** Identify the basic purpose or role of a specified phrase or sentence Apply an awareness of the focus and purpose of a fairly involved essay to determine the rhetorical effect and suitability of an existing phrase or sentence, or to determine the need to delete plausible but irrelevant material **Word Choice in Terms of Style, Tone, Clarity, and Economy:** Revise vague nouns and pronouns that create obvious logic problems Revise expressions that deviate from the style of an essay Use the word or phrase most consistent with the style and tone of a fairly straightforward essay Determine the clearest and most logical conjunction to link clauses Identify and correct ambiguous pronoun references Use the word or phrase most appropriate in terms of the content of the sentence and tone of the essay **Writing** College Readiness Standards **Using Language:** Show competent use of language to communicate ideas by • correctly employing most conventions of standard English grammar, usage, and mechanics, with a few distracting errors but none that impede understanding • using some precise and varied vocabulary • using several kinds of sentence structures to vary pace and to support meaning Show effective use of language to clearly communicate ideas by • correctly employing most conventions of standard English grammar, usage, and mechanics, with just a few, if any, errors • using precise and varied vocabulary • using a variety of kinds of sentence structures to vary pace and to support meaning
E. Conventions In written text apply a. conventions of capitalization b. conventions of punctuation c. standard usage	**English** College Readiness Standards **Conventions of Usage:** Solve such basic grammatical problems as how to form the past and past participle of irregular but commonly used verbs and how to form comparative and superlative adjectives Solve such grammatical problems as whether to use an adverb or adjective form, how to ensure straightforward subject-verb and pronoun-antecedent agreement, and which

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= Measured by ACT English, Reading, and/or Writing tests

MISSOURI English IV Course Level Expectations	ACT English and Writing College Readiness Standards
Strand 2: Writing	
Big Idea 2. Compose well-developed text	
	preposition to use in simple contexts Recognize and use the appropriate word in frequently confused pairs such as *there* and *their*, *past* and *passed*, and *led* and *lead* Use idiomatically appropriate prepositions, especially in combination with verbs (e.g., *long for*, *appeal to*) Ensure that a verb agrees with its subject when there is some text between the two Ensure that a pronoun agrees with its antecedent when the two occur in separate clauses or sentences Identify the correct past and past participle forms of irregular and infrequently used verbs and form present-perfect verbs by using *have* rather than *of* Correctly use reflexive pronouns, the possessive pronouns *its* and *your*, and the relative pronouns *who* and *whom* Ensure that a verb agrees with its subject in unusual situations (e.g., when the subject-verb order is inverted or when the subject is an indefinite pronoun) **Conventions of Punctuation:** Delete commas that create basic sense problems (e.g., between verb and direct object) Provide appropriate punctuation in straightforward situations (e.g., items in a series) Delete commas that disturb the sentence flow (e.g., between modifier and modified element) Use commas to set off simple parenthetical phrases Delete unnecessary commas when an incorrect reading of the sentence suggests a pause that should be punctuated (e.g., between verb and direct object clause) Use punctuation to set off complex parenthetical phrases Recognize and delete unnecessary commas based on a careful reading of a complicated sentence (e.g., between the elements of a compound subject or compound verb joined by *and*) Use apostrophes to indicate simple possessive nouns Recognize inappropriate uses of colons and semicolons Use commas to set off a nonessential/nonrestrictive appositive or clause **Writing** College Readiness Standards **Using Language:** Show adequate use of language to communicate by • correctly employing many of the conventions of standard English grammar, usage, and mechanics, but with some distracting errors that may occasionally impede understanding • using appropriate vocabulary • using some varied kinds of sentence structures to vary

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 = Measured by ACT English, Reading, and/or Writing tests

MISSOURI English IV Course Level Expectations	ACT English and Writing College Readiness Standards
Strand 2: Writing	
Big Idea 2. Compose well-developed text	
	pace Show competent use of language to communicate ideas by • correctly employing most conventions of standard English grammar, usage, and mechanics, with a few distracting errors but none that impede understanding • using some precise and varied vocabulary • using several kinds of sentence structures to vary pace and to support meaning Show effective use of language to clearly communicate ideas by • correctly employing most conventions of standard English grammar, usage, and mechanics, with just a few, if any, errors • using precise and varied vocabulary • using a variety of kinds of sentence structures to vary pace and to support meaning

*Locally assessed.

 = Measured by ACT English, Reading, and/or Writing tests

TABLE 1E

MISSOURI English IV Course Level Expectations	ACT English and Writing College Readiness Standards
Strand 2: Writing	
Big Idea 3. Write effectively in various forms and types of writing	
A. Forms/Types/Modes of Writing Compose a variety of texts, a. using narrative, descriptive, expository, and/or persuasive features b. in various formats, including workplace communications (resume, letter of application, follow-up letter) c. including summary d. including literary analysis e. including reflective writing	**English** College Readiness Standards **Topic Development in Terms of Purpose and Focus:** Identify the basic purpose or role of a specified phrase or sentence Delete a clause or sentence because it is obviously irrelevant to the essay Identify the central idea or main topic of a straightforward piece of writing Determine relevancy when presented with a variety of sentence-level details Identify the focus of a simple essay, applying that knowledge to add a sentence that sharpens that focus or to determine if an essay has met a specified goal Delete material primarily because it disturbs the flow and development of the paragraph Add a sentence to accomplish a fairly straightforward purpose such as illustrating a given statement Apply an awareness of the focus and purpose of a fairly involved essay to determine the rhetorical effect and suitability of an existing phrase or sentence, or to determine the need to delete plausible but irrelevant material Add a sentence to accomplish a subtle rhetorical purpose such as to emphasize, to add supporting detail, or to express meaning through connotation **Organization, Unity, and Coherence:** Use conjunctive adverbs or phrases to show time relationships in simple narrative essays (e.g., *then*, *this time*) Select the most logical place to add a sentence in a paragraph Use conjunctive adverbs or phrases to express straightforward logical relationships (e.g., *first*, *afterward*, *in response*) Decide the most logical place to add a sentence in an essay Add a sentence that introduces a simple paragraph Determine the need for conjunctive adverbs or phrases to create subtle logical connections between sentences (e.g., *therefore*, *however*, *in addition*) Rearrange the sentences in a fairly uncomplicated paragraph for the sake of logic Add a sentence to introduce or conclude the essay or to provide a transition between paragraphs when the essay is fairly straightforward **Word Choice in Terms of Style, Tone, Clarity, and Economy:** Revise sentences to correct awkward and confusing arrangements of sentence elements

*Locally assessed.

 = Measured by ACT English, Reading, and/or Writing tests

TABLE 1E

MISSOURI English IV Course Level Expectations	ACT English and Writing College Readiness Standards
Strand 2: Writing	
Big Idea 3. Write effectively in various forms and types of writing	
	Revise vague nouns and pronouns that create obvious logic problems Delete obviously synonymous and wordy material in a sentence Revise expressions that deviate from the style of an essay Delete redundant material when information is repeated in different parts of speech (e.g., “alarmingly startled”) Use the word or phrase most consistent with the style and tone of a fairly straightforward essay Determine the clearest and most logical conjunction to link clauses Revise a phrase that is redundant in terms of the meaning and logic of the entire sentence Identify and correct ambiguous pronoun references Use the word or phrase most appropriate in terms of the content of the sentence and tone of the essay **Sentence Structure and Formation:** Use conjunctions or punctuation to join simple clauses Revise shifts in verb tense between simple clauses in a sentence or between simple adjoining sentences Determine the need for punctuation and conjunctions to avoid awkward-sounding sentence fragments and fused sentences Decide the appropriate verb tense and voice by considering the meaning of the entire sentence Recognize and correct marked disturbances of sentence flow and structure (e.g., participial phrase fragments, missing or incorrect relative pronouns, dangling or misplaced modifiers) Revise to avoid faulty placement of phrases and faulty coordination and subordination of clauses in sentences with subtle structural problems Maintain consistent verb tense and pronoun person on the basis of the preceding clause or sentence Use sentence-combining techniques, effectively avoiding problematic comma splices, run-on sentences, and sentence fragments, especially in sentences containing compound subjects or verbs Maintain a consistent and logical use of verb tense and pronoun person on the basis of information in the paragraph or essay as a whole **Conventions of Usage:** Solve such basic grammatical problems as how to form the past and past participle of irregular but commonly used verbs and how to form comparative and superlative adjectives

*Locally assessed.

 = Measured by ACT English, Reading, and/or Writing tests

TABLE 1E

MISSOURI English IV Course Level Expectations	ACT English and Writing College Readiness Standards
Strand 2: Writing	
Big Idea 3. Write effectively in various forms and types of writing	
	Solve such grammatical problems as whether to use an adverb or adjective form, how to ensure straightforward subject-verb and pronoun-antecedent agreement, and which preposition to use in simple contexts Recognize and use the appropriate word in frequently confused pairs such as *there* and *their*, *past* and *passed*, and *led* and *lead* Use idiomatically appropriate prepositions, especially in combination with verbs (e.g., *long for*, *appeal to*) Ensure that a verb agrees with its subject when there is some text between the two Ensure that a pronoun agrees with its antecedent when the two occur in separate clauses or sentences Identify the correct past and past participle forms of irregular and infrequently used verbs and form present-perfect verbs by using *have* rather than *of* Correctly use reflexive pronouns, the possessive pronouns *its* and *your*, and the relative pronouns *who* and *whom* Ensure that a verb agrees with its subject in unusual situations (e.g., when the subject-verb order is inverted or when the subject is an indefinite pronoun) **Conventions of Punctuation:** Delete commas that create basic sense problems (e.g., between verb and direct object) Provide appropriate punctuation in straightforward situations (e.g., items in a series) Delete commas that disturb the sentence flow (e.g., between modifier and modified element) Use commas to set off simple parenthetical phrases Delete unnecessary commas when an incorrect reading of the sentence suggests a pause that should be punctuated (e.g., between verb and direct object clause) Use punctuation to set off complex parenthetical phrases Recognize and delete unnecessary commas based on a careful reading of a complicated sentence (e.g., between the elements of a compound subject or compound verb joined by *and*) Use apostrophes to indicate simple possessive nouns Recognize inappropriate uses of colons and semicolons Use commas to set off a nonessential/nonrestrictive appositive or clause **Writing** College Readiness Standards **Expressing Judgments:** Show clear understanding of the persuasive purpose of the task by taking a position on the specific issue in the prompt and offering a broad context for discussion

*Locally assessed.

 = Measured by ACT English, Reading, and/or Writing tests

TABLE 1E

MISSOURI English IV Course Level Expectations	ACT English and Writing College Readiness Standards
Strand 2: Writing	
Big Idea 3. Write effectively in various forms and types of writing	
	Show clear understanding of the persuasive purpose of the task by taking a position on the specific issue in the prompt and offering a critical context for discussion

*Locally assessed.

= Measured by ACT English, Reading, and/or Writing tests

TABLE 1E

MISSOURI English IV Course Level Expectations	ACT College Readiness Standards
Strand 3: Listening and Speaking	
Big Idea 1. Develop and apply effective listening skills and strategies	
A. Purpose for Listening Listen • for enjoyment • for information • for directions • critically to summarize and evaluate communications that inform, persuade and entertain • to evaluate own and others' effectiveness in presentations and group discussions, using provided criteria • to evaluate the validity and reliability of speaker's message	
B. Listening Behavior Use active-listening behaviors (e.g., asks questions of speaker and uses body language and facial expressions to indicate agreement, disagreement or confusion)	
Big Idea 2. Develop and apply effective speaking skills and strategies for various audiences and purposes	
A. Discussion and Presentation In discussions and presentations, • create concise presentations on a variety of topics • incorporate appropriate media or technology • respond to feedback • defend ideas • demonstrate poise and self-control	
B. Giving Directions Give clear and concise multi-step oral directions to perform complex procedures and/or tasks	

*Locally assessed.

= Measured by ACT English, Reading, and/or Writing tests

TABLE 1E

MISSOURI English IV Course Level Expectations	ACT College Readiness Standards
Strand 4: Information Literacy	
Big Idea 1. Develop and apply effective research process skills to gather, analyze and evaluate information	
A. Research Plan Develop an appropriate research plan to guide investigation and research of focus questions	
B. Acquire information Locate and use multiple primary and secondary sources to • select relevant and credible information • evaluate reliability of information • evaluate reliability of sources	
C. Record Information Record relevant information from multiple primary and secondary sources using a self-selected note-taking or organizational strategy	
D. Sources Consulted Document sources of information using a standard citation format	
Big Idea 2. Develop and apply effective skills and strategies to analyze and evaluate oral and visual media	
A. Media Messages Analyze, describe and evaluate the elements of messages projected in various media (e.g., videos, pictures, web-sites, artwork, plays and/or news programs)	

*Locally assessed.

= Measured by ACT English, Reading, and/or Writing tests

SUPPLEMENT
TABLES 2A–2M:
MATHEMATICS

TABLE 2A

MISSOURI Algebra I Course Level Expectations	EXPLORE Mathematics College Readiness Standards
Strand 1: Number and Operations	
Big Idea 1. Understand numbers, ways of representing numbers, relationships among numbers and number systems	
A. Read, write and compare numbers: compare and order rational and irrational numbers, including finding their approximate locations on a number line	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent **Numbers: Concepts & Properties:** Identify a digit's place value Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor Find and use the least common multiple Order fractions **Graphical Representations:** Identify the location of a point with a positive coordinate on the number line Locate points on the number line and in the first quadrant
B. Represent and use rational numbers: use real numbers and various models, drawing, etc. to solve problems	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) **Probability, Statistics, & Data Analysis:** Perform a single computation using information from a table or chart Read tables and graphs Perform computations on data from tables and graphs Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs

*Locally assessed.

= Measured by EXPLORE Mathematics Test

TABLE 2A

MISSOURI Algebra I Course Level Expectations	EXPLORE Mathematics College Readiness Standards
Strand 1: Number and Operations	
Big Idea 1. Understand numbers, ways of representing numbers, relationships among numbers and number systems	
C. Compose and decompose numbers: use a variety of representations to demonstrate an understanding of very large and very small numbers*	**Numbers: Concepts & Properties:** Recognize equivalent fractions and fractions in lowest terms Recognize one-digit factors of a number Identify a digit's place value Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor Find and use the least common multiple Order fractions Work with numerical factors Work with scientific notation Work with squares and square roots of numbers
D. Classify and describe numeric relationships: No CLE	**Numbers: Concepts & Properties:** Recognize equivalent fractions and fractions in lowest terms Recognize one-digit factors of a number Identify a digit's place value Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor Find and use the least common multiple Order fractions Work with numerical factors Work with scientific notation Work with squares and square roots of numbers

*Locally assessed.

= Measured by EXPLORE Mathematics Test

TABLE 2A

MISSOURI Algebra I Course Level Expectations	EXPLORE Mathematics College Readiness Standards
Strand 1: Number and Operations	
Big Idea 2. Understand meanings of operations and how they relate to one another	
A. Represent operations: No CLE	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour)
B. Describe effects of operations: describe the effects of operations, such as multiplication, division, and computing powers and roots on the magnitude of quantities*	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) **Numbers: Concepts & Properties:** Recognize one-digit factors of a number Identify a digit's place value Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor Find and use the least common multiple Order fractions Work with numerical factors Work with scientific notation Work with squares and square roots of numbers

*Locally assessed.

= Measured by EXPLORE Mathematics Test

TABLE 2A

MISSOURI Algebra I Course Level Expectations	EXPLORE Mathematics College Readiness Standards
Strand 1: Number and Operations	
Big Idea 2. Understand meanings of operations and how they relate to one another	
C. Apply properties of operations: No CLE	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour)
D. Apply operations on real and complex numbers: apply operations to real numbers, using mental computation or paper-and-pencil calculations for simple cases and technology for more complicated cases*	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour)

*Locally assessed.

= Measured by EXPLORE Mathematics Test

TABLE 2A

MISSOURI Algebra I Course Level Expectations	EXPLORE Mathematics College Readiness Standards
Strand 1: Number and Operations	
Big Idea 3. Compute fluently and make reasonable estimates	
A. Describe or represent mental strategies: No CLE	
B. Develop and demonstrate fluency: No CLE	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour)
C. Compute problems: No CLE	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Perform common conversions (e.g., inches to feet or hours to minutes) Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour)
D. Estimate and justify solutions: judge the reasonableness of numerical computations and their results*	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour)

*Locally assessed.

= Measured by EXPLORE Mathematics Test

TABLE 2A

MISSOURI Algebra I Course Level Expectations	EXPLORE Mathematics College Readiness Standards
Strand 1: Number and Operations	
Big Idea 3. Compute fluently and make reasonable estimates	
E. Use proportional reasoning: solve problems involving proportions*	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Perform common conversions (e.g., inches to feet or hours to minutes) Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) **Expressions, Equations, & Inequalities:** Solve routine first-degree equations Solve real-world problems using first-degree equations Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions)

*Locally assessed.

TABLE 2A

MISSOURI Algebra I Course Level Expectations	EXPLORE Mathematics College Readiness Standards
Strand 2: Algebraic Relationships	
Big Idea 1. Understand patterns, relations and functions	
A. Recognize and extend patterns: No CLE	**Numbers: Concepts & Properties:** Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor
B. Create and analyze patterns: generalize patterns using explicitly or recursively defined functions	**Numbers: Concepts & Properties:** Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor
C. Classify objects and representations: compare and contrast various forms of representations of patterns	**Numbers: Concepts & Properties:** Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor
D. Identify and compare functions: understand and compare the properties of linear and nonlinear functions	**Probability, Statistics, & Data Analysis:** Read tables and graphs Perform computations on data from tables and graphs Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs **Graphical Representations:** Locate points on the number line and in the first quadrant Locate points in the coordinate plane
E. Describe the effects of parameter changes: describe the effects of parameter changes on linear, exponential growth/decay and quadratic functions including intercepts	**Probability, Statistics, & Data Analysis:** Read tables and graphs Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs **Graphical Representations:** Locate points on the number line and in the first quadrant Locate points in the coordinate plane

*Locally assessed.

= Measured by EXPLORE Mathematics Test

TABLE 2A

MISSOURI Algebra I Course Level Expectations	EXPLORE Mathematics College Readiness Standards
Strand 2: Algebraic Relationships	
Big Idea 2. Represent and analyze mathematical situations and structures using algebraic symbols	
A. Represent mathematical situations: use symbolic algebra to represent and solve problems that involve linear and quadratic relationships including equations and inequalities	**Expressions, Equations, & Inequalities:** Exhibit knowledge of basic expressions (e.g., identify an expression for a total as $b + g$) Solve equations in the form $x + a = b$, where a and b are whole numbers or decimals Solve one-step equations having integer or decimal answers Solve routine first-degree equations Perform straightforward word-to-symbol translations Solve real-world problems using first-degree equations Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions) Identify solutions to simple quadratic equations
B. Describe and use mathematical manipulation: describe and use algebraic manipulations, including factoring and rules of integer exponents and apply properties of exponents (including order of operations) to simplify expressions	**Numbers: Concepts & Properties:** Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor **Expressions, Equations, & Inequalities:** Combine like terms (e.g., $2x + 5x$) Add and subtract simple algebraic expressions
C. Utilize equivalent forms: use and solve equivalent forms of equations (linear, absolute value, and quadratic)	**Expressions, Equations, & Inequalities:** Solve equations in the form $x + a = b$, where a and b are whole numbers or decimals Solve one-step equations having integer or decimal answers Solve routine first-degree equations Solve real-world problems using first-degree equations
D. Utilize systems: use and solve systems of linear equations or inequalities with 2 variables	

*Locally assessed.

= Measured by EXPLORE Mathematics Test

TABLE 2A

MISSOURI Algebra I Course Level Expectations	EXPLORE Mathematics College Readiness Standards
Strand 2: Algebraic Relationships	
Big Idea 3. Use mathematical models to represent and understand quantitative relationships	
A. Use mathematical models: identify quantitative relationships and determine the type(s) of functions that might model the situation to solve the problem	**Probability, Statistics, & Data Analysis:** Read tables and graphs Perform computations on data from tables and graphs Manipulate data from tables and graphs **Expressions, Equations, & Inequalities:** Perform straightforward word-to-symbol translations Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions)
Big Idea 4. Analyze change in various contexts	
A. Analyze change: analyze linear and quadratic functions by investigating rates of change, intercepts and zeros	**Probability, Statistics, & Data Analysis:** Perform a single computation using information from a table or chart Read tables and graphs Perform computations on data from tables and graphs Manipulate data from tables and graphs **Graphical Representations:** Locate points on the number line and in the first quadrant Locate points in the coordinate plane

*Locally assessed.

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TABLE 2A

MISSOURI Algebra I Course Level Expectations	EXPLORE Mathematics College Readiness Standards
Strand 3: Geometric and Spatial Relationships	
Big Idea 1. Analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships	
A. Describe and use geometric relationships: No CLE	**Properties of Plane Figures:** Exhibit some knowledge of the angles associated with parallel lines Find the measure of an angle using properties of parallel lines Exhibit knowledge of basic angle properties and special sums of angle measures (e.g., 90°, 180°, and 360°) Use several angle properties to find an unknown angle measure
B. Apply geometric relationships: apply geometric properties such as similarity and angle relationship to solve multi-step problems in 2 dimensions*	**Properties of Plane Figures:** Exhibit some knowledge of the angles associated with parallel lines Find the measure of an angle using properties of parallel lines Exhibit knowledge of basic angle properties and special sums of angle measures (e.g., 90°, 180°, and 360°) Use several angle properties to find an unknown angle measure
C. Compose and decompose shapes: No CLE	**Measurement:** Estimate or calculate the length of a line segment based on other lengths given on a geometric figure Compute the perimeter of polygons when all side lengths are given Compute the area of rectangles when whole number dimensions are given Compute the area and perimeter of triangles and rectangles in simple problems Use geometric formulas when all necessary information is given Compute the area of triangles and rectangles when one or more additional simple steps are required Compute the area and circumference of circles after identifying necessary information
Big Idea 2. Specify locations and describe spatial relationships using coordinate geometry and other representational systems	
A. Use coordinate systems: No CLE	**Graphical Representations:** Locate points on the number line and in the first quadrant Locate points in the coordinate plane

*Locally assessed.

TABLE 2A

MISSOURI Algebra I Course Level Expectations	EXPLORE Mathematics College Readiness Standards
Strand 3: Geometric and Spatial Relationships	
Big Idea 3. Apply transformations and use symmetry to analyze mathematical situations	
A. Use transformations on objects: No CLE	
B. Use transformations on functions: No CLE	
C. Use symmetry: No CLE	
Big Idea 4. Use visualization, spatial reasoning and geometric modeling to solve problems	
A. Recognize and draw three-dimensional representations: No CLE	
B. Draw and use visual models: draw or use visual models to represent and solve problems*	**Probability, Statistics, & Data Analysis:** Perform a single computation using information from a table or chart Calculate the average, given the number of data values and the sum of the data values Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs **Graphical Representations:** Locate points on the number line and in the first quadrant Locate points in the coordinate plane

*Locally assessed.

TABLE 2A

MISSOURI Algebra I Course Level Expectations	EXPLORE Mathematics College Readiness Standards
Strand 4: Measurement	
Big Idea 1. Understand measurable attributes of objects and the units, systems and processes of measurement	
A. Determine unit of measurement: No CLE	**Basic Operations & Applications:** Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour)
B. Identify equivalent measures: No CLE	**Basic Operations & Applications:** Perform common conversions (e.g., inches to feet or hours to minutes) Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour)
C. Tell and use units of time: No CLE	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average
D. Count and compute money: No CLE	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average

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TABLE 2A

MISSOURI Algebra I Course Level Expectations	EXPLORE Mathematics College Readiness Standards
Strand 4: Measurement	
Big Idea 2. Apply appropriate techniques, tools and formulas to determine measurements	
A. Use standard or non-standard measurement: No CLE	**Measurement:** Estimate or calculate the length of a line segment based on other lengths given on a geometric figure Compute the perimeter of polygons when all side lengths are given Compute the area and perimeter of triangles and rectangles in simple problems Use geometric formulas when all necessary information is given Compute the area of triangles and rectangles when one or more additional simple steps are required Compute the area and circumference of circles after identifying necessary information
B. Use angle measurement: No CLE	**Properties of Plane Figures:** Exhibit some knowledge of the angles associated with parallel lines Find the measure of an angle using properties of parallel lines Exhibit knowledge of basic angle properties and special sums of angle measures (e.g., 90°, 180°, and 360°) Use several angle properties to find an unknown angle measure
C. Apply geometric measurements: No CLE	**Measurement:** Estimate or calculate the length of a line segment based on other lengths given on a geometric figure Compute the perimeter of polygons when all side lengths are given Compute the area of rectangles when whole number dimensions are given Compute the area and perimeter of triangles and rectangles in simple problems Use geometric formulas when all necessary information is given Compute the area of triangles and rectangles when one or more additional simple steps are required Compute the area and circumference of circles after identifying necessary information

*Locally assessed.

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TABLE 2A

MISSOURI Algebra I Course Level Expectations	EXPLORE Mathematics College Readiness Standards
Strand 4: Measurement	
Big Idea 2. Apply appropriate techniques, tools and formulas to determine measurements	
D. Analyze precision: describe the effects of operations, such as multiplication, division and computing powers and roots on magnitudes of quantities and effects of computation on precision which include the judging of reasonableness of numerical computations and their results*	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Perform common conversions (e.g., inches to feet or hours to minutes) Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour)
E. Use relationships within a measurement system: use unit analysis to solve problems*	**Basic Operations & Applications:** Perform common conversions (e.g., inches to feet or hours to minutes) Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour)

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TABLE 2A

MISSOURI Algebra I Course Level Expectations	EXPLORE Mathematics College Readiness Standards
Strand 5: Data and Probability	
Big Idea 1. Formulate questions that can be addressed with data and collect, organize and display relevant data to answer them	
A. Formulate questions: formulate questions and collect data about a characteristic which include sample spaces and distributions	
B. Classify and organize data: No CLE	**Probability, Statistics, & Data Analysis:** Perform a single computation using information from a table or chart Calculate the average, given the number of data values and the sum of the data values Read tables and graphs Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs
C. Represent and interpret data: select and use appropriate graphical representation of data and given one-variable quantitative data, display the distribution and describe its shape	**Probability, Statistics, & Data Analysis:** Perform a single computation using information from a table or chart Calculate the average, given the number of data values and the sum of the data values Read tables and graphs Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs
Big Idea 2. Select and use appropriate statistical methods to analyze data	
A. Describe and analyze data: apply statistical measures of center to solve problems	**Probability, Statistics, & Data Analysis:** Calculate the average of a list of positive whole numbers Calculate the average of a list of numbers Calculate the average, given the number of data values and the sum of the data values Calculate the missing data value, given the average and all data values but one Calculate the average, given the frequency counts of all the data values
B. Compare data representations: No CLE	**Probability, Statistics, & Data Analysis:** Perform a single computation using information from a table or chart Calculate the average, given the number of data values and the sum of the data values Read tables and graphs Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs

*Locally assessed.

TABLE 2A

MISSOURI Algebra I Course Level Expectations	EXPLORE Mathematics College Readiness Standards
Strand 5: Data and Probability	
C. Represent data algebraically: given a scatterplot, determine an equation for a line of best fit	**Probability, Statistics, & Data Analysis:** Read tables and graphs Perform computations on data from tables and graphs Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs **Expressions, Equations, & Inequalities:** Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions)
Big Idea 3. Develop and evaluate inferences and predictions that are based on data	
A. Develop and evaluate inferences: make conjectures about possible relationships between 2 characteristics of a sample on the basis of scatter plots of the data	**Probability, Statistics, & Data Analysis:** Perform a single computation using information from a table or chart Calculate the average, given the number of data values and the sum of the data values Read tables and graphs Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs
B. Analyze basic statistical techniques: No CLE	
Big Idea 4. Understand and apply basic concepts of probability	
A. Apply basic concepts of probability: No CLE	**Probability, Statistics, & Data Analysis:** Use the relationship between the probability of an event and the probability of its complement Determine the probability of a simple event Exhibit knowledge of simple counting techniques Compute straightforward probabilities for common situations
B. Use and describe compound events: No CLE	

*Locally assessed.

TABLE 2B

MISSOURI Algebra I Course Level Expectations	PLAN Mathematics College Readiness Standards
Strand 1: Number and Operations	
Big Idea 1. Understand numbers, ways of representing numbers, relationships among numbers and number systems	
A. Read, write and compare numbers: compare and order rational and irrational numbers, including finding their approximate locations on a number line	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent **Numbers: Concepts & Properties:** Identify a digit's place value Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor Find and use the least common multiple Order fractions **Graphical Representations:** Identify the location of a point with a positive coordinate on the number line Locate points on the number line and in the first quadrant
B. Represent and use rational numbers: use real numbers and various models, drawing, etc. to solve problems	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages **Probability, Statistics, & Data Analysis:** Perform a single computation using information from a table or chart Read tables and graphs Perform computations on data from tables and graphs Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs

*Locally assessed.

= Measured by PLAN Mathematics Test

TABLE 2B

MISSOURI Algebra I Course Level Expectations	PLAN Mathematics College Readiness Standards
Strand 1: Number and Operations	
Big Idea 1. Understand numbers, ways of representing numbers, relationships among numbers and number systems	
C. Compose and decompose numbers: use a variety of representations to demonstrate an understanding of very large and very small numbers*	**Numbers: Concepts & Properties:** Recognize equivalent fractions and fractions in lowest terms Recognize one-digit factors of a number Identify a digit's place value Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor Find and use the least common multiple Order fractions Work with numerical factors Work with scientific notation Work with squares and square roots of numbers Work problems involving positive integer exponents Apply number properties involving prime factorization Apply rules of exponents
D. Classify and describe numeric relationships: No CLE	**Numbers: Concepts & Properties:** Recognize equivalent fractions and fractions in lowest terms Recognize one-digit factors of a number Identify a digit's place value Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor Find and use the least common multiple Order fractions Work with numerical factors Work with scientific notation Work with squares and square roots of numbers Work problems involving positive integer exponents Work with cubes and cube roots of numbers Apply number properties involving prime factorization Apply number properties involving even/odd numbers and factors/multiples Apply number properties involving positive/negative numbers Apply rules of exponents

*Locally assessed.

= Measured by PLAN Mathematics Test

TABLE 2B

MISSOURI Algebra I Course Level Expectations	PLAN Mathematics College Readiness Standards
Strand 1: Number and Operations	
Big Idea 2. Understand meanings of operations and how they relate to one another	
A. Represent operations: No CLE	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages
B. Describe effects of operations: describe the effects of operations, such as multiplication, division, and computing powers and roots on the magnitude of quantities*	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages **Numbers: Concepts & Properties:** Recognize one-digit factors of a number Identify a digit's place value Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor Find and use the least common multiple Order fractions Work with numerical factors Work with scientific notation Work with squares and square roots of numbers Work problems involving positive integer exponents Work with cubes and cube roots of numbers

*Locally assessed.

= Measured by PLAN Mathematics Test

TABLE 2B

MISSOURI Algebra I Course Level Expectations	PLAN Mathematics College Readiness Standards
Strand 1: Number and Operations	
Big Idea 2. Understand meanings of operations and how they relate to one another	
	Apply number properties involving prime factorization Apply number properties involving even/odd numbers and factors/multiples Apply number properties involving positive/negative numbers Apply rules of exponents
C. Apply properties of operations: No CLE	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Perform common conversions (e.g., inches to feet or hours to minutes) Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages
D. Apply operations on real and complex numbers: apply operations to real numbers, using mental computation or paper-and-pencil calculations for simple cases and technology for more complicated cases*	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages

*Locally assessed.

= Measured by PLAN Mathematics Test

TABLE 2B

MISSOURI Algebra I Course Level Expectations	PLAN Mathematics College Readiness Standards
Strand 1: Number and Operations	
Big Idea 3. Compute fluently and make reasonable estimates	
A. Describe or represent mental strategies: No CLE	
B. Develop and demonstrate fluency: No CLE	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages
C. Compute problems: No CLE	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages

*Locally assessed.

= Measured by PLAN Mathematics Test

TABLE 2B

MISSOURI Algebra I Course Level Expectations	PLAN Mathematics College Readiness Standards
Strand 1: Number and Operations	
Big Idea 3. Compute fluently and make reasonable estimates	
D. Estimate and justify solutions: judge the reasonableness of numerical computations and their results*	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages
E. Use proportional reasoning: solve problems involving proportions*	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Perform common conversions (e.g., inches to feet or hours to minutes) Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages **Expressions, Equations, & Inequalities:** Solve routine first-degree equations Solve real-world problems using first-degree equations Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions) Write expressions, equations, and inequalities for common algebra settings

*Locally assessed.

= Measured by PLAN Mathematics Test

TABLE 2B

MISSOURI Algebra I Course Level Expectations	PLAN Mathematics College Readiness Standards
Strand 2: Algebraic Relationships	
Big Idea 1. Understand patterns, relations and functions	
A. Recognize and extend patterns: No CLE	**Numbers: Concepts & Properties:** Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor
B. Create and analyze patterns: generalize patterns using explicitly or recursively defined functions	**Numbers: Concepts & Properties:** Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor
C. Classify objects and representations: compare and contrast various forms of representations of patterns	**Numbers: Concepts & Properties:** Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor
D. Identify and compare functions: understand and compare the properties of linear and nonlinear functions	**Probability, Statistics, & Data Analysis:** Read tables and graphs Perform computations on data from tables and graphs Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs **Graphical Representations:** Locate points on the number line and in the first quadrant Locate points in the coordinate plane Exhibit knowledge of slope Determine the slope of a line from points or equations Match linear graphs with their equations
E. Describe the effects of parameter changes: describe the effects of parameter changes on linear, exponential growth/decay and quadratic functions including intercepts	**Probability, Statistics, & Data Analysis:** Read tables and graphs Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs **Graphical Representations:** Locate points on the number line and in the first quadrant Locate points in the coordinate plane Exhibit knowledge of slope Determine the slope of a line from points or equations Match linear graphs with their equations Interpret and use information from graphs in the coordinate plane Use properties of parallel and perpendicular lines to determine an equation of a line or coordinates of a point

*Locally assessed.

= Measured by PLAN Mathematics Test

TABLE 2B

MISSOURI Algebra I Course Level Expectations	PLAN Mathematics College Readiness Standards
Strand 2: Algebraic Relationships	
Big Idea 2. Represent and analyze mathematical situations and structures using algebraic symbols	
A. Represent mathematical situations: use symbolic algebra to represent and solve problems that involve linear and quadratic relationships including equations and inequalities	**Expressions, Equations, & Inequalities:** Exhibit knowledge of basic expressions (e.g., identify an expression for a total as $b + g$) Solve equations in the form $x + a = b$, where a and b are whole numbers or decimals Solve one-step equations having integer or decimal answers Solve routine first-degree equations Perform straightforward word-to-symbol translations Solve real-world problems using first-degree equations Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions) Identify solutions to simple quadratic equations Factor simple quadratics (e.g., the difference of squares and perfect square trinomials) Solve first-degree inequalities that do not require reversing the inequality sign Manipulate expressions and equations Write expressions, equations, and inequalities for common algebra settings Solve linear inequalities that require reversing the inequality sign Solve quadratic equations
B. Describe and use mathematical manipulation: describe and use algebraic manipulations, including factoring and rules of integer exponents and apply properties of exponents (including order of operations) to simplify expressions	**Numbers: Concepts & Properties:** Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor Work with numerical factors Work problems involving positive integer exponents Apply rules of exponents **Expressions, Equations, & Inequalities:** Combine like terms (e.g., $2x + 5x$) Add and subtract simple algebraic expressions Multiply two binomials Add, subtract, and multiply polynomials Manipulate expressions and equations

*Locally assessed.

= Measured by PLAN Mathematics Test

TABLE 2B

MISSOURI Algebra I Course Level Expectations	PLAN Mathematics College Readiness Standards
Strand 2: Algebraic Relationships	
Big Idea 2. Represent and analyze mathematical situations and structures using algebraic symbols	
C. Utilize equivalent forms: use and solve equivalent forms of equations (linear, absolute value, and quadratic)	**Expressions, Equations, & Inequalities:** Solve equations in the form $x + a = b$, where a and b are whole numbers or decimals Solve one-step equations having integer or decimal answers Solve routine first-degree equations Solve real-world problems using first-degree equations Solve first-degree inequalities that do not require reversing the inequality sign Manipulate expressions and equations Solve linear inequalities that require reversing the inequality sign Solve absolute value equations Solve quadratic equations
D. Utilize systems: use and solve systems of linear equations or inequalities with 2 variables	**Expressions, Equations, & Inequalities:** Find solutions to systems of linear equations

*Locally assessed.

= Measured by PLAN Mathematics Test

TABLE 2B

MISSOURI Algebra I Course Level Expectations	PLAN Mathematics College Readiness Standards
Strand 2: Algebraic Relationships	
Big Idea 3. Use mathematical models to represent and understand quantitative relationships	
A. Use mathematical models: identify quantitative relationships and determine the type(s) of functions that might model the situation to solve the problem	**Probability, Statistics, & Data Analysis:** Read tables and graphs Perform computations on data from tables and graphs Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs **Expressions, Equations, & Inequalities:** Perform straightforward word-to-symbol translations Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions) Manipulate expressions and equations Write expressions, equations, and inequalities for common algebra settings
Big Idea 4. Analyze change in various contexts	
A. Analyze change: analyze linear and quadratic functions by investigating rates of change, intercepts and zeros	**Probability, Statistics, & Data Analysis:** Perform a single computation using information from a table or chart Read tables and graphs Perform computations on data from tables and graphs Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs **Graphical Representations:** Locate points on the number line and in the first quadrant Locate points in the coordinate plane Exhibit knowledge of slope Determine the slope of a line from points or equations Interpret and use information from graphs in the coordinate plane

*Locally assessed.

= Measured by PLAN Mathematics Test

TABLE 2B

MISSOURI Algebra I Course Level Expectations	PLAN Mathematics College Readiness Standards
Strand 3: Geometric and Spatial Relationships	
Big Idea 1. Analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships	
A. Describe and use geometric relationships: No CLE	**Properties of Plane Figures:** Exhibit some knowledge of the angles associated with parallel lines Find the measure of an angle using properties of parallel lines Exhibit knowledge of basic angle properties and special sums of angle measures (e.g., 90°, 180°, and 360°) Use several angle properties to find an unknown angle measure Recognize Pythagorean triples Use properties of isosceles triangles Apply properties of 30°-60°-90°, 45°-45°-90°, similar, and congruent triangles Use the Pythagorean theorem
B. Apply geometric relationships: apply geometric properties such as similarity and angle relationship to solve multi-step problems in 2 dimensions*	**Properties of Plane Figures:** Exhibit some knowledge of the angles associated with parallel lines Find the measure of an angle using properties of parallel lines Exhibit knowledge of basic angle properties and special sums of angle measures (e.g., 90°, 180°, and 360°) Use several angle properties to find an unknown angle measure Use properties of isosceles triangles Apply properties of 30°-60°-90°, 45°-45°-90°, similar, and congruent triangles
C. Compose and decompose shapes: No CLE	**Measurement:** Estimate or calculate the length of a line segment based on other lengths given on a geometric figure Compute the perimeter of polygons when all side lengths are given Compute the area of rectangles when whole number dimensions are given Compute the area and perimeter of triangles and rectangles in simple problems Use geometric formulas when all necessary information is given Compute the area of triangles and rectangles when one or more additional simple steps are required Compute the area and circumference of circles after identifying necessary information Compute the perimeter of simple composite geometric figures with unknown side lengths Use relationships involving area, perimeter, and volume of geometric figures to compute another measure

*Locally assessed.

= Measured by PLAN Mathematics Test

TABLE 2B

MISSOURI Algebra I Course Level Expectations	PLAN Mathematics College Readiness Standards
Strand 3: Geometric and Spatial Relationships	
Big Idea 2. Specify locations and describe spatial relationships using coordinate geometry and other representational systems	
A. Use coordinate systems: No CLE	**Graphical Representations:** Locate points on the number line and in the first quadrant Locate points in the coordinate plane Find the midpoint of a line segment Interpret and use information from graphs in the coordinate plane Use the distance formula
Big Idea 3. Apply transformations and use symmetry to analyze mathematical situations	
A. Use transformations on objects: No CLE	
B. Use transformations on functions: No CLE	
C. Use symmetry: No CLE	
Big Idea 4. Use visualization, spatial reasoning and geometric modeling to solve problems	
A. Recognize and draw three-dimensional representations: No CLE	
B. Draw and use visual models: draw or use visual models to represent and solve problems*	**Probability, Statistics, & Data Analysis:** Perform a single computation using information from a table or chart Calculate the average, given the number of data values and the sum of the data values Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs **Graphical Representations:** Locate points on the number line and in the first quadrant Locate points in the coordinate plane Interpret and use information from graphs in the coordinate plane

*Locally assessed.

= Measured by PLAN Mathematics Test

TABLE 2B

MISSOURI Algebra I Course Level Expectations	PLAN Mathematics College Readiness Standards
Strand 4: Measurement	
Big Idea 1. Understand measurable attributes of objects and the units, systems and processes of measurement	
A. Determine unit of measurement: No CLE	**Basic Operations & Applications:** Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour)
B. Identify equivalent measures: No CLE	**Basic Operations & Applications:** Perform common conversions (e.g., inches to feet or hours to minutes) Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour)
C. Tell and use units of time: No CLE	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average
D. Count and compute money: No CLE	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average

*Locally assessed.

= Measured by PLAN Mathematics Test

TABLE 2B

MISSOURI Algebra I Course Level Expectations	PLAN Mathematics College Readiness Standards
Strand 4: Measurement	
Big Idea 2. Apply appropriate techniques, tools and formulas to determine measurements	
A. Use standard or non-standard measurement: No CLE	**Measurement:** Estimate or calculate the length of a line segment based on other lengths given on a geometric figure Compute the perimeter of polygons when all side lengths are given Compute the area and perimeter of triangles and rectangles in simple problems Use geometric formulas when all necessary information is given Compute the area of triangles and rectangles when one or more additional simple steps are required Compute the area and circumference of circles after identifying necessary information Compute the perimeter of simple composite geometric figures with unknown side lengths Use relationships involving area, perimeter, and volume of geometric figures to compute another measure
B. Use angle measurement: No CLE	**Properties of Plane Figures:** Exhibit some knowledge of the angles associated with parallel lines Find the measure of an angle using properties of parallel lines Exhibit knowledge of basic angle properties and special sums of angle measures (e.g., 90°, 180°, and 360°) Use several angle properties to find an unknown angle measure Use properties of isosceles triangles Apply properties of 30°-60°-90°, 45°-45°-90°, similar, and congruent triangles
C. Apply geometric measurements: No CLE	**Measurement:** Estimate or calculate the length of a line segment based on other lengths given on a geometric figure Compute the perimeter of polygons when all side lengths are given Compute the area of rectangles when whole number dimensions are given Compute the area and perimeter of triangles and rectangles in simple problems Use geometric formulas when all necessary information is given Compute the area of triangles and rectangles when one or more additional simple steps are required Compute the area and circumference of circles after identifying necessary information Compute the perimeter of simple composite geometric

*Locally assessed.

TABLE 2B

MISSOURI Algebra I Course Level Expectations	PLAN Mathematics College Readiness Standards
Strand 4: Measurement	
Big Idea 2. Apply appropriate techniques, tools and formulas to determine measurements	
	figures with unknown side lengths Use relationships involving area, perimeter, and volume of geometric figures to compute another measure
D. Analyze precision: describe the effects of operations, such as multiplication, division and computing powers and roots on magnitudes of quantities and effects of computation on precision which include the judging of reasonableness of numerical computations and their results*	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Perform common conversions (e.g., inches to feet or hours to minutes) Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour)
E. Use relationships within a measurement system: use unit analysis to solve problems*	**Basic Operations & Applications:** Perform common conversions (e.g., inches to feet or hours to minutes) Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour)

*Locally assessed.

= Measured by PLAN Mathematics Test

TABLE 2B

MISSOURI Algebra I Course Level Expectations	PLAN Mathematics College Readiness Standards
Strand 5: Data and Probability	
Big Idea 1. Formulate questions that can be addressed with data and collect, organize and display relevant data to answer them	
A. Formulate questions: formulate questions and collect data about a characteristic which include sample spaces and distributions	
B. Classify and organize data: No CLE	**Probability, Statistics, & Data Analysis:** Perform a single computation using information from a table or chart Calculate the average, given the number of data values and the sum of the data values Read tables and graphs Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs
C. Represent and interpret data: select and use appropriate graphical representation of data and given one-variable quantitative data, display the distribution and describe its shape	**Probability, Statistics, & Data Analysis:** Perform a single computation using information from a table or chart Calculate the average, given the number of data values and the sum of the data values Read tables and graphs Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs

*Locally assessed.

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TABLE 2B

MISSOURI Algebra I Course Level Expectations	PLAN Mathematics College Readiness Standards
Strand 5: Data and Probability	
Big Idea 2. Select and use appropriate statistical methods to analyze data	
A. Describe and analyze data: apply statistical measures of center to solve problems	**Probability, Statistics, & Data Analysis:** Calculate the average of a list of positive whole numbers Calculate the average of a list of numbers Calculate the average, given the number of data values and the sum of the data values Calculate the missing data value, given the average and all data values but one Calculate the average, given the frequency counts of all the data values Calculate or use a weighted average
B. Compare data representations: No CLE	**Probability, Statistics, & Data Analysis:** Perform a single computation using information from a table or chart Calculate the average, given the number of data values and the sum of the data values Read tables and graphs Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs
C. Represent data algebraically: given a scatterplot, determine an equation for a line of best fit	**Probability, Statistics, & Data Analysis:** Read tables and graphs Perform computations on data from tables and graphs Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs **Expressions, Equations, & Inequalities:** Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions) Write expressions, equations, and inequalities for common algebra settings

*Locally assessed.

= Measured by PLAN Mathematics Test

TABLE 2B

MISSOURI Algebra I Course Level Expectations	PLAN Mathematics College Readiness Standards
Strand 5: Data and Probability	
Big Idea 3. Develop and evaluate inferences and predictions that are based on data	
A. Develop and evaluate inferences: make conjectures about possible relationships between 2 characteristics of a sample on the basis of scatter plots of the data	**Probability, Statistics, & Data Analysis:** Perform a single computation using information from a table or chart Calculate the average, given the number of data values and the sum of the data values Read tables and graphs Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs
B. Analyze basic statistical techniques: No CLE	
Big Idea 4. Understand and apply basic concepts of probability	
A. Apply basic concepts of probability: No CLE	**Probability, Statistics, & Data Analysis:** Use the relationship between the probability of an event and the probability of its complement Determine the probability of a simple event Exhibit knowledge of simple counting techniques Compute straightforward probabilities for common situations Use Venn diagrams in counting Apply counting techniques Compute a probability when the event and/or sample space are not given or obvious
B. Use and describe compound events: No CLE	**Probability, Statistics, & Data Analysis:** Apply counting techniques Compute a probability when the event and/or sample space are not given or obvious

*Locally assessed.

= Measured by PLAN Mathematics Test

TABLE 2C

MISSOURI Algebra I Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 1: Number and Operations	
Big Idea 1. Understand numbers, ways of representing numbers, relationships among numbers and number systems	
A. Read, write and compare numbers: compare and order rational and irrational numbers, including finding their approximate locations on a number line	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent **Numbers: Concepts & Properties:** Identify a digit's place value Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor Find and use the least common multiple Order fractions **Graphical Representations:** Identify the location of a point with a positive coordinate on the number line Locate points on the number line and in the first quadrant
B. Represent and use rational numbers: use real numbers and various models, drawing, etc. to solve problems	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages Solve complex arithmetic problems involving percent of increase or decrease and problems requiring integration of several concepts from pre-algebra and/or pre-geometry (e.g., comparing percentages or averages, using several ratios, and finding ratios in geometry settings) **Probability, Statistics, & Data Analysis:** Perform a single computation using information from a table or chart Read tables and graphs Perform computations on data from tables and graphs Translate from one representation of data to another (e.g., a

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= Measured by ACT Mathematics Test

TABLE 2C

MISSOURI Algebra I Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 1: Number and Operations	
Big Idea 1. Understand numbers, ways of representing numbers, relationships among numbers and number systems	
	bar graph to a circle graph) Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs Analyze and draw conclusions based on information from figures, tables, and graphs
C. Compose and decompose numbers: use a variety of representations to demonstrate an understanding of very large and very small numbers*	**Numbers: Concepts & Properties:** Recognize equivalent fractions and fractions in lowest terms Recognize one-digit factors of a number Identify a digit's place value Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor Find and use the least common multiple Order fractions Work with numerical factors Work with scientific notation Work with squares and square roots of numbers Work problems involving positive integer exponents Apply number properties involving prime factorization Apply rules of exponents Draw conclusions based on number concepts, algebraic properties, and/or relationships between expressions and numbers
D. Classify and describe numeric relationships: No CLE	**Numbers: Concepts & Properties:** Recognize equivalent fractions and fractions in lowest terms Recognize one-digit factors of a number Identify a digit's place value Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor Find and use the least common multiple Order fractions Work with numerical factors Work with scientific notation Work with squares and square roots of numbers Work problems involving positive integer exponents Work with cubes and cube roots of numbers Apply number properties involving prime factorization Apply number properties involving even/odd numbers and factors/multiples Apply number properties involving positive/negative

*Locally assessed.

= Measured by ACT Mathematics Test

TABLE 2C

MISSOURI Algebra I Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 1: Number and Operations	
Big Idea 1. Understand numbers, ways of representing numbers, relationships among numbers and number systems	
	numbers Apply rules of exponents Draw conclusions based on number concepts, algebraic properties, and/or relationships between expressions and numbers

*Locally assessed.

= Measured by ACT Mathematics Test

TABLE 2C

MISSOURI Algebra I Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 1: Number and Operations	
Big Idea 2. Understand meanings of operations and how they relate to one another	
A. Represent operations: No CLE	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages Solve complex arithmetic problems involving percent of increase or decrease and problems requiring integration of several concepts from pre-algebra and/or pre-geometry (e.g., comparing percentages or averages, using several ratios, and finding ratios in geometry settings)
B. Describe effects of operations: describe the effects of operations, such as multiplication, division, and computing powers and roots on the magnitude of quantities*	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages Solve complex arithmetic problems involving percent of increase or decrease and problems requiring integration of several concepts from pre-algebra and/or pre-geometry (e.g., comparing percentages or averages, using several ratios, and finding ratios in geometry settings) **Numbers: Concepts & Properties:** Recognize one-digit factors of a number Identify a digit's place value

*Locally assessed.

= Measured by ACT Mathematics Test

TABLE 2C

MISSOURI Algebra I Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 1: Number and Operations	
Big Idea 2. Understand meanings of operations and how they relate to one another	
	Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor Find and use the least common multiple Order fractions Work with numerical factors Work with scientific notation Work with squares and square roots of numbers Work problems involving positive integer exponents Work with cubes and cube roots of numbers Apply number properties involving prime factorization Apply number properties involving even/odd numbers and factors/multiples Apply number properties involving positive/negative numbers Apply rules of exponents Draw conclusions based on number concepts, algebraic properties, and/or relationships between expressions and numbers
C. Apply properties of operations: No CLE	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Perform common conversions (e.g., inches to feet or hours to minutes) Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages Solve complex arithmetic problems involving percent of increase or decrease and problems requiring integration of several concepts from pre-algebra and/or pre-geometry (e.g., comparing percentages or averages, using several ratios, and finding ratios in geometry settings)

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= Measured by ACT Mathematics Test

TABLE 2C

MISSOURI Algebra I Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 1: Number and Operations	
Big Idea 2. Understand meanings of operations and how they relate to one another	
D. Apply operations on real and complex numbers: apply operations to real numbers, using mental computation or paper-and-pencil calculations for simple cases and technology for more complicated cases*	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages Solve complex arithmetic problems involving percent of increase or decrease and problems requiring integration of several concepts from pre-algebra and/or pre-geometry (e.g., comparing percentages or averages, using several ratios, and finding ratios in geometry settings)

*Locally assessed.

= Measured by ACT Mathematics Test

TABLE 2C

MISSOURI Algebra I Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 1: Number and Operations	
Big Idea 3. Compute fluently and make reasonable estimates	
A. Describe or represent mental strategies: No CLE	
B. Develop and demonstrate fluency: No CLE	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages Solve complex arithmetic problems involving percent of increase or decrease and problems requiring integration of several concepts from pre-algebra and/or pre-geometry (e.g., comparing percentages or averages, using several ratios, and finding ratios in geometry settings)
C. Compute problems: No CLE	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages Solve complex arithmetic problems involving percent of increase or decrease and problems requiring integration of several concepts from pre-algebra and/or pre-geometry (e.g., comparing percentages or averages, using several ratios, and finding ratios in geometry settings)

*Locally assessed.

= Measured by ACT Mathematics Test

TABLE 2C

MISSOURI Algebra I Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 1: Number and Operations	
Big Idea 3. Compute fluently and make reasonable estimates	
D. Estimate and justify solutions: judge the reasonableness of numerical computations and their results*	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages Solve complex arithmetic problems involving percent of increase or decrease and problems requiring integration of several concepts from pre-algebra and/or pre-geometry (e.g., comparing percentages or averages, using several ratios, and finding ratios in geometry settings) **Properties of Plane Figures:** Draw conclusions based on a set of conditions
E. Use proportional reasoning: solve problems involving proportions*	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Perform common conversions (e.g., inches to feet or hours to minutes) Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages Solve complex arithmetic problems involving percent of increase or decrease and problems requiring integration of several concepts from pre-algebra and/or pre-geometry (e.g., comparing percentages or averages, using several ratios, and finding ratios in geometry settings)

*Locally assessed.

= Measured by ACT Mathematics Test

TABLE 2C

MISSOURI Algebra I Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 1: Number and Operations	
Big Idea 3. Compute fluently and make reasonable estimates	
	Expressions, Equations, & Inequalities: Solve routine first-degree equations Solve real-world problems using first-degree equations Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions) Write expressions, equations, and inequalities for common algebra settings Write expressions that require planning and/or manipulating to accurately model a situation Write equations and inequalities that require planning, manipulating, and/or solving

*Locally assessed.

= Measured by ACT Mathematics Test

TABLE 2C

MISSOURI Algebra I Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 2: Algebraic Relationships	
Big Idea 1. Understand patterns, relations and functions	
A. Recognize and extend patterns: No CLE	**Numbers: Concepts & Properties:** Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor Exhibit knowledge of logarithms and geometric sequences
B. Create and analyze patterns: generalize patterns using explicitly or recursively defined functions	**Numbers: Concepts & Properties:** Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor Exhibit knowledge of logarithms and geometric sequences
C. Classify objects and representations: compare and contrast various forms of representations of patterns	**Numbers: Concepts & Properties:** Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor Exhibit knowledge of logarithms and geometric sequences
D. Identify and compare functions: understand and compare the properties of linear and nonlinear functions	**Probability, Statistics, & Data Analysis:** Read tables and graphs Perform computations on data from tables and graphs Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs Analyze and draw conclusions based on information from figures, tables, and graphs **Graphical Representations:** Locate points on the number line and in the first quadrant Locate points in the coordinate plane Exhibit knowledge of slope Determine the slope of a line from points or equations Match linear graphs with their equations Interpret and use information from graphs in the coordinate plane Use properties of parallel and perpendicular lines to determine an equation of a line or coordinates of a point Identify characteristics of graphs based on a set of conditions or on a general equation such as $y = ax^2 + c$ Solve problems integrating multiple algebraic and/or geometric concepts Analyze and draw conclusions based on information from graphs in the coordinate plane

*Locally assessed.

= Measured by ACT Mathematics Test

TABLE 2C

MISSOURI Algebra I Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 2: Algebraic Relationships	
Big Idea 1. Understand patterns, relations and functions	
E. Describe the effects of parameter changes: describe the effects of parameter changes on linear, exponential growth/decay and quadratic functions including intercepts	**Probability, Statistics, & Data Analysis:** Read tables and graphs Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs Analyze and draw conclusions based on information from figures, tables, and graphs **Numbers: Concepts & Properties:** Exhibit knowledge of logarithms and geometric sequences **Graphical Representations:** Locate points on the number line and in the first quadrant Locate points in the coordinate plane Exhibit knowledge of slope Determine the slope of a line from points or equations Match linear graphs with their equations Interpret and use information from graphs in the coordinate plane Use properties of parallel and perpendicular lines to determine an equation of a line or coordinates of a point Recognize special characteristics of parabolas and circles (e.g., the vertex of a parabola and the center or radius of a circle) Identify characteristics of graphs based on a set of conditions or on a general equation such as $y = ax^2 + c$ Solve problems integrating multiple algebraic and/or geometric concepts Analyze and draw conclusions based on information from graphs in the coordinate plane

*Locally assessed.

= Measured by ACT Mathematics Test

TABLE 2C

MISSOURI Algebra I Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 2: Algebraic Relationships	
Big Idea 2. Represent and analyze mathematical situations and structures using algebraic symbols	
A. Represent mathematical situations: use symbolic algebra to represent and solve problems that involve linear and quadratic relationships including equations and inequalities	**Expressions, Equations, & Inequalities:** Exhibit knowledge of basic expressions (e.g., identify an expression for a total as $b + g$) Solve equations in the form $x + a = b$, where a and b are whole numbers or decimals Solve one-step equations having integer or decimal answers Solve routine first-degree equations Perform straightforward word-to-symbol translations Solve real-world problems using first-degree equations Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions) Identify solutions to simple quadratic equations Factor simple quadratics (e.g., the difference of squares and perfect square trinomials) Solve first-degree inequalities that do not require reversing the inequality sign Manipulate expressions and equations Write expressions, equations, and inequalities for common algebra settings Solve linear inequalities that require reversing the inequality sign Solve quadratic equations Write expressions that require planning and/or manipulating to accurately model a situation Write equations and inequalities that require planning, manipulating, and/or solving
B. Describe and use mathematical manipulation: describe and use algebraic manipulations, including factoring and rules of integer exponents and apply properties of exponents (including order of operations) to simplify expressions	**Numbers: Concepts & Properties:** Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor Work with numerical factors Work problems involving positive integer exponents Apply rules of exponents Draw conclusions based on number concepts, algebraic properties, and/or relationships between expressions and numbers **Expressions, Equations, & Inequalities:** Combine like terms (e.g., $2x + 5x$) Add and subtract simple algebraic expressions Multiply two binomials Add, subtract, and multiply polynomials Manipulate expressions and equations

*Locally assessed.

= Measured by ACT Mathematics Test

TABLE 2C

MISSOURI Algebra I Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 2: Algebraic Relationships	
Big Idea 2. Represent and analyze mathematical situations and structures using algebraic symbols	
	Write expressions that require planning and/or manipulating to accurately model a situation Write equations and inequalities that require planning, manipulating, and/or solving
C. Utilize equivalent forms: use and solve equivalent forms of equations (linear, absolute value, and quadratic)	**Expressions, Equations, & Inequalities:** Solve equations in the form $x + a = b$, where a and b are whole numbers or decimals Solve one-step equations having integer or decimal answers Solve routine first-degree equations Solve real-world problems using first-degree equations Solve first-degree inequalities that do not require reversing the inequality sign Manipulate expressions and equations Solve linear inequalities that require reversing the inequality sign Solve absolute value equations Solve quadratic equations Write expressions that require planning and/or manipulating to accurately model a situation Write equations and inequalities that require planning, manipulating, and/or solving
D. Utilize systems: use and solve systems of linear equations or inequalities with 2 variables	**Expressions, Equations, & Inequalities:** Find solutions to systems of linear equations Write equations and inequalities that require planning, manipulating, and/or solving

*Locally assessed.

= Measured by ACT Mathematics Test

TABLE 2C

MISSOURI Algebra I Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 2: Algebraic Relationships	
Big Idea 3. Use mathematical models to represent and understand quantitative relationships	
A. Use mathematical models: identify quantitative relationships and determine the type(s) of functions that might model the situation to solve the problem	**Probability, Statistics, & Data Analysis:** Read tables and graphs Perform computations on data from tables and graphs Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs Analyze and draw conclusions based on information from figures, tables, and graphs **Expressions, Equations, & Inequalities:** Perform straightforward word-to-symbol translations Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions) Manipulate expressions and equations Write expressions, equations, and inequalities for common algebra settings Write expressions that require planning and/or manipulating to accurately model a situation Write equations and inequalities that require planning, manipulating, and/or solving

*Locally assessed.

= Measured by ACT Mathematics Test

TABLE 2C

MISSOURI Algebra I Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 2: Algebraic Relationships	
Big Idea 4. Analyze change in various contexts	
A. Analyze change: analyze linear and quadratic functions by investigating rates of change, intercepts and zeros	**Probability, Statistics, & Data Analysis:** Perform a single computation using information from a table or chart Read tables and graphs Perform computations on data from tables and graphs Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs Analyze and draw conclusions based on information from figures, tables, and graphs **Graphical Representations:** Locate points on the number line and in the first quadrant Locate points in the coordinate plane Exhibit knowledge of slope Determine the slope of a line from points or equations Interpret and use information from graphs in the coordinate plane Recognize special characteristics of parabolas and circles (e.g., the vertex of a parabola and the center or radius of a circle) Identify characteristics of graphs based on a set of conditions or on a general equation such as $y = ax^2 + c$ Solve problems integrating multiple algebraic and/or geometric concepts Analyze and draw conclusions based on information from graphs in the coordinate plane

*Locally assessed.

= Measured by ACT Mathematics Test

TABLE 2C

MISSOURI Algebra I Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 3: Geometric and Spatial Relationships	
Big Idea 1. Analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships	
A. Describe and use geometric relationships: No CLE	**Properties of Plane Figures:** Exhibit some knowledge of the angles associated with parallel lines Find the measure of an angle using properties of parallel lines Exhibit knowledge of basic angle properties and special sums of angle measures (e.g., 90°, 180°, and 360°) Use several angle properties to find an unknown angle measure Recognize Pythagorean triples Use properties of isosceles triangles Apply properties of 30°-60°-90°, 45°-45°-90°, similar, and congruent triangles Use the Pythagorean theorem Draw conclusions based on a set of conditions Solve multistep geometry problems that involve integrating concepts, planning, visualization, and/or making connections with other content areas
B. Apply geometric relationships: apply geometric properties such as similarity and angle relationship to solve multi-step problems in 2 dimensions*	**Properties of Plane Figures:** Exhibit some knowledge of the angles associated with parallel lines Find the measure of an angle using properties of parallel lines Exhibit knowledge of basic angle properties and special sums of angle measures (e.g., 90°, 180°, and 360°) Use several angle properties to find an unknown angle measure Use properties of isosceles triangles Apply properties of 30°-60°-90°, 45°-45°-90°, similar, and congruent triangles Draw conclusions based on a set of conditions Solve multistep geometry problems that involve integrating concepts, planning, visualization, and/or making connections with other content areas Use relationships among angles, arcs, and distances in a circle
C. Compose and decompose shapes: No CLE	**Measurement:** Estimate or calculate the length of a line segment based on other lengths given on a geometric figure Compute the perimeter of polygons when all side lengths are given Compute the area of rectangles when whole number dimensions are given

*Locally assessed.

= Measured by ACT Mathematics Test

TABLE 2C

MISSOURI Algebra I Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 3: Geometric and Spatial Relationships	
Big Idea 1. Analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships	
	Compute the area and perimeter of triangles and rectangles in simple problems Use geometric formulas when all necessary information is given Compute the area of triangles and rectangles when one or more additional simple steps are required Compute the area and circumference of circles after identifying necessary information Compute the perimeter of simple composite geometric figures with unknown side lengths Use relationships involving area, perimeter, and volume of geometric figures to compute another measure Compute the area of composite geometric figures when planning or visualization is required
Big Idea 2. Specify locations and describe spatial relationships using coordinate geometry and other representational systems	
A. Use coordinate systems: No CLE	**Graphical Representations:** Locate points on the number line and in the first quadrant Locate points in the coordinate plane Find the midpoint of a line segment Interpret and use information from graphs in the coordinate plane Use the distance formula Solve problems integrating multiple algebraic and/or geometric concepts Analyze and draw conclusions based on information from graphs in the coordinate plane
Big Idea 3. Apply transformations and use symmetry to analyze mathematical situations	
A. Use transformations on objects: No CLE	**Graphical Representations:** Solve problems integrating multiple algebraic and/or geometric concepts Analyze and draw conclusions based on information from graphs in the coordinate plane
B. Use transformations on functions: No CLE	**Graphical Representations:** Solve problems integrating multiple algebraic and/or geometric concepts Analyze and draw conclusions based on information from graphs in the coordinate plane
C. Use symmetry: No CLE	**Graphical Representations:** Solve problems integrating multiple algebraic and/or geometric concepts Analyze and draw conclusions based on information from graphs in the coordinate plane

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TABLE 2C

MISSOURI Algebra I Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 3: Geometric and Spatial Relationships	
Big Idea 4. Use visualization, spatial reasoning and geometric modeling to solve problems	
A. Recognize and draw three-dimensional representations: No CLE	**Graphical Representations:** Solve problems integrating multiple algebraic and/or geometric concepts Analyze and draw conclusions based on information from graphs in the coordinate plane
B. Draw and use visual models: draw or use visual models to represent and solve problems*	**Probability, Statistics, & Data Analysis:** Perform a single computation using information from a table or chart Calculate the average, given the number of data values and the sum of the data values Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs Analyze and draw conclusions based on information from figures, tables, and graphs **Graphical Representations:** Locate points on the number line and in the first quadrant Locate points in the coordinate plane Interpret and use information from graphs in the coordinate plane Solve problems integrating multiple algebraic and/or geometric concepts Analyze and draw conclusions based on information from graphs in the coordinate plane

*Locally assessed.

= Measured by ACT Mathematics Test

TABLE 2C

MISSOURI Algebra I Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 4: Measurement	
Big Idea 1. Understand measurable attributes of objects and the units, systems and processes of measurement	
A. Determine unit of measurement: No CLE	**Basic Operations & Applications:** Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour)
B. Identify equivalent measures: No CLE	**Basic Operations & Applications:** Perform common conversions (e.g., inches to feet or hours to minutes) Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour)
C. Tell and use units of time: No CLE	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average
D. Count and compute money: No CLE	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average

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= Measured by ACT Mathematics Test

TABLE 2C

MISSOURI Algebra I Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 4: Measurement	
Big Idea 2. Apply appropriate techniques, tools and formulas to determine measurements	
A. Use standard or non-standard measurement: No CLE	**Measurement:** Estimate or calculate the length of a line segment based on other lengths given on a geometric figure Compute the perimeter of polygons when all side lengths are given Compute the area and perimeter of triangles and rectangles in simple problems Use geometric formulas when all necessary information is given Compute the area of triangles and rectangles when one or more additional simple steps are required Compute the area and circumference of circles after identifying necessary information Compute the perimeter of simple composite geometric figures with unknown side lengths Use relationships involving area, perimeter, and volume of geometric figures to compute another measure Compute the area of composite geometric figures when planning or visualization is required
B. Use angle measurement: No CLE	**Properties of Plane Figures:** Exhibit some knowledge of the angles associated with parallel lines Find the measure of an angle using properties of parallel lines Exhibit knowledge of basic angle properties and special sums of angle measures (e.g., 90°, 180°, and 360°) Use several angle properties to find an unknown angle measure Use properties of isosceles triangles Apply properties of 30°-60°-90°, 45°-45°-90°, similar, and congruent triangles Draw conclusions based on a set of conditions Solve multistep geometry problems that involve integrating concepts, planning, visualization, and/or making connections with other content areas Use relationships among angles, arcs, and distances in a circle
C. Apply geometric measurements: No CLE	**Measurement:** Estimate or calculate the length of a line segment based on other lengths given on a geometric figure Compute the perimeter of polygons when all side lengths are given Compute the area of rectangles when whole number dimensions are given

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= Measured by ACT Mathematics Test

TABLE 2C

MISSOURI Algebra I Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 4: Measurement	
Big Idea 2. Apply appropriate techniques, tools and formulas to determine measurements	
	Compute the area and perimeter of triangles and rectangles in simple problems Use geometric formulas when all necessary information is given Compute the area of triangles and rectangles when one or more additional simple steps are required Compute the area and circumference of circles after identifying necessary information Compute the perimeter of simple composite geometric figures with unknown side lengths Use relationships involving area, perimeter, and volume of geometric figures to compute another measure Compute the area of composite geometric figures when planning or visualization is required
D. Analyze precision: describe the effects of operations, such as multiplication, division and computing powers and roots on magnitudes of quantities and effects of computation on precision which include the judging of reasonableness of numerical computations and their results*	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Perform common conversions (e.g., inches to feet or hours to minutes) Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour)
E. Use relationships within a measurement system: use unit analysis to solve problems*	**Basic Operations & Applications:** Perform common conversions (e.g., inches to feet or hours to minutes) Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour)

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TABLE 2C

MISSOURI Algebra I Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 5: Data and Probability	
Big Idea 1. Formulate questions that can be addressed with data and collect, organize and display relevant data to answer them	
A. Formulate questions: formulate questions and collect data about a characteristic which include sample spaces and distributions	
B. Classify and organize data: No CLE	**Probability, Statistics, & Data Analysis:** Perform a single computation using information from a table or chart Calculate the average, given the number of data values and the sum of the data values Read tables and graphs Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs Analyze and draw conclusions based on information from figures, tables, and graphs
C. Represent and interpret data: select and use appropriate graphical representation of data and given one-variable quantitative data, display the distribution and describe its shape	**Probability, Statistics, & Data Analysis:** Perform a single computation using information from a table or chart Calculate the average, given the number of data values and the sum of the data values Read tables and graphs Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs Analyze and draw conclusions based on information from figures, tables, and graphs

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TABLE 2C

MISSOURI Algebra I Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 5: Data and Probability	
Big Idea 2. Select and use appropriate statistical methods to analyze data	
A. Describe and analyze data: apply statistical measures of center to solve problems	**Probability, Statistics, & Data Analysis:** Calculate the average of a list of positive whole numbers Calculate the average of a list of numbers Calculate the average, given the number of data values and the sum of the data values Calculate the missing data value, given the average and all data values but one Calculate the average, given the frequency counts of all the data values Calculate or use a weighted average Distinguish between mean, median, and mode for a list of numbers
B. Compare data representations: No CLE	**Probability, Statistics, & Data Analysis:** Perform a single computation using information from a table or chart Calculate the average, given the number of data values and the sum of the data values Read tables and graphs Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs Analyze and draw conclusions based on information from figures, tables, and graphs
C. Represent data algebraically: given a scatterplot, determine an equation for a line of best fit	**Probability, Statistics, & Data Analysis:** Read tables and graphs Perform computations on data from tables and graphs Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs Analyze and draw conclusions based on information from figures, tables, and graphs **Expressions, Equations, & Inequalities:** Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions) Write expressions, equations, and inequalities for common algebra settings Write expressions that require planning and/or manipulating to accurately model a situation Write equations and inequalities that require planning, manipulating, and/or solving

*Locally assessed.

= Measured by ACT Mathematics Test

TABLE 2C

MISSOURI Algebra I Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 5: Data and Probability	
Big Idea 3. Develop and evaluate inferences and predictions that are based on data	
A. Develop and evaluate inferences: make conjectures about possible relationships between 2 characteristics of a sample on the basis of scatter plots of the data	**Probability, Statistics, & Data Analysis:** Perform a single computation using information from a table or chart Calculate the average, given the number of data values and the sum of the data values Read tables and graphs Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs Analyze and draw conclusions based on information from figures, tables, and graphs
B. Analyze basic statistical techniques: No CLE	
Big Idea 4. Understand and apply basic concepts of probability	
A. Apply basic concepts of probability: No CLE	**Probability, Statistics, & Data Analysis:** Use the relationship between the probability of an event and the probability of its complement Determine the probability of a simple event Exhibit knowledge of simple counting techniques Compute straightforward probabilities for common situations Use Venn diagrams in counting Apply counting techniques Compute a probability when the event and/or sample space are not given or obvious Exhibit knowledge of conditional and joint probability
B. Use and describe compound events: No CLE	**Probability, Statistics, & Data Analysis:** Apply counting techniques Compute a probability when the event and/or sample space are not given or obvious Exhibit knowledge of conditional and joint probability

*Locally assessed.

= Measured by ACT Mathematics Test

TABLE 2D

MISSOURI Geometry Course Level Expectations	EXPLORE Mathematics College Readiness Standards
Strand 1: Number and Operations	
Big Idea 1. Understand numbers, ways of representing numbers, relationships among numbers and number systems	
A. Read, write and compare numbers: compare and order rational and irrational numbers, including finding their approximate locations on a number line	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent **Numbers: Concepts & Properties:** Identify a digit's place value Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor Find and use the least common multiple Order fractions **Graphical Representations:** Identify the location of a point with a positive coordinate on the number line Locate points on the number line and in the first quadrant
B. Represent and use rational numbers: use real numbers and various models, drawing, etc. to solve problems	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) **Probability, Statistics, & Data Analysis:** Perform a single computation using information from a table or chart Read tables and graphs Perform computations on data from tables and graphs Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs
C. Compose and decompose numbers: No CLE	
D. Classify and describe numeric relationships: No CLE	

*Locally assessed.

TABLE 2D

MISSOURI Geometry Course Level Expectations	EXPLORE Mathematics College Readiness Standards
Strand 1: Number and Operations	
Big Idea 2. Understand meanings of operations and how they relate to one another	
A. Represent operations: No CLE	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour)
B. Describe effects of operations: No CLE	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) **Numbers: Concepts & Properties:** Recognize one-digit factors of a number Identify a digit's place value Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor Find and use the least common multiple Order fractions Work with numerical factors Work with scientific notation Work with squares and square roots of numbers

*Locally assessed.

TABLE 2D

MISSOURI Geometry Course Level Expectations	EXPLORE Mathematics College Readiness Standards
Strand 1: Number and Operations	
Big Idea 2. Understand meanings of operations and how they relate to one another	
C. Apply properties of operations: No CLE	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour)
D. Apply operations on real and complex numbers: apply operations to real numbers, using mental computation or paper-and-pencil calculations for simple cases and technology for more complicated cases*	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour)

*Locally assessed.

= Measured by EXPLORE Mathematics Test

TABLE 2D

MISSOURI Geometry Course Level Expectations	EXPLORE Mathematics College Readiness Standards
Strand 1: Number and Operations	
Big Idea 3. Compute fluently and make reasonable estimates	
A. Describe or represent mental strategies: No CLE	
B. Develop and demonstrate fluency: No CLE	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour)
C. Compute problems: No CLE	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour)
D. Estimate and justify solutions: judge the reasonableness of numerical computations and their results*	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour)

*Locally assessed.

TABLE 2D

MISSOURI Geometry Course Level Expectations	EXPLORE Mathematics College Readiness Standards
Strand 1: Number and Operations	
Big Idea 3. Compute fluently and make reasonable estimates	
E. Use proportional reasoning: solve problems involving proportions*	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Perform common conversions (e.g., inches to feet or hours to minutes) Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) **Expressions, Equations, & Inequalities:** Solve routine first-degree equations Solve real-world problems using first-degree equations Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions)

*Locally assessed.

TABLE 2D

MISSOURI Geometry Course Level Expectations	EXPLORE Mathematics College Readiness Standards
Strand 2: Algebraic Relationships	
Big Idea 1. Understand patterns, relations and functions	
A. Recognize and extend patterns: No CLE	**Numbers: Concepts & Properties:** Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor
B. Create and analyze patterns: generalize patterns using explicitly or recursively defined functions	**Numbers: Concepts & Properties:** Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor
C. Classify objects and representations: compare and contrast various forms of representations of patterns	**Numbers: Concepts & Properties:** Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor
D. Identify and compare functions: No CLE	**Probability, Statistics, & Data Analysis:** Read tables and graphs Perform computations on data from tables and graphs Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs **Graphical Representations:** Locate points on the number line and in the first quadrant Locate points in the coordinate plane
E. Describe the effects of parameter changes: No CLE	**Probability, Statistics, & Data Analysis:** Read tables and graphs Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs **Graphical Representations:** Locate points on the number line and in the first quadrant Locate points in the coordinate plane

*Locally assessed.

TABLE 2D

MISSOURI Geometry Course Level Expectations	EXPLORE Mathematics College Readiness Standards
Strand 2: Algebraic Relationships	
Big Idea 2. Represent and analyze mathematical situations and structures using algebraic symbols	
A. Represent mathematical situations: No CLE	**Expressions, Equations, & Inequalities:** Exhibit knowledge of basic expressions (e.g., identify an expression for a total as $b + g$) Solve equations in the form $x + a = b$, where a and b are whole numbers or decimals Solve one-step equations having integer or decimal answers Solve routine first-degree equations Perform straightforward word-to-symbol translations Solve real-world problems using first-degree equations Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions) Identify solutions to simple quadratic equations
B. Describe and use mathematical manipulation: apply appropriate properties of exponents to simplify expressions and solve equations	**Numbers: Concepts & Properties:** Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor **Expressions, Equations, & Inequalities:** Combine like terms (e.g., $2x + 5x$) Add and subtract simple algebraic expressions
C. Utilize equivalent forms: No CLE	**Expressions, Equations, & Inequalities:** Solve equations in the form $x + a = b$, where a and b are whole numbers or decimals Solve one-step equations having integer or decimal answers Solve routine first-degree equations Solve real-world problems using first-degree equations
D. Utilize systems: No CLE	
Big Idea 3. Use mathematical models to represent and understand quantitative relationships	
A. Use mathematical models: identify quantitative relationships and determine the type(s) of functions that might model the situation to solve the problem	**Probability, Statistics, & Data Analysis:** Read tables and graphs Perform computations on data from tables and graphs Manipulate data from tables and graphs **Expressions, Equations, & Inequalities:** Perform straightforward word-to-symbol translations Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions)

*Locally assessed.

= Measured by EXPLORE Mathematics Test

TABLE 2D

MISSOURI Geometry Course Level Expectations	EXPLORE Mathematics College Readiness Standards
Strand 2: Algebraic Relationships	
Big Idea 4. Analyze change in various contexts	
A. Analyze change: analyze linear functions by investigating rates of change and intercepts	**Probability, Statistics, & Data Analysis:** Perform a single computation using information from a table or chart Read tables and graphs Perform computations on data from tables and graphs Manipulate data from tables and graphs **Graphical Representations:** Locate points on the number line and in the first quadrant Locate points in the coordinate plane

*Locally assessed.

TABLE 2D

MISSOURI Geometry Course Level Expectations	EXPLORE Mathematics College Readiness Standards
Strand 3: Geometric and Spatial Relationships	
Big Idea 1. Analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships	
A. Describe and use geometric relationships: use inductive and deductive reasoning to establish the validity of geometric conjectures, prove theorems and critique arguments made by others	
B. Apply geometric relationships: No CLE	**Properties of Plane Figures:** Exhibit some knowledge of the angles associated with parallel lines Find the measure of an angle using properties of parallel lines Exhibit knowledge of basic angle properties and special sums of angle measures (e.g., 90°, 180°, and 360°) Use several angle properties to find an unknown angle measure
C. Compose and decompose shapes: No CLE	**Measurement:** Estimate or calculate the length of a line segment based on other lengths given on a geometric figure Compute the perimeter of polygons when all side lengths are given Compute the area of rectangles when whole number dimensions are given Compute the area and perimeter of triangles and rectangles in simple problems Compute the area of triangles and rectangles when one or more additional simple steps are required Compute the area and circumference of circles after identifying necessary information
Big Idea 2. Specify locations and describe spatial relationships using coordinate geometry and other representational systems	
A. Use coordinate systems: make conjectures and solve problems involving 2-dimensional objects represented with Cartesian coordinates	**Graphical Representations:** Locate points on the number line and in the first quadrant Locate points in the coordinate plane
Big Idea 3. Apply transformations and use symmetry to analyze mathematical situations	
A. Use transformations on objects: use and apply constructions and the coordinate plane to represent translations, reflections, rotations and dilations of objects	
B. Use transformations on functions: No CLE	
C. Use symmetry: identify types of symmetries of 2- and 3-dimensional figures	

*Locally assessed.

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TABLE 2D

MISSOURI Geometry Course Level Expectations	EXPLORE Mathematics College Readiness Standards
Strand 3: Geometric and Spatial Relationships	
Big Idea 4. Use visualization, spatial reasoning and geometric modeling to solve problems	
A. Recognize and draw three-dimensional representations: draw and use vertex-edge graphs or networks to find optimal solutions and draw representations of 3-dimensional geometric objects from different perspectives	**Probability, Statistics, & Data Analysis:** Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs
B. Draw and use visual models: draw or use visual models to represent and solve problems*	**Probability, Statistics, & Data Analysis:** Perform a single computation using information from a table or chart Calculate the average, given the number of data values and the sum of the data values Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs **Graphical Representations:** Locate points on the number line and in the first quadrant Locate points in the coordinate plane

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TABLE 2D

MISSOURI Geometry Course Level Expectations	EXPLORE Mathematics College Readiness Standards
Strand 4: Measurement	
Big Idea 1. Understand measurable attributes of objects and the units, systems and processes of measurement	
A. Determine unit of measurement: No CLE	**Basic Operations & Applications:** Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour)
B. Identify equivalent measures: No CLE	**Basic Operations & Applications:** Perform common conversions (e.g., inches to feet or hours to minutes) Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour)
C. Tell and use units of time: No CLE	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average
D. Count and compute money: No CLE	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average

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TABLE 2D

MISSOURI Geometry Course Level Expectations	EXPLORE Mathematics College Readiness Standards
Strand 4: Measurement	
Big Idea 2. Apply appropriate techniques, tools and formulas to determine measurements	
A. Use standard or non-standard measurement: No CLE	**Measurement:** Estimate or calculate the length of a line segment based on other lengths given on a geometric figure Compute the perimeter of polygons when all side lengths are given Compute the area and perimeter of triangles and rectangles in simple problems Use geometric formulas when all necessary information is given Compute the area of triangles and rectangles when one or more additional simple steps are required Compute the area and circumference of circles after identifying necessary information
B. Use angle measurement: solve problems of angle measure, including those involving triangles or other polygons and of parallel lines cut by a transversal	**Properties of Plane Figures:** Exhibit some knowledge of the angles associated with parallel lines Find the measure of an angle using properties of parallel lines Exhibit knowledge of basic angle properties and special sums of angle measures (e.g., 90°, 180°, and 360°) Use several angle properties to find an unknown angle measure
C. Apply geometric measurements: determine the surface area, and volume of geometric figures, including cones, spheres, and cylinders	**Measurement:** Compute the perimeter of polygons when all side lengths are given Compute the area of rectangles when whole number dimensions are given Compute the area and perimeter of triangles and rectangles in simple problems Use geometric formulas when all necessary information is given Compute the area of triangles and rectangles when one or more additional simple steps are required Compute the area and circumference of circles after identifying necessary information Compute the perimeter of simple composite geometric figures with unknown side lengths

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TABLE 2D

MISSOURI Geometry Course Level Expectations	EXPLORE Mathematics College Readiness Standards
Strand 4: Measurement	
Big Idea 2. Apply appropriate techniques, tools and formulas to determine measurements	
D. Analyze precision: No CLE	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour)
E. Use relationships within a measurement system: use unit analysis to solve problems*	**Basic Operations & Applications:** Perform common conversions (e.g., inches to feet or hours to minutes) Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour)

*Locally assessed.

TABLE 2D

MISSOURI Geometry Course Level Expectations	EXPLORE Mathematics College Readiness Standards
Strand 5: Data and Probability	
Big Idea 1. Formulate questions that can be addressed with data and collect, organize and display relevant data to answer them	
A. Formulate questions: formulate and collect data about a characteristic	
B. Classify and organize data: No CLE	**Probability, Statistics, & Data Analysis:** Perform a single computation using information from a table or chart Calculate the average, given the number of data values and the sum of the data values Read tables and graphs Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs
C. Represent and interpret data: select and use appropriate graphical representation of data and given one-variable quantitative data, display the distribution and describe its shape	**Probability, Statistics, & Data Analysis:** Perform a single computation using information from a table or chart Calculate the average, given the number of data values and the sum of the data values Read tables and graphs Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs
Big Idea 2. Select and use appropriate statistical methods to analyze data	
A. Describe and analyze data: No CLE	**Probability, Statistics, & Data Analysis:** Calculate the average of a list of positive whole numbers Calculate the average of a list of numbers Calculate the average, given the number of data values and the sum of the data values Calculate the missing data value, given the average and all data values but one Calculate the average, given the frequency counts of all the data values
B. Compare data representations: No CLE	**Probability, Statistics, & Data Analysis:** Perform a single computation using information from a table or chart Calculate the average, given the number of data values and the sum of the data values Read tables and graphs Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs

*Locally assessed.

TABLE 2D

MISSOURI Geometry Course Level Expectations	EXPLORE Mathematics College Readiness Standards
Strand 5: Data and Probability	
C. Represent data algebraically: No CLE	**Probability, Statistics, & Data Analysis:** Read tables and graphs Perform computations on data from tables and graphs Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs **Expressions, Equations, & Inequalities:** Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions)
Big Idea 3. Develop and evaluate inferences and predictions that are based on data	
A. Develop and evaluate inferences: No CLE	**Probability, Statistics, & Data Analysis:** Perform a single computation using information from a table or chart Calculate the average, given the number of data values and the sum of the data values Read tables and graphs Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs
B. Analyze basic statistical techniques: No CLE	
Big Idea 4. Understand and apply basic concepts of probability	
A. Apply basic concepts of probability: No CLE	**Probability, Statistics, & Data Analysis:** Use the relationship between the probability of an event and the probability of its complement Determine the probability of a simple event Exhibit knowledge of simple counting techniques Compute straightforward probabilities for common situations
B. Use and describe compound events: No CLE	

*Locally assessed.

TABLE 2E

MISSOURI Geometry Course Level Expectations	PLAN Mathematics College Readiness Standards
Strand 1: Number and Operations	
Big Idea 1. Understand numbers, ways of representing numbers, relationships among numbers and number systems	
A. Read, write and compare numbers: compare and order rational and irrational numbers, including finding their approximate locations on a number line	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent **Numbers: Concepts & Properties:** Identify a digit's place value Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor Find and use the least common multiple Order fractions **Graphical Representations:** Identify the location of a point with a positive coordinate on the number line Locate points on the number line and in the first quadrant
B. Represent and use rational numbers: use real numbers and various models, drawing, etc. to solve problems	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages **Probability, Statistics, & Data Analysis:** Perform a single computation using information from a table or chart Read tables and graphs Perform computations on data from tables and graphs Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs

*Locally assessed.

TABLE 2E

MISSOURI Geometry Course Level Expectations	PLAN Mathematics College Readiness Standards
Strand 1: Number and Operations	
Big Idea 1. Understand numbers, ways of representing numbers, relationships among numbers and number systems	
C. Compose and decompose numbers: No CLE	**Numbers: Concepts & Properties:** Recognize equivalent fractions and fractions in lowest terms Recognize one-digit factors of a number Identify a digit's place value Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor Find and use the least common multiple Order fractions Work with numerical factors Work with scientific notation Work with squares and square roots of numbers Work problems involving positive integer exponents Apply number properties involving prime factorization Apply rules of exponents
D. Classify and describe numeric relationships: No CLE	**Numbers: Concepts & Properties:** Recognize equivalent fractions and fractions in lowest terms Recognize one-digit factors of a number Identify a digit's place value Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor Find and use the least common multiple Order fractions Work with numerical factors Work with scientific notation Work with squares and square roots of numbers Work problems involving positive integer exponents Work with cubes and cube roots of numbers Apply number properties involving prime factorization Apply number properties involving even/odd numbers and factors/multiples Apply number properties involving positive/negative numbers Apply rules of exponents

*Locally assessed.

= Measured by PLAN Mathematics Test

TABLE 2E

MISSOURI Geometry Course Level Expectations	PLAN Mathematics College Readiness Standards
Strand 1: Number and Operations	
Big Idea 2. Understand meanings of operations and how they relate to one another	
A. Represent operations: No CLE	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages
B. Describe effects of operations: No CLE	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages **Numbers: Concepts & Properties:** Recognize one-digit factors of a number Identify a digit's place value Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor Find and use the least common multiple Order fractions Work with numerical factors Work with scientific notation Work with squares and square roots of numbers Work with cubes and cube roots of numbers Apply number properties involving prime factorization

*Locally assessed.

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TABLE 2E

MISSOURI Geometry Course Level Expectations	PLAN Mathematics College Readiness Standards
Strand 1: Number and Operations	
Big Idea 2. Understand meanings of operations and how they relate to one another	
	Apply number properties involving even/odd numbers and factors/multiples Apply number properties involving positive/negative numbers Apply rules of exponents
C. Apply properties of operations: No CLE	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages
D. Apply operations on real and complex numbers: apply operations to real numbers, using mental computation or paper-and-pencil calculations for simple cases and technology for more complicated cases*	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages

*Locally assessed.

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TABLE 2E

MISSOURI Geometry Course Level Expectations	PLAN Mathematics College Readiness Standards
Strand 1: Number and Operations	
Big Idea 3. Compute fluently and make reasonable estimates	
A. Describe or represent mental strategies: No CLE	
B. Develop and demonstrate fluency: No CLE	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages
C. Compute problems: No CLE	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages

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TABLE 2E

MISSOURI Geometry Course Level Expectations	PLAN Mathematics College Readiness Standards
Strand 1: Number and Operations	
Big Idea 3. Compute fluently and make reasonable estimates	
D. Estimate and justify solutions: judge the reasonableness of numerical computations and their results*	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages
E. Use proportional reasoning: solve problems involving proportions*	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Perform common conversions (e.g., inches to feet or hours to minutes) Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages **Expressions, Equations, & Inequalities:** Solve routine first-degree equations Solve real-world problems using first-degree equations Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions) Write expressions, equations, and inequalities for common algebra settings

*Locally assessed.

= Measured by PLAN Mathematics Test

TABLE 2E

MISSOURI Geometry Course Level Expectations	PLAN Mathematics College Readiness Standards
Strand 2: Algebraic Relationships	
Big Idea 1. Understand patterns, relations and functions	
A. Recognize and extend patterns: No CLE	**Numbers: Concepts & Properties:** Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor
B. Create and analyze patterns: generalize patterns using explicitly or recursively defined functions	**Numbers: Concepts & Properties:** Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor
C. Classify objects and representations: compare and contrast various forms of representations of patterns	**Numbers: Concepts & Properties:** Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor
D. Identify and compare functions: No CLE	**Probability, Statistics, & Data Analysis:** Read tables and graphs Perform computations on data from tables and graphs Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs **Graphical Representations:** Locate points on the number line and in the first quadrant Locate points in the coordinate plane Exhibit knowledge of slope Determine the slope of a line from points or equations Match linear graphs with their equations
E. Describe the effects of parameter changes: No CLE	**Probability, Statistics, & Data Analysis:** Read tables and graphs Perform computations on data from tables and graphs Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs **Graphical Representations:** Locate points on the number line and in the first quadrant Locate points in the coordinate plane Exhibit knowledge of slope Determine the slope of a line from points or equations Match linear graphs with their equations Interpret and use information from graphs in the coordinate plane Use properties of parallel and perpendicular lines to determine an equation of a line or coordinates of a point

*Locally assessed.

= Measured by PLAN Mathematics Test

TABLE 2E

MISSOURI Geometry Course Level Expectations	PLAN Mathematics College Readiness Standards
Strand 2: Algebraic Relationships	
Big Idea 2. Represent and analyze mathematical situations and structures using algebraic symbols	
A. Represent mathematical situations: No CLE	**Expressions, Equations, & Inequalities:** Exhibit knowledge of basic expressions (e.g., identify an expression for a total as $b + g$) Solve equations in the form $x + a = b$, where a and b are whole numbers or decimals Solve one-step equations having integer or decimal answers Solve routine first-degree equations Perform straightforward word-to-symbol translations Solve real-world problems using first-degree equations Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions) Identify solutions to simple quadratic equations Factor simple quadratics (e.g., the difference of squares and perfect square trinomials) Solve first-degree inequalities that do not require reversing the inequality sign Manipulate expressions and equations Write expressions, equations, and inequalities for common algebra settings Solve linear inequalities that require reversing the inequality sign Solve quadratic equations
B. Describe and use mathematical manipulation: apply appropriate properties of exponents to simplify expressions and solve equations	**Numbers: Concepts & Properties:** Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor Work with numerical factors Work with scientific notation Work problems involving positive integer exponents Apply rules of exponents **Expressions, Equations, & Inequalities:** Combine like terms (e.g., $2x + 5x$) Add and subtract simple algebraic expressions Multiply two binomials Add, subtract, and multiply polynomials Manipulate expressions and equations

*Locally assessed.

TABLE 2E

MISSOURI Geometry Course Level Expectations	PLAN Mathematics College Readiness Standards
Strand 2: Algebraic Relationships	
Big Idea 2. Represent and analyze mathematical situations and structures using algebraic symbols	
C. Utilize equivalent forms: No CLE	**Expressions, Equations, & Inequalities:** Solve equations in the form $x + a = b$, where a and b are whole numbers or decimals Solve one-step equations having integer or decimal answers Solve routine first-degree equations Solve real-world problems using first-degree equations Solve first-degree inequalities that do not require reversing the inequality sign Manipulate expressions and equations Solve linear inequalities that require reversing the inequality sign Solve absolute value equations Solve quadratic equations
D. Utilize systems: No CLE	**Expressions, Equations, & Inequalities:** Find solutions to systems of linear equations

*Locally assessed.

TABLE 2E

MISSOURI Geometry Course Level Expectations	PLAN Mathematics College Readiness Standards
Strand 2: Algebraic Relationships	
Big Idea 3. Use mathematical models to represent and understand quantitative relationships	
A. Use mathematical models: identify quantitative relationships and determine the type(s) of functions that might model the situation to solve the problem	**Probability, Statistics, & Data Analysis:** Read tables and graphs Perform computations on data from tables and graphs Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs **Expressions, Equations, & Inequalities:** Perform straightforward word-to-symbol translations Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions) Manipulate expressions and equations Write expressions, equations, and inequalities for common algebra settings
Big Idea 4. Analyze change in various contexts	
A. Analyze change: analyze linear functions by investigating rates of change and intercepts	**Probability, Statistics, & Data Analysis:** Perform a single computation using information from a table or chart Read tables and graphs Perform computations on data from tables and graphs Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs **Graphical Representations:** Locate points on the number line and in the first quadrant Locate points in the coordinate plane Exhibit knowledge of slope Determine the slope of a line from points or equations Interpret and use information from graphs in the coordinate plane

*Locally assessed.

= Measured by PLAN Mathematics Test

TABLE 2E

MISSOURI Geometry Course Level Expectations	PLAN Mathematics College Readiness Standards
Strand 3: Geometric and Spatial Relationships	
Big Idea 1. Analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships	
A. Describe and use geometric relationships: use inductive and deductive reasoning to establish the validity of geometric conjectures, prove theorems and critique arguments made by others	**Properties of Plane Figures:** Apply properties of 30°-60°-90°, 45°-45°-90°, similar, and congruent triangles
B. Apply geometric relationships: No CLE	**Properties of Plane Figures:** Exhibit some knowledge of the angles associated with parallel lines Find the measure of an angle using properties of parallel lines Exhibit knowledge of basic angle properties and special sums of angle measures (e.g., 90°, 180°, and 360°) Use several angle properties to find an unknown angle measure Use properties of isosceles triangles Apply properties of 30°-60°-90°, 45°-45°-90°, similar, and congruent triangles
C. Compose and decompose shapes: No CLE	**Measurement:** Estimate or calculate the length of a line segment based on other lengths given on a geometric figure Compute the perimeter of polygons when all side lengths are given Compute the area of rectangles when whole number dimensions are given Compute the area and perimeter of triangles and rectangles in simple problems Compute the area of triangles and rectangles when one or more additional simple steps are required Compute the area and circumference of circles after identifying necessary information Compute the perimeter of simple composite geometric figures with unknown side lengths Use relationships involving area, perimeter, and volume of geometric figures to compute another measure

*Locally assessed.

= Measured by PLAN Mathematics Test

TABLE 2E

MISSOURI Geometry Course Level Expectations	PLAN Mathematics College Readiness Standards
Strand 3: Geometric and Spatial Relationships	
Big Idea 2. Specify locations and describe spatial relationships using coordinate geometry and other representational systems	
A. Use coordinate systems: make conjectures and solve problems involving 2-dimensional objects represented with Cartesian coordinates	**Graphical Representations:** Locate points on the number line and in the first quadrant Locate points in the coordinate plane Exhibit knowledge of slope Determine the slope of a line from points or equations Find the midpoint of a line segment Interpret and use information from graphs in the coordinate plane Use the distance formula Use properties of parallel and perpendicular lines to determine an equation of a line or coordinates of a point
Big Idea 3. Apply transformations and use symmetry to analyze mathematical situations	
A. Use transformations on objects: use and apply constructions and the coordinate plane to represent translations, reflections, rotations and dilations of objects	
B. Use transformations on functions: No CLE	
C. Use symmetry: identify types of symmetries of 2- and 3-dimensional figures	

*Locally assessed.

= Measured by PLAN Mathematics Test

TABLE 2E

MISSOURI Geometry Course Level Expectations	PLAN Mathematics College Readiness Standards
Strand 3: Geometric and Spatial Relationships	
Big Idea 4. Use visualization, spatial reasoning and geometric modeling to solve problems	
A. Recognize and draw three-dimensional representations: draw and use vertex-edge graphs or networks to find optimal solutions and draw representations of 3-dimensional geometric objects from different perspectives	**Probability, Statistics, & Data Analysis:** Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs **Graphical Representations:** Interpret and use information from graphs in the coordinate plane
B. Draw and use visual models: draw or use visual models to represent and solve problems*	**Probability, Statistics, & Data Analysis:** Perform a single computation using information from a table or chart Calculate the average, given the number of data values and the sum of the data values Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs **Graphical Representations:** Locate points on the number line and in the first quadrant Locate points in the coordinate plane Interpret and use information from graphs in the coordinate plane

*Locally assessed.

TABLE 2E

MISSOURI Geometry Course Level Expectations	PLAN Mathematics College Readiness Standards
Strand 4: Measurement	
Big Idea 1. Understand measurable attributes of objects and the units, systems and processes of measurement	
A. Determine unit of measurement: No CLE	**Basic Operations & Applications:** Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour)
B. Identify equivalent measures: No CLE	**Basic Operations & Applications:** Perform common conversions (e.g., inches to feet or hours to minutes) Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour)
C. Tell and use units of time: No CLE	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average
D. Count and compute money: No CLE	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average

*Locally assessed.

= Measured by PLAN Mathematics Test

TABLE 2E

MISSOURI Geometry Course Level Expectations	PLAN Mathematics College Readiness Standards
Strand 4: Measurement	
Big Idea 2. Apply appropriate techniques, tools and formulas to determine measurements	
A. Use standard or non-standard measurement: No CLE	**Measurement:** Estimate or calculate the length of a line segment based on other lengths given on a geometric figure Compute the perimeter of polygons when all side lengths are given Compute the area and perimeter of triangles and rectangles in simple problems Use geometric formulas when all necessary information is given Compute the area of triangles and rectangles when one or more additional simple steps are required Compute the area and circumference of circles after identifying necessary information Compute the perimeter of simple composite geometric figures with unknown side lengths Use relationships involving area, perimeter, and volume of geometric figures to compute another measure
B. Use angle measurement: solve problems of angle measure, including those involving triangles or other polygons and of parallel lines cut by a transversal	**Properties of Plane Figures:** Exhibit some knowledge of the angles associated with parallel lines Find the measure of an angle using properties of parallel lines Exhibit knowledge of basic angle properties and special sums of angle measures (e.g., 90°, 180°, and 360°) Use several angle properties to find an unknown angle measure Use properties of isosceles triangles Apply properties of 30°-60°-90°, 45°-45°-90°, similar, and congruent triangles
C. Apply geometric measurements: determine the surface area, and volume of geometric figures, including cones, spheres, and cylinders	**Measurement:** Compute the perimeter of polygons when all side lengths are given Compute the area of rectangles when whole number dimensions are given Compute the area and perimeter of triangles and rectangles in simple problems Use geometric formulas when all necessary information is given Compute the area of triangles and rectangles when one or more additional simple steps are required Compute the area and circumference of circles after identifying necessary information Compute the perimeter of simple composite geometric figures with unknown side lengths Use relationships involving area, perimeter, and volume of

*Locally assessed.

= Measured by PLAN Mathematics Test

TABLE 2E

MISSOURI Geometry Course Level Expectations	PLAN Mathematics College Readiness Standards
Strand 4: Measurement	
Big Idea 2. Apply appropriate techniques, tools and formulas to determine measurements	
	geometric figures to compute another measure
D. Analyze precision: No CLE	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour)
E. Use relationships within a measurement system: use unit analysis to solve problems*	**Basic Operations & Applications:** Perform common conversions (e.g., inches to feet or hours to minutes) Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour)

*Locally assessed.

TABLE 2E

MISSOURI Geometry Course Level Expectations	PLAN Mathematics College Readiness Standards
Strand 5: Data and Probability	
Big Idea 1. Formulate questions that can be addressed with data and collect, organize and display relevant data to answer them	
A. Formulate questions: formulate and collect data about a characteristic	
B. Classify and organize data: No CLE	**Probability, Statistics, & Data Analysis:** Perform a single computation using information from a table or chart Calculate the average, given the number of data values and the sum of the data values Read tables and graphs Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs
C. Represent and interpret data: select and use appropriate graphical representation of data and given one-variable quantitative data, display the distribution and describe its shape	**Probability, Statistics, & Data Analysis:** Perform a single computation using information from a table or chart Calculate the average, given the number of data values and the sum of the data values Read tables and graphs Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs

*Locally assessed.

= Measured by PLAN Mathematics Test

TABLE 2E

MISSOURI Geometry Course Level Expectations	PLAN Mathematics College Readiness Standards
Strand 5: Data and Probability	
Big Idea 2. Select and use appropriate statistical methods to analyze data	
A. Describe and analyze data: No CLE	**Probability, Statistics, & Data Analysis:** Calculate the average of a list of positive whole numbers Calculate the average of a list of numbers Calculate the average, given the number of data values and the sum of the data values Calculate the missing data value, given the average and all data values but one Calculate the average, given the frequency counts of all the data values Calculate or use a weighted average
B. Compare data representations: No CLE	**Probability, Statistics, & Data Analysis:** Perform a single computation using information from a table or chart Calculate the average, given the number of data values and the sum of the data values Read tables and graphs Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs
C. Represent data algebraically: No CLE	**Probability, Statistics, & Data Analysis:** Read tables and graphs Perform computations on data from tables and graphs Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs **Expressions, Equations, & Inequalities:** Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions) Write expressions, equations, and inequalities for common algebra settings

*Locally assessed.

= Measured by PLAN Mathematics Test

TABLE 2E

MISSOURI Geometry Course Level Expectations	PLAN Mathematics College Readiness Standards
Strand 5: Data and Probability	
Big Idea 3. Develop and evaluate inferences and predictions that are based on data	
A. Develop and evaluate inferences: No CLE	**Probability, Statistics, & Data Analysis:** Perform a single computation using information from a table or chart Calculate the average, given the number of data values and the sum of the data values Read tables and graphs Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs
B. Analyze basic statistical techniques: No CLE	
Big Idea 4. Understand and apply basic concepts of probability	
A. Apply basic concepts of probability: No CLE	**Probability, Statistics, & Data Analysis:** Use the relationship between the probability of an event and the probability of its complement Determine the probability of a simple event Exhibit knowledge of simple counting techniques Compute straightforward probabilities for common situations Use Venn diagrams in counting Apply counting techniques Compute a probability when the event and/or sample space are not given or obvious
B. Use and describe compound events: No CLE	**Probability, Statistics, & Data Analysis:** Apply counting techniques Compute a probability when the event and/or sample space are not given or obvious

*Locally assessed.

= Measured by PLAN Mathematics Test

TABLE 2F

MISSOURI Geometry Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 1: Number and Operations	
Big Idea 1. Understand numbers, ways of representing numbers, relationships among numbers and number systems	
A. Read, write and compare numbers: compare and order rational and irrational numbers, including finding their approximate locations on a number line	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent **Numbers: Concepts & Properties:** Identify a digit's place value Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor Find and use the least common multiple Order fractions **Graphical Representations:** Identify the location of a point with a positive coordinate on the number line Locate points on the number line and in the first quadrant
B. Represent and use rational numbers: use real numbers and various models, drawing, etc. to solve problems	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages Solve complex arithmetic problems involving percent of increase or decrease and problems requiring integration of several concepts from pre-algebra and/or pre-geometry (e.g., comparing percentages or averages, using several ratios, and finding ratios in geometry settings) **Probability, Statistics, & Data Analysis:** Perform a single computation using information from a table or chart Read tables and graphs Perform computations on data from tables and graphs Translate from one representation of data to another (e.g., a bar graph to a circle graph)

*Locally assessed.

= Measured by ACT Mathematics Test

TABLE 2F

MISSOURI Geometry Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 1: Number and Operations	
Big Idea 1. Understand numbers, ways of representing numbers, relationships among numbers and number systems	
	Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs Analyze and draw conclusions based on information from figures, tables, and graphs
C. Compose and decompose numbers: No CLE	**Numbers: Concepts & Properties:** Recognize equivalent fractions and fractions in lowest terms Recognize one-digit factors of a number Identify a digit's place value Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor Find and use the least common multiple Order fractions Work with numerical factors Work with scientific notation Work with squares and square roots of numbers Work problems involving positive integer exponents Apply number properties involving prime factorization Apply rules of exponents Draw conclusions based on number concepts, algebraic properties, and/or relationships between expressions and numbers
D. Classify and describe numeric relationships: No CLE	**Numbers: Concepts & Properties:** Recognize equivalent fractions and fractions in lowest terms Recognize one-digit factors of a number Identify a digit's place value Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor Find and use the least common multiple Order fractions Work with numerical factors Work with scientific notation Work with squares and square roots of numbers Work problems involving positive integer exponents Work with cubes and cube roots of numbers Apply number properties involving prime factorization Apply number properties involving even/odd numbers and factors/multiples Apply number properties involving positive/negative numbers

*Locally assessed.

= Measured by ACT Mathematics Test

TABLE 2F

MISSOURI Geometry Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 1: Number and Operations	
Big Idea 1. Understand numbers, ways of representing numbers, relationships among numbers and number systems	
	Apply rules of exponents Draw conclusions based on number concepts, algebraic properties, and/or relationships between expressions and numbers

*Locally assessed.

= Measured by ACT Mathematics Test

TABLE 2F

MISSOURI Geometry Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 1: Number and Operations	
Big Idea 2. Understand meanings of operations and how they relate to one another	
A. Represent operations: No CLE	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages Solve complex arithmetic problems involving percent of increase or decrease and problems requiring integration of several concepts from pre-algebra and/or pre-geometry (e.g., comparing percentages or averages, using several ratios, and finding ratios in geometry settings)
B. Describe effects of operations: No CLE	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages Solve complex arithmetic problems involving percent of increase or decrease and problems requiring integration of several concepts from pre-algebra and/or pre-geometry (e.g., comparing percentages or averages, using several ratios, and finding ratios in geometry settings) **Numbers: Concepts & Properties:** Recognize one-digit factors of a number Identify a digit's place value

*Locally assessed.

= Measured by ACT Mathematics Test

TABLE 2F

MISSOURI Geometry Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 1: Number and Operations	
Big Idea 2. Understand meanings of operations and how they relate to one another	
	Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor Find and use the least common multiple Order fractions Work with numerical factors Work with scientific notation Work with squares and square roots of numbers Work with cubes and cube roots of numbers Apply number properties involving prime factorization Apply number properties involving even/odd numbers and factors/multiples Apply number properties involving positive/negative numbers Apply rules of exponents Draw conclusions based on number concepts, algebraic properties, and/or relationships between expressions and numbers
C. Apply properties of operations: No CLE	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages Solve complex arithmetic problems involving percent of increase or decrease and problems requiring integration of several concepts from pre-algebra and/or pre-geometry (e.g., comparing percentages or averages, using several ratios, and finding ratios in geometry settings)

*Locally assessed.

TABLE 2F

MISSOURI Geometry Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 1: Number and Operations	
Big Idea 2. Understand meanings of operations and how they relate to one another	
D. Apply operations on real and complex numbers: apply operations to real numbers, using mental computation or paper-and-pencil calculations for simple cases and technology for more complicated cases*	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages Solve complex arithmetic problems involving percent of increase or decrease and problems requiring integration of several concepts from pre-algebra and/or pre-geometry (e.g., comparing percentages or averages, using several ratios, and finding ratios in geometry settings)

*Locally assessed.

= Measured by ACT Mathematics Test

TABLE 2F

MISSOURI Geometry Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 1: Number and Operations	
Big Idea 3. Compute fluently and make reasonable estimates	
A. Describe or represent mental strategies: No CLE	
B. Develop and demonstrate fluency: No CLE	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages Solve complex arithmetic problems involving percent of increase or decrease and problems requiring integration of several concepts from pre-algebra and/or pre-geometry (e.g., comparing percentages or averages, using several ratios, and finding ratios in geometry settings)
C. Compute problems: No CLE	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages Solve complex arithmetic problems involving percent of increase or decrease and problems requiring integration of several concepts from pre-algebra and/or pre-geometry (e.g., comparing percentages or averages, using several ratios, and finding ratios in geometry settings)

*Locally assessed.

TABLE 2F

MISSOURI Geometry Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 1: Number and Operations	
Big Idea 3. Compute fluently and make reasonable estimates	
D. Estimate and justify solutions: judge the reasonableness of numerical computations and their results*	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages Solve complex arithmetic problems involving percent of increase or decrease and problems requiring integration of several concepts from pre-algebra and/or pre-geometry (e.g., comparing percentages or averages, using several ratios, and finding ratios in geometry settings) **Properties of Plane Figures:** Draw conclusions based on a set of conditions
E. Use proportional reasoning: solve problems involving proportions*	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Perform common conversions (e.g., inches to feet or hours to minutes) Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages Solve complex arithmetic problems involving percent of increase or decrease and problems requiring integration of several concepts from pre-algebra and/or pre-geometry (e.g., comparing percentages or averages, using several ratios, and finding ratios in geometry settings)

*Locally assessed.

= Measured by ACT Mathematics Test

TABLE 2F

MISSOURI Geometry Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 1: Number and Operations	
Big Idea 3. Compute fluently and make reasonable estimates	
	Expressions, Equations, & Inequalities: Solve routine first-degree equations Solve real-world problems using first-degree equations Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions) Write expressions, equations, and inequalities for common algebra settings Write expressions that require planning and/or manipulating to accurately model a situation Write equations and inequalities that require planning, manipulating, and/or solving

*Locally assessed.

= Measured by ACT Mathematics Test

TABLE 2F

MISSOURI Geometry Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 2: Algebraic Relationships	
Big Idea 1. Understand patterns, relations and functions	
A. Recognize and extend patterns: No CLE	**Numbers: Concepts & Properties:** Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor Exhibit knowledge of logarithms and geometric sequences
B. Create and analyze patterns: generalize patterns using explicitly or recursively defined functions	**Numbers: Concepts & Properties:** Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor Exhibit knowledge of logarithms and geometric sequences
C. Classify objects and representations: compare and contrast various forms of representations of patterns	**Numbers: Concepts & Properties:** Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor Exhibit knowledge of logarithms and geometric sequences
D. Identify and compare functions: No CLE	**Probability, Statistics, & Data Analysis:** Read tables and graphs Perform computations on data from tables and graphs Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs Analyze and draw conclusions based on information from figures, tables, and graphs **Graphical Representations:** Locate points on the number line and in the first quadrant Locate points in the coordinate plane Exhibit knowledge of slope Determine the slope of a line from points or equations Match linear graphs with their equations Interpret and use information from graphs in the coordinate plane Use properties of parallel and perpendicular lines to determine an equation of a line or coordinates of a point Identify characteristics of graphs based on a set of conditions or on a general equation such as $y = ax^2 + c$ Solve problems integrating multiple algebraic and/or geometric concepts Analyze and draw conclusions based on information from graphs in the coordinate plane

*Locally assessed.

= Measured by ACT Mathematics Test

TABLE 2F

MISSOURI Geometry Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 2: Algebraic Relationships	
Big Idea 1. Understand patterns, relations and functions	
E. Describe the effects of parameter changes: No CLE	**Probability, Statistics, & Data Analysis:** Read tables and graphs Perform computations on data from tables and graphs Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs Analyze and draw conclusions based on information from figures, tables, and graphs **Numbers: Concepts & Properties:** Exhibit knowledge of logarithms and geometric sequences **Graphical Representations:** Locate points on the number line and in the first quadrant Locate points in the coordinate plane Exhibit knowledge of slope Determine the slope of a line from points or equations Match linear graphs with their equations Interpret and use information from graphs in the coordinate plane Use properties of parallel and perpendicular lines to determine an equation of a line or coordinates of a point Recognize special characteristics of parabolas and circles (e.g., the vertex of a parabola and the center or radius of a circle) Identify characteristics of graphs based on a set of conditions or on a general equation such as $y = ax^2 + c$ Solve problems integrating multiple algebraic and/or geometric concepts Analyze and draw conclusions based on information from graphs in the coordinate plane

*Locally assessed.

= Measured by ACT Mathematics Test

TABLE 2F

MISSOURI Geometry Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 2: Algebraic Relationships	
Big Idea 2. Represent and analyze mathematical situations and structures using algebraic symbols	
A. Represent mathematical situations: No CLE	**Expressions, Equations, & Inequalities:** Exhibit knowledge of basic expressions (e.g., identify an expression for a total as $b + g$) Solve equations in the form $x + a = b$, where a and b are whole numbers or decimals Solve one-step equations having integer or decimal answers Solve routine first-degree equations Perform straightforward word-to-symbol translations Solve real-world problems using first-degree equations Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions) Identify solutions to simple quadratic equations Factor simple quadratics (e.g., the difference of squares and perfect square trinomials) Solve first-degree inequalities that do not require reversing the inequality sign Manipulate expressions and equations Write expressions, equations, and inequalities for common algebra settings Solve linear inequalities that require reversing the inequality sign Solve quadratic equations Write expressions that require planning and/or manipulating to accurately model a situation Write equations and inequalities that require planning, manipulating, and/or solving
B. Describe and use mathematical manipulation: apply appropriate properties of exponents to simplify expressions and solve equations	**Numbers: Concepts & Properties:** Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor Work with numerical factors Work with scientific notation Work problems involving positive integer exponents Apply rules of exponents Draw conclusions based on number concepts, algebraic properties, and/or relationships between expressions and numbers **Expressions, Equations, & Inequalities:** Combine like terms (e.g., $2x + 5x$) Add and subtract simple algebraic expressions Multiply two binomials Add, subtract, and multiply polynomials

*Locally assessed.

= Measured by ACT Mathematics Test

TABLE 2F

MISSOURI Geometry Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 2: Algebraic Relationships	
Big Idea 2. Represent and analyze mathematical situations and structures using algebraic symbols	
	Manipulate expressions and equations Write expressions that require planning and/or manipulating to accurately model a situation Write equations and inequalities that require planning, manipulating, and/or solving
C. Utilize equivalent forms: No CLE	**Expressions, Equations, & Inequalities:** Solve equations in the form $x + a = b$, where a and b are whole numbers or decimals Solve one-step equations having integer or decimal answers Solve routine first-degree equations Solve real-world problems using first-degree equations Solve first-degree inequalities that do not require reversing the inequality sign Manipulate expressions and equations Solve linear inequalities that require reversing the inequality sign Solve absolute value equations Solve quadratic equations Write expressions that require planning and/or manipulating to accurately model a situation Write equations and inequalities that require planning, manipulating, and/or solving
D. Utilize systems: No CLE	**Expressions, Equations, & Inequalities:** Find solutions to systems of linear equations Write equations and inequalities that require planning, manipulating, and/or solving

*Locally assessed.

= Measured by ACT Mathematics Test

TABLE 2F

MISSOURI Geometry Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 2: Algebraic Relationships	
Big Idea 3. Use mathematical models to represent and understand quantitative relationships	
A. Use mathematical models: identify quantitative relationships and determine the type(s) of functions that might model the situation to solve the problem	**Probability, Statistics, & Data Analysis:** Read tables and graphs Perform computations on data from tables and graphs Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs Analyze and draw conclusions based on information from figures, tables, and graphs **Expressions, Equations, & Inequalities:** Perform straightforward word-to-symbol translations Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions) Manipulate expressions and equations Write expressions, equations, and inequalities for common algebra settings Write expressions that require planning and/or manipulating to accurately model a situation Write equations and inequalities that require planning, manipulating, and/or solving

*Locally assessed.

= Measured by ACT Mathematics Test

TABLE 2F

MISSOURI Geometry Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 2: Algebraic Relationships	
Big Idea 4. Analyze change in various contexts	
A. Analyze change: analyze linear functions by investigating rates of change and intercepts	**Probability, Statistics, & Data Analysis:** Perform a single computation using information from a table or chart Read tables and graphs Perform computations on data from tables and graphs Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs Analyze and draw conclusions based on information from figures, tables, and graphs **Graphical Representations:** Locate points on the number line and in the first quadrant Locate points in the coordinate plane Exhibit knowledge of slope Determine the slope of a line from points or equations Interpret and use information from graphs in the coordinate plane Recognize special characteristics of parabolas and circles (e.g., the vertex of a parabola and the center or radius of a circle) Identify characteristics of graphs based on a set of conditions or on a general equation such as $y = ax^2 + c$ Solve problems integrating multiple algebraic and/or geometric concepts Analyze and draw conclusions based on information from graphs in the coordinate plane

*Locally assessed.

= Measured by ACT Mathematics Test

TABLE 2F

MISSOURI Geometry Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 3: Geometric and Spatial Relationships	
Big Idea 1. Analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships	
A. Describe and use geometric relationships: use inductive and deductive reasoning to establish the validity of geometric conjectures, prove theorems and critique arguments made by others	**Properties of Plane Figures:** Apply properties of 30°-60°-90°, 45°-45°-90°, similar, and congruent triangles Draw conclusions based on a set of conditions Solve multistep geometry problems that involve integrating concepts, planning, visualization, and/or making connections with other content areas
B. Apply geometric relationships: No CLE	**Properties of Plane Figures:** Exhibit some knowledge of the angles associated with parallel lines Find the measure of an angle using properties of parallel lines Exhibit knowledge of basic angle properties and special sums of angle measures (e.g., 90°, 180°, and 360°) Use several angle properties to find an unknown angle measure Use properties of isosceles triangles Apply properties of 30°-60°-90°, 45°-45°-90°, similar, and congruent triangles Draw conclusions based on a set of conditions Solve multistep geometry problems that involve integrating concepts, planning, visualization, and/or making connections with other content areas Use relationships among angles, arcs, and distances in a circle

*Locally assessed.

TABLE 2F

MISSOURI Geometry Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 3: Geometric and Spatial Relationships	
C. Compose and decompose shapes: No CLE	**Measurement:** Estimate or calculate the length of a line segment based on other lengths given on a geometric figure Compute the perimeter of polygons when all side lengths are given Compute the area of rectangles when whole number dimensions are given Compute the area and perimeter of triangles and rectangles in simple problems Compute the area of triangles and rectangles when one or more additional simple steps are required Compute the area and circumference of circles after identifying necessary information Compute the perimeter of simple composite geometric figures with unknown side lengths Use relationships involving area, perimeter, and volume of geometric figures to compute another measure Compute the area of composite geometric figures when planning or visualization is required
Big Idea 2. Specify locations and describe spatial relationships using coordinate geometry and other representational systems	
A. Use coordinate systems: make conjectures and solve problems involving 2-dimensional objects represented with Cartesian coordinates	**Graphical Representations:** Locate points on the number line and in the first quadrant Locate points in the coordinate plane Exhibit knowledge of slope Determine the slope of a line from points or equations Find the midpoint of a line segment Interpret and use information from graphs in the coordinate plane Use the distance formula Use properties of parallel and perpendicular lines to determine an equation of a line or coordinates of a point Identify characteristics of graphs based on a set of conditions or on a general equation such as $y = ax^2 + c$ Solve problems integrating multiple algebraic and/or geometric concepts Analyze and draw conclusions based on information from graphs in the coordinate plane
Big Idea 3. Apply transformations and use symmetry to analyze mathematical situations	
A. Use transformations on objects: use and apply constructions and the coordinate plane to represent translations, reflections, rotations and dilations of objects	**Graphical Representations:** Solve problems integrating multiple algebraic and/or geometric concepts Analyze and draw conclusions based on information from graphs in the coordinate plane

*Locally assessed.

= Measured by ACT Mathematics Test

TABLE 2F

MISSOURI Geometry Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 3: Geometric and Spatial Relationships	
B. Use transformations on functions: No CLE	**Graphical Representations:** Solve problems integrating multiple algebraic and/or geometric concepts Analyze and draw conclusions based on information from graphs in the coordinate plane
C. Use symmetry: identify types of symmetries of 2- and 3-dimensional figures	**Graphical Representations:** Solve problems integrating multiple algebraic and/or geometric concepts Analyze and draw conclusions based on information from graphs in the coordinate plane
Big Idea 4. Use visualization, spatial reasoning and geometric modeling to solve problems	
A. Recognize and draw three-dimensional representations: draw and use vertex-edge graphs or networks to find optimal solutions and draw representations of 3-dimensional geometric objects from different perspectives	**Probability, Statistics, & Data Analysis:** Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs Analyze and draw conclusions based on information from figures, tables, and graphs **Graphical Representations:** Interpret and use information from graphs in the coordinate plane Solve problems integrating multiple algebraic and/or geometric concepts Analyze and draw conclusions based on information from graphs in the coordinate plane

*Locally assessed.

= Measured by ACT Mathematics Test

TABLE 2F

MISSOURI Geometry Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 3: Geometric and Spatial Relationships	
B. Draw and use visual models: draw or use visual models to represent and solve problems*	**Probability, Statistics, & Data Analysis:** Perform a single computation using information from a table or chart Calculate the average, given the number of data values and the sum of the data values Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs Analyze and draw conclusions based on information from figures, tables, and graphs **Graphical Representations:** Locate points on the number line and in the first quadrant Locate points in the coordinate plane Interpret and use information from graphs in the coordinate plane Solve problems integrating multiple algebraic and/or geometric concepts Analyze and draw conclusions based on information from graphs in the coordinate plane

*Locally assessed.

= Measured by ACT Mathematics Test

TABLE 2F

MISSOURI Geometry Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 4: Measurement	
Big Idea 1. Understand measurable attributes of objects and the units, systems and processes of measurement	
A. Determine unit of measurement: No CLE	**Basic Operations & Applications:** Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour)
B. Identify equivalent measures: No CLE	**Basic Operations & Applications:** Perform common conversions (e.g., inches to feet or hours to minutes) Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour)
C. Tell and use units of time: No CLE	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average
D. Count and compute money: No CLE	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average

*Locally assessed.

= Measured by ACT Mathematics Test

TABLE 2F

MISSOURI Geometry Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 4: Measurement	
Big Idea 2. Apply appropriate techniques, tools and formulas to determine measurements	
A. Use standard or non-standard measurement: No CLE	**Measurement:** Estimate or calculate the length of a line segment based on other lengths given on a geometric figure Compute the perimeter of polygons when all side lengths are given Compute the area and perimeter of triangles and rectangles in simple problems Use geometric formulas when all necessary information is given Compute the area of triangles and rectangles when one or more additional simple steps are required Compute the area and circumference of circles after identifying necessary information Compute the perimeter of simple composite geometric figures with unknown side lengths Use relationships involving area, perimeter, and volume of geometric figures to compute another measure Compute the area of composite geometric figures when planning or visualization is required
B. Use angle measurement: solve problems of angle measure, including those involving triangles or other polygons and of parallel lines cut by a transversal	**Properties of Plane Figures:** Exhibit some knowledge of the angles associated with parallel lines Find the measure of an angle using properties of parallel lines Exhibit knowledge of basic angle properties and special sums of angle measures (e.g., 90°, 180°, and 360°) Use several angle properties to find an unknown angle measure Use properties of isosceles triangles Apply properties of 30°-60°-90°, 45°-45°-90°, similar, and congruent triangles Draw conclusions based on a set of conditions Solve multistep geometry problems that involve integrating concepts, planning, visualization, and/or making connections with other content areas Use relationships among angles, arcs, and distances in a circle

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TABLE 2F

MISSOURI Geometry Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 4: Measurement	
Big Idea 2. Apply appropriate techniques, tools and formulas to determine measurements	
C. Apply geometric measurements: determine the surface area, and volume of geometric figures, including cones, spheres, and cylinders	**Measurement:** Compute the perimeter of polygons when all side lengths are given Compute the area of rectangles when whole number dimensions are given Compute the area and perimeter of triangles and rectangles in simple problems Use geometric formulas when all necessary information is given Compute the area of triangles and rectangles when one or more additional simple steps are required Compute the area and circumference of circles after identifying necessary information Compute the perimeter of simple composite geometric figures with unknown side lengths Use relationships involving area, perimeter, and volume of geometric figures to compute another measure Compute the area of composite geometric figures when planning or visualization is required
D. Analyze precision: No CLE	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour)
E. Use relationships within a measurement system: use unit analysis to solve problems*	**Basic Operations & Applications:** Perform common conversions (e.g., inches to feet or hours to minutes) Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour)

*Locally assessed.

= Measured by ACT Mathematics Test

TABLE 2F

MISSOURI Geometry Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 5: Data and Probability	
Big Idea 1. Formulate questions that can be addressed with data and collect, organize and display relevant data to answer them	
A. Formulate questions: formulate and collect data about a characteristic	
B. Classify and organize data: No CLE	**Probability, Statistics, & Data Analysis:** Perform a single computation using information from a table or chart Calculate the average, given the number of data values and the sum of the data values Read tables and graphs Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs Analyze and draw conclusions based on information from figures, tables, and graphs
C. Represent and interpret data: select and use appropriate graphical representation of data and given one-variable quantitative data, display the distribution and describe its shape	**Probability, Statistics, & Data Analysis:** Perform a single computation using information from a table or chart Calculate the average, given the number of data values and the sum of the data values Read tables and graphs Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs Analyze and draw conclusions based on information from figures, tables, and graphs

*Locally assessed.

= Measured by ACT Mathematics Test

TABLE 2F

MISSOURI Geometry Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 5: Data and Probability	
Big Idea 2. Select and use appropriate statistical methods to analyze data	
A. Describe and analyze data: No CLE	**Probability, Statistics, & Data Analysis:** Calculate the average of a list of positive whole numbers Calculate the average of a list of numbers Calculate the average, given the number of data values and the sum of the data values Calculate the missing data value, given the average and all data values but one Calculate the average, given the frequency counts of all the data values Calculate or use a weighted average Distinguish between mean, median, and mode for a list of numbers
B. Compare data representations: No CLE	**Probability, Statistics, & Data Analysis:** Perform a single computation using information from a table or chart Calculate the average, given the number of data values and the sum of the data values Read tables and graphs Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs Analyze and draw conclusions based on information from figures, tables, and graphs
C. Represent data algebraically: No CLE	**Probability, Statistics, & Data Analysis:** Read tables and graphs Perform computations on data from tables and graphs Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs Analyze and draw conclusions based on information from figures, tables, and graphs **Expressions, Equations, & Inequalities:** Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions) Write expressions, equations, and inequalities for common algebra settings Write expressions that require planning and/or manipulating to accurately model a situation Write equations and inequalities that require planning,

*Locally assessed.

TABLE 2F

MISSOURI Geometry Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 5: Data and Probability	
Big Idea 2. Select and use appropriate statistical methods to analyze data	
	manipulating, and/or solving

*Locally assessed.

TABLE 2F

MISSOURI Geometry Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 5: Data and Probability	
Big Idea 3. Develop and evaluate inferences and predictions that are based on data	
A. Develop and evaluate inferences: No CLE	**Probability, Statistics, & Data Analysis:** Perform a single computation using information from a table or chart Calculate the average, given the number of data values and the sum of the data values Read tables and graphs Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs Analyze and draw conclusions based on information from figures, tables, and graphs
B. Analyze basic statistical techniques: No CLE	
Big Idea 4. Understand and apply basic concepts of probability	
A. Apply basic concepts of probability: No CLE	**Probability, Statistics, & Data Analysis:** Use the relationship between the probability of an event and the probability of its complement Determine the probability of a simple event Exhibit knowledge of simple counting techniques Compute straightforward probabilities for common situations Use Venn diagrams in counting Apply counting techniques Compute a probability when the event and/or sample space are not given or obvious Exhibit knowledge of conditional and joint probability
B. Use and describe compound events: No CLE	**Probability, Statistics, & Data Analysis:** Apply counting techniques Compute a probability when the event and/or sample space are not given or obvious Exhibit knowledge of conditional and joint probability

*Locally assessed.

= Measured by ACT Mathematics Test

TABLE 2G

MISSOURI Integrated Math II Course Level Expectations	EXPLORE Mathematics College Readiness Standards
Strand 1: Number and Operations	
Big Idea 1. Understand numbers, ways of representing numbers, relationships among numbers and number systems	
A. Read, write and compare numbers: compare and order rational and irrational numbers, including finding their approximate locations on a number line	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent **Numbers: Concepts & Properties:** Identify a digit's place value Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor Find and use the least common multiple Order fractions **Graphical Representations:** Identify the location of a point with a positive coordinate on the number line Locate points on the number line and in the first quadrant
B. Represent and use rational numbers: use real numbers and various models, drawings, etc. to solve problems	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) **Probability, Statistics, & Data Analysis:** Perform a single computation using information from a table or chart Read tables and graphs Perform computations on data from tables and graphs Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs

*Locally assessed.

TABLE 2G

MISSOURI Integrated Math II Course Level Expectations	EXPLORE Mathematics College Readiness Standards
Strand 1: Number and Operations	
Big Idea 1. Understand numbers, ways of representing numbers, relationships among numbers and number systems	
C. Compose and decompose numbers: No CLE	**Numbers: Concepts & Properties:** Recognize equivalent fractions and fractions in lowest terms Recognize one-digit factors of a number Identify a digit's place value Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor Find and use the least common multiple Order fractions Work with numerical factors Work with scientific notation Work with squares and square roots of numbers
D. Classify and describe numeric relationships: No CLE	**Numbers: Concepts & Properties:** Recognize equivalent fractions and fractions in lowest terms Recognize one-digit factors of a number Identify a digit's place value Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor Find and use the least common multiple Order fractions Work with numerical factors Work with scientific notation Work with squares and square roots of numbers

*Locally assessed.

TABLE 2G

MISSOURI Integrated Math II Course Level Expectations	EXPLORE Mathematics College Readiness Standards
Strand 1: Number and Operations	
Big Idea 2. Understand meanings of operations and how they relate to one another	
A. Represent operations: No CLE	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour)
B. Describe effects of operations: No CLE	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) **Numbers: Concepts & Properties:** Recognize one-digit factors of a number Identify a digit's place value Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor Find and use the least common multiple Order fractions Work with numerical factors Work with scientific notation Work with squares and square roots of numbers
C. Apply properties of operations: apply properties of exponents to simplify expressions or solve equations	**Numbers: Concepts & Properties:** Work with scientific notation

*Locally assessed.

TABLE 2G

MISSOURI Integrated Math II Course Level Expectations	EXPLORE Mathematics College Readiness Standards
Strand 1: Number and Operations	
Big Idea 2. Understand meanings of operations and how they relate to one another	
D. Apply operations on real and complex numbers: apply operations to real numbers, using mental computation or paper-and-pencil calculations for simple cases and technology for more complicated cases*	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour)

*Locally assessed.

= Measured by EXPLORE Mathematics Test

TABLE 2G

MISSOURI Integrated Math II Course Level Expectations	EXPLORE Mathematics College Readiness Standards
Strand 1: Number and Operations	
Big Idea 3. Compute fluently and make reasonable estimates	
A. Describe or represent mental strategies: No CLE	
B. Develop and demonstrate fluency: No CLE	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour)
C. Compute problems: No CLE	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour)
D. Estimate and justify solutions: judge the reasonableness of numerical computations and their results*	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour)

*Locally assessed.

TABLE 2G

MISSOURI Integrated Math II Course Level Expectations	EXPLORE Mathematics College Readiness Standards
Strand 1: Number and Operations	
Big Idea 3. Compute fluently and make reasonable estimates	
E. Use proportional reasoning: solve problems involving proportions*	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) **Expressions, Equations, & Inequalities:** Solve routine first-degree equations Solve real-world problems using first-degree equations Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions)

*Locally assessed.

TABLE 2G

MISSOURI Integrated Math II Course Level Expectations	EXPLORE Mathematics College Readiness Standards
Strand 2: Algebraic Relationships	
Big Idea 1. Understand patterns, relations and functions	
A. Recognize and extend patterns: No CLE	**Numbers: Concepts & Properties:** Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor
B. Create and analyze patterns: generalize patterns using explicitly or recursively defined functions	**Numbers: Concepts & Properties:** Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor
C. Classify objects and representations: compare and contrast various forms of representations of patterns	**Numbers: Concepts & Properties:** Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor
D. Identify and compare functions: understand and compare the properties of linear, exponential and quadratic functions (include domain and range)	**Probability, Statistics, & Data Analysis:** Read tables and graphs Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs **Graphical Representations:** Locate points on the number line and in the first quadrant Locate points in the coordinate plane
E. Describe the effects of parameter changes: describe the effects of parameter changes on quadratic and exponential functions	**Probability, Statistics, & Data Analysis:** Read tables and graphs Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs **Graphical Representations:** Locate points on the number line and in the first quadrant Locate points in the coordinate plane

*Locally assessed.

TABLE 2G

MISSOURI Integrated Math II Course Level Expectations	EXPLORE Mathematics College Readiness Standards
Strand 2: Algebraic Relationships	
Big Idea 2. Represent and analyze mathematical situations and structures using algebraic symbols	
A. Represent mathematical situations: use symbolic algebra to represent and solve problems that involve quadratic relationships, including recursive relationships	**Numbers: Concepts & Properties:** Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor **Expressions, Equations, & Inequalities:** Exhibit knowledge of basic expressions (e.g., identify an expression for a total as $b + g$) Solve equations in the form $x + a = b$, where a and b are whole numbers or decimals Solve one-step equations having integer or decimal answers Solve routine first-degree equations Perform straightforward word-to-symbol translations Solve real-world problems using first-degree equations Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions) Identify solutions to simple quadratic equations
B. Describe and use mathematical manipulation: describe and use algebraic manipulations, including factoring and rules of integer exponents	**Numbers: Concepts & Properties:** Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor **Expressions, Equations, & Inequalities:** Combine like terms (e.g., $2x + 5x$) Add and subtract simple algebraic expressions
C. Utilize equivalent forms: use and solve equivalent forms of equations and inequalities (piece-wise and quadratic)	**Expressions, Equations, & Inequalities:** Solve equations in the form $x + a = b$, where a and b are whole numbers or decimals Solve one-step equations having integer or decimal answers Solve routine first-degree equations Solve real-world problems using first-degree equations
D. Utilize systems: use and solve systems of linear equations or inequalities with 2 variables	

*Locally assessed.

TABLE 2G

MISSOURI Integrated Math II Course Level Expectations	EXPLORE Mathematics College Readiness Standards
Strand 2: Algebraic Relationships	
Big Idea 3. Use mathematical models to represent and understand quantitative relationships	
A. Use mathematical models: identify quantitative relationships and determine the type(s) of functions that might model the situation to solve the problem	**Probability, Statistics, & Data Analysis:** Read tables and graphs Perform computations on data from tables and graphs Manipulate data from tables and graphs **Expressions, Equations, & Inequalities:** Perform straightforward word-to-symbol translations Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions)
Big Idea 4. Analyze change in various contexts	
A. Analyze change: analyze quadratic functions by investigating rates of change, intercepts and zeros	**Probability, Statistics, & Data Analysis:** Perform a single computation using information from a table or chart Read tables and graphs Perform computations on data from tables and graphs Manipulate data from tables and graphs **Graphical Representations:** Locate points on the number line and in the first quadrant Locate points in the coordinate plane

*Locally assessed.

TABLE 2G

MISSOURI Integrated Math II Course Level Expectations	EXPLORE Mathematics College Readiness Standards
Strand 3: Geometric and Spatial Relationships	
Big Idea 1. Analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships	
A. Describe and use geometric relationships: use trigonometric relationships with right triangles to determine lengths and angle measures	
B. Apply geometric relationships: apply relationships among surface areas and among volumes of similar objects*	
C. Compose and decompose shapes: No CLE	**Measurement:** Estimate or calculate the length of a line segment based on other lengths given on a geometric figure Compute the perimeter of polygons when all side lengths are given Compute the area of rectangles when whole number dimensions are given Compute the area and perimeter of triangles and rectangles in simple problems Use geometric formulas when all necessary information is given Compute the area of triangles and rectangles when one or more additional simple steps are required Compute the area and circumference of circles after identifying necessary information
Big Idea 2. Specify locations and describe spatial relationships using coordinate geometry and other representational systems	
A. Use coordinate systems: make conjectures and solve problems involving 2-dimensional objects represented with Cartesian coordinates	**Graphical Representations:** Locate points on the number line and in the first quadrant Locate points in the coordinate plane
Big Idea 3. Apply transformations and use symmetry to analyze mathematical situations	
A. Use transformations on objects: use and apply constructions and matrices to represent translations, reflections, rotations, and dilations	
B. Use transformations on functions: translate, dilate and reflect quadratic and exponential functions	
C. Use symmetry: No CLE	

*Locally assessed.

= Measured by EXPLORE Mathematics Test

TABLE 2G

MISSOURI Integrated Math II Course Level Expectations	EXPLORE Mathematics College Readiness Standards
Strand 3: Geometric and Spatial Relationships	
Big Idea 4. Use visualization, spatial reasoning and geometric modeling to solve problems	
A. Recognize and draw three-dimensional representations: No CLE	
B. Draw and use visual models: draw or use visual models to represent and solve problems*	**Probability, Statistics, & Data Analysis:** Perform a single computation using information from a table or chart Calculate the average, given the number of data values and the sum of the data values Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs **Graphical Representations:** Locate points on the number line and in the first quadrant Locate points in the coordinate plane

*Locally assessed.

= Measured by EXPLORE Mathematics Test

TABLE 2G

MISSOURI Integrated Math II Course Level Expectations	EXPLORE Mathematics College Readiness Standards
Strand 4: Measurement	
Big Idea 1. Understand measurable attributes of objects and the units, systems and processes of measurement	
A. Determine unit of measurement: No CLE	**Basic Operations & Applications:** Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour)
B. Identify equivalent measures: No CLE	**Basic Operations & Applications:** Perform common conversions (e.g., inches to feet or hours to minutes) Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour)
C. Tell and use units of time: No CLE	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average
D. Count and compute money: No CLE	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average

*Locally assessed.

TABLE 2G

MISSOURI Integrated Math II Course Level Expectations	EXPLORE Mathematics College Readiness Standards
Strand 4: Measurement	
Big Idea 2. Apply appropriate techniques, tools and formulas to determine measurements	
A. Use standard or non-standard measurement: No CLE	**Measurement:** Estimate or calculate the length of a line segment based on other lengths given on a geometric figure Compute the perimeter of polygons when all side lengths are given Compute the area and perimeter of triangles and rectangles in simple problems Use geometric formulas when all necessary information is given Compute the area of triangles and rectangles when one or more additional simple steps are required Compute the area and circumference of circles after identifying necessary information
B. Use angle measurement: No CLE	**Properties of Plane Figures:** Exhibit some knowledge of the angles associated with parallel lines Find the measure of an angle using properties of parallel lines Exhibit knowledge of basic angle properties and special sums of angle measures (e.g., 90°, 180°, and 360°) Use several angle properties to find an unknown angle measure
C. Apply geometric measurements: No CLE	
D. Analyze precision: analyze effects of computation on accuracy and precision in measurement*	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Perform common conversions (e.g., inches to feet or hours to minutes) Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour)
E. Use relationships within a measurement system: No CLE	**Basic Operations & Applications:** Perform common conversions (e.g., inches to feet or hours to minutes) Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour)

*Locally assessed.

= Measured by EXPLORE Mathematics Test

TABLE 2G

MISSOURI Integrated Math II Course Level Expectations	EXPLORE Mathematics College Readiness Standards
Strand 5: Data and Probability	
Big Idea 1. Formulate questions that can be addressed with data and collect, organize and display relevant data to answer them	
A. Formulate questions: No CLE	
B. Classify and organize data: No CLE	**Probability, Statistics, & Data Analysis:** Perform a single computation using information from a table or chart Calculate the average, given the number of data values and the sum of the data values Read tables and graphs Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs
C. Represent and interpret data: No CLE	**Probability, Statistics, & Data Analysis:** Perform a single computation using information from a table or chart Calculate the average, given the number of data values and the sum of the data values Read tables and graphs Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs
Big Idea 2. Select and use appropriate statistical methods to analyze data	
A. Describe and analyze data: apply statistical concepts to solve problems and distinguish between a statistic and a parameter	**Probability, Statistics, & Data Analysis:** Calculate the average of a list of positive whole numbers Calculate the average of a list of numbers Calculate the average, given the number of data values and the sum of the data values Calculate the missing data value, given the average and all data values but one Calculate the average, given the frequency counts of all the data values
B. Compare data representations: No CLE	**Probability, Statistics, & Data Analysis:** Perform a single computation using information from a table or chart Calculate the average, given the number of data values and the sum of the data values Read tables and graphs Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs

*Locally assessed.

TABLE 2G

MISSOURI Integrated Math II Course Level Expectations	EXPLORE Mathematics College Readiness Standards
Strand 5: Data and Probability	
C. Represent data algebraically: given a scatterplot, determine the type of function which models the data	**Probability, Statistics, & Data Analysis:** Read tables and graphs Perform computations on data from tables and graphs Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs **Expressions, Equations, & Inequalities:** Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions)
Big Idea 3. Develop and evaluate inferences and predictions that are based on data	
A. Develop and evaluate inferences: No CLE	**Probability, Statistics, & Data Analysis:** Perform a single computation using information from a table or chart Calculate the average, given the number of data values and the sum of the data values Read tables and graphs Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs
B. Analyze basic statistical techniques: No CLE	
Big Idea 4. Understand and apply basic concepts of probability	
A. Apply basic concepts of probability: describe the concepts of sample space and probability distribution	**Probability, Statistics, & Data Analysis:** Use the relationship between the probability of an event and the probability of its complement Determine the probability of a simple event Exhibit knowledge of simple counting techniques Compute straightforward probabilities for common situations
B. Use and describe compound events: use and describe the concepts of conditional probability and independent events	

*Locally assessed.

TABLE 2H

MISSOURI Integrated Math II Course Level Expectations	PLAN Mathematics College Readiness Standards
Strand 1: Number and Operations	
Big Idea 1. Understand numbers, ways of representing numbers, relationships among numbers and number systems	
A. Read, write and compare numbers: compare and order rational and irrational numbers, including finding their approximate locations on a number line	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent **Numbers: Concepts & Properties:** Identify a digit's place value Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor Find and use the least common multiple Order fractions **Graphical Representations:** Identify the location of a point with a positive coordinate on the number line Locate points on the number line and in the first quadrant
B. Represent and use rational numbers: use real numbers and various models, drawings, etc. to solve problems	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages **Probability, Statistics, & Data Analysis:** Perform a single computation using information from a table or chart Read tables and graphs Perform computations on data from tables and graphs Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs

*Locally assessed.

= Measured by PLAN Mathematics Test

TABLE 2H

MISSOURI Integrated Math II Course Level Expectations	PLAN Mathematics College Readiness Standards
Strand 1: Number and Operations	
Big Idea 1. Understand numbers, ways of representing numbers, relationships among numbers and number systems	
C. Compose and decompose numbers: No CLE	**Numbers: Concepts & Properties:** Recognize equivalent fractions and fractions in lowest terms Recognize one-digit factors of a number Identify a digit's place value Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor Find and use the least common multiple Order fractions Work with numerical factors Work with scientific notation Work with squares and square roots of numbers Work problems involving positive integer exponents Apply number properties involving prime factorization Apply rules of exponents
D. Classify and describe numeric relationships: No CLE	**Numbers: Concepts & Properties:** Recognize equivalent fractions and fractions in lowest terms Recognize one-digit factors of a number Identify a digit's place value Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor Find and use the least common multiple Order fractions Work with numerical factors Work with scientific notation Work with squares and square roots of numbers Work problems involving positive integer exponents Work with cubes and cube roots of numbers Apply number properties involving prime factorization Apply number properties involving even/odd numbers and factors/multiples Apply number properties involving positive/negative numbers Apply rules of exponents

*Locally assessed.

= Measured by PLAN Mathematics Test

TABLE 2H

MISSOURI Integrated Math II Course Level Expectations	PLAN Mathematics College Readiness Standards
Strand 1: Number and Operations	
Big Idea 2. Understand meanings of operations and how they relate to one another	
A. Represent operations: No CLE	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages
B. Describe effects of operations: No CLE	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages **Numbers: Concepts & Properties:** Recognize one-digit factors of a number Identify a digit's place value Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor Find and use the least common multiple Order fractions Work with numerical factors Work with scientific notation Work with squares and square roots of numbers Work problems involving positive integer exponents Work with cubes and cube roots of numbers

*Locally assessed.

= Measured by PLAN Mathematics Test

TABLE 2H

MISSOURI Integrated Math II Course Level Expectations	PLAN Mathematics College Readiness Standards
Strand 1: Number and Operations	
Big Idea 2. Understand meanings of operations and how they relate to one another	
	Apply number properties involving prime factorization Apply number properties involving even/odd numbers and factors/multiples Apply number properties involving positive/negative numbers Apply rules of exponents
C. Apply properties of operations: apply properties of exponents to simplify expressions or solve equations	**Numbers: Concepts & Properties:** Work with scientific notation Work problems involving positive integer exponents Apply rules of exponents
D. Apply operations on real and complex numbers: apply operations to real numbers, using mental computation or paper-and-pencil calculations for simple cases and technology for more complicated cases*	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages

*Locally assessed.

= Measured by PLAN Mathematics Test

TABLE 2H

MISSOURI Integrated Math II Course Level Expectations	PLAN Mathematics College Readiness Standards
Strand 1: Number and Operations	
Big Idea 3. Compute fluently and make reasonable estimates	
A. Describe or represent mental strategies: No CLE	
B. Develop and demonstrate fluency: No CLE	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages
C. Compute problems: No CLE	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages

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TABLE 2H

MISSOURI Integrated Math II Course Level Expectations	PLAN Mathematics College Readiness Standards
Strand 1: Number and Operations	
Big Idea 3. Compute fluently and make reasonable estimates	
D. Estimate and justify solutions: judge the reasonableness of numerical computations and their results*	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages
E. Use proportional reasoning: solve problems involving proportions*	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages **Expressions, Equations, & Inequalities:** Solve routine first-degree equations Solve real-world problems using first-degree equations Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions) Write expressions, equations, and inequalities for common algebra settings

*Locally assessed.

TABLE 2H

MISSOURI Integrated Math II Course Level Expectations	PLAN Mathematics College Readiness Standards
Strand 2: Algebraic Relationships	
Big Idea 1. Understand patterns, relations and functions	
A. Recognize and extend patterns: No CLE	**Numbers: Concepts & Properties:** Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor
B. Create and analyze patterns: generalize patterns using explicitly or recursively defined functions	**Numbers: Concepts & Properties:** Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor
C. Classify objects and representations: compare and contrast various forms of representations of patterns	**Numbers: Concepts & Properties:** Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor
D. Identify and compare functions: understand and compare the properties of linear, exponential and quadratic functions (include domain and range)	**Probability, Statistics, & Data Analysis:** Read tables and graphs Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs **Graphical Representations:** Locate points on the number line and in the first quadrant Locate points in the coordinate plane Exhibit knowledge of slope Determine the slope of a line from points or equations Match linear graphs with their equations
E. Describe the effects of parameter changes: describe the effects of parameter changes on quadratic and exponential functions	**Probability, Statistics, & Data Analysis:** Read tables and graphs Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs **Graphical Representations:** Locate points on the number line and in the first quadrant Locate points in the coordinate plane Exhibit knowledge of slope Determine the slope of a line from points or equations Match linear graphs with their equations Interpret and use information from graphs in the coordinate plane Use properties of parallel and perpendicular lines to determine an equation of a line or coordinates of a point

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TABLE 2H

MISSOURI Integrated Math II Course Level Expectations	PLAN Mathematics College Readiness Standards
Strand 2: Algebraic Relationships	
Big Idea 2. Represent and analyze mathematical situations and structures using algebraic symbols	
A. Represent mathematical situations: use symbolic algebra to represent and solve problems that involve quadratic relationships, including recursive relationships	**Numbers: Concepts & Properties:** Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor **Expressions, Equations, & Inequalities:** Exhibit knowledge of basic expressions (e.g., identify an expression for a total as $b + g$) Solve equations in the form $x + a = b$, where a and b are whole numbers or decimals Solve one-step equations having integer or decimal answers Solve routine first-degree equations Perform straightforward word-to-symbol translations Solve real-world problems using first-degree equations Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions) Identify solutions to simple quadratic equations Factor simple quadratics (e.g., the difference of squares and perfect square trinomials) Solve first-degree inequalities that do not require reversing the inequality sign Manipulate expressions and equations Write expressions, equations, and inequalities for common algebra settings Solve linear inequalities that require reversing the inequality sign Solve quadratic equations
B. Describe and use mathematical manipulation: describe and use algebraic manipulations, including factoring and rules of integer exponents	**Numbers: Concepts & Properties:** Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor **Expressions, Equations, & Inequalities:** Combine like terms (e.g., $2x + 5x$) Add and subtract simple algebraic expressions Multiply two binomials Add, subtract, and multiply polynomials Manipulate expressions and equations

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TABLE 2H

MISSOURI Integrated Math II Course Level Expectations	PLAN Mathematics College Readiness Standards
Strand 2: Algebraic Relationships	
Big Idea 2. Represent and analyze mathematical situations and structures using algebraic symbols	
C. Utilize equivalent forms: use and solve equivalent forms of equations and inequalities (piece-wise and quadratic)	**Expressions, Equations, & Inequalities:** Solve equations in the form $x + a = b$, where a and b are whole numbers or decimals Solve one-step equations having integer or decimal answers Solve routine first-degree equations Solve real-world problems using first-degree equations Solve first-degree inequalities that do not require reversing the inequality sign Manipulate expressions and equations Solve linear inequalities that require reversing the inequality sign Solve absolute value equations Solve quadratic equations
D. Utilize systems: use and solve systems of linear equations or inequalities with 2 variables	**Expressions, Equations, & Inequalities:** Find solutions to systems of linear equations

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TABLE 2H

MISSOURI Integrated Math II Course Level Expectations	PLAN Mathematics College Readiness Standards
Strand 2: Algebraic Relationships	
Big Idea 3. Use mathematical models to represent and understand quantitative relationships	
A. Use mathematical models: identify quantitative relationships and determine the type(s) of functions that might model the situation to solve the problem	**Probability, Statistics, & Data Analysis:** Read tables and graphs Perform computations on data from tables and graphs Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs **Expressions, Equations, & Inequalities:** Perform straightforward word-to-symbol translations Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions) Manipulate expressions and equations Write expressions, equations, and inequalities for common algebra settings
Big Idea 4. Analyze change in various contexts	
A. Analyze change: analyze quadratic functions by investigating rates of change, intercepts and zeros	**Probability, Statistics, & Data Analysis:** Perform a single computation using information from a table or chart Read tables and graphs Perform computations on data from tables and graphs Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs **Graphical Representations:** Locate points on the number line and in the first quadrant Locate points in the coordinate plane Exhibit knowledge of slope Determine the slope of a line from points or equations Interpret and use information from graphs in the coordinate plane

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TABLE 2H

MISSOURI Integrated Math II Course Level Expectations	PLAN Mathematics College Readiness Standards
Strand 3: Geometric and Spatial Relationships	
Big Idea 1. Analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships	
A. Describe and use geometric relationships: use trigonometric relationships with right triangles to determine lengths and angle measures	
B. Apply geometric relationships: apply relationships among surface areas and among volumes of similar objects*	**Measurement:** Use relationships involving area, perimeter, and volume of geometric figures to compute another measure
C. Compose and decompose shapes: No CLE	**Measurement:** Estimate or calculate the length of a line segment based on other lengths given on a geometric figure Compute the perimeter of polygons when all side lengths are given Compute the area of rectangles when whole number dimensions are given Compute the area and perimeter of triangles and rectangles in simple problems Use geometric formulas when all necessary information is given Compute the area of triangles and rectangles when one or more additional simple steps are required Compute the area and circumference of circles after identifying necessary information Compute the perimeter of simple composite geometric figures with unknown side lengths Use relationships involving area, perimeter, and volume of geometric figures to compute another measure
Big Idea 2. Specify locations and describe spatial relationships using coordinate geometry and other representational systems	
A. Use coordinate systems: make conjectures and solve problems involving 2-dimensional objects represented with Cartesian coordinates	**Graphical Representations:** Locate points on the number line and in the first quadrant Locate points in the coordinate plane Find the midpoint of a line segment Interpret and use information from graphs in the coordinate plane Use the distance formula
Big Idea 3. Apply transformations and use symmetry to analyze mathematical situations	
A. Use transformations on objects: use and apply constructions and matrices to represent translations, reflections, rotations, and dilations	
B. Use transformations on functions: translate, dilate and reflect quadratic and exponential functions	
C. Use symmetry: No CLE	

*Locally assessed.

TABLE 2H

MISSOURI Integrated Math II Course Level Expectations	PLAN Mathematics College Readiness Standards
Strand 3: Geometric and Spatial Relationships	
Big Idea 4. Use visualization, spatial reasoning and geometric modeling to solve problems	
A. Recognize and draw three-dimensional representations: No CLE	
B. Draw and use visual models: draw or use visual models to represent and solve problems*	**Probability, Statistics, & Data Analysis:** Perform a single computation using information from a table or chart Calculate the average, given the number of data values and the sum of the data values Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs **Graphical Representations:** Locate points on the number line and in the first quadrant Locate points in the coordinate plane Interpret and use information from graphs in the coordinate plane

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TABLE 2H

MISSOURI Integrated Math II Course Level Expectations	PLAN Mathematics College Readiness Standards
Strand 4: Measurement	
Big Idea 1. Understand measurable attributes of objects and the units, systems and processes of measurement	
A. Determine unit of measurement: No CLE	**Basic Operations & Applications:** Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour)
B. Identify equivalent measures: No CLE	**Basic Operations & Applications:** Perform common conversions (e.g., inches to feet or hours to minutes) Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour)
C. Tell and use units of time: No CLE	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average
D. Count and compute money: No CLE	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average

*Locally assessed.

TABLE 2H

MISSOURI Integrated Math II Course Level Expectations	PLAN Mathematics College Readiness Standards
Strand 4: Measurement	
Big Idea 2. Apply appropriate techniques, tools and formulas to determine measurements	
A. Use standard or non-standard measurement: No CLE	**Measurement:** Estimate or calculate the length of a line segment based on other lengths given on a geometric figure Compute the perimeter of polygons when all side lengths are given Compute the area and perimeter of triangles and rectangles in simple problems Use geometric formulas when all necessary information is given Compute the area of triangles and rectangles when one or more additional simple steps are required Compute the area and circumference of circles after identifying necessary information Compute the perimeter of simple composite geometric figures with unknown side lengths Use relationships involving area, perimeter, and volume of geometric figures to compute another measure
B. Use angle measurement: No CLE	**Properties of Plane Figures:** Exhibit some knowledge of the angles associated with parallel lines Find the measure of an angle using properties of parallel lines Exhibit knowledge of basic angle properties and special sums of angle measures (e.g., 90°, 180°, and 360°) Use several angle properties to find an unknown angle measure Use properties of isosceles triangles Apply properties of 30°-60°-90°, 45°-45°-90°, similar, and congruent triangles
C. Apply geometric measurements: No CLE	**Measurement:** Compute the perimeter of simple composite geometric figures with unknown side lengths Use relationships involving area, perimeter, and volume of geometric figures to compute another measure

*Locally assessed.

TABLE 2H

MISSOURI Integrated Math II Course Level Expectations	PLAN Mathematics College Readiness Standards
Strand 4: Measurement	
Big Idea 2. Apply appropriate techniques, tools and formulas to determine measurements	
D. Analyze precision: analyze effects of computation on accuracy and precision in measurement*	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Perform common conversions (e.g., inches to feet or hours to minutes) Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour)
E. Use relationships within a measurement system: No CLE	**Basic Operations & Applications:** Perform common conversions (e.g., inches to feet or hours to minutes) Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour)

*Locally assessed.

TABLE 2H

MISSOURI Integrated Math II Course Level Expectations	PLAN Mathematics College Readiness Standards
Strand 5: Data and Probability	
Big Idea 1. Formulate questions that can be addressed with data and collect, organize and display relevant data to answer them	
A. Formulate questions: No CLE	
B. Classify and organize data: No CLE	**Probability, Statistics, & Data Analysis:** Perform a single computation using information from a table or chart Calculate the average, given the number of data values and the sum of the data values Read tables and graphs Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs
C. Represent and interpret data: No CLE	**Probability, Statistics, & Data Analysis:** Perform a single computation using information from a table or chart Calculate the average, given the number of data values and the sum of the data values Read tables and graphs Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs

*Locally assessed.

TABLE 2H

MISSOURI Integrated Math II Course Level Expectations	PLAN Mathematics College Readiness Standards
Strand 5: Data and Probability	
Big Idea 2. Select and use appropriate statistical methods to analyze data	
A. Describe and analyze data: apply statistical concepts to solve problems and distinguish between a statistic and a parameter	**Probability, Statistics, & Data Analysis:** Calculate the average of a list of positive whole numbers Calculate the average of a list of numbers Calculate the average, given the number of data values and the sum of the data values Calculate the missing data value, given the average and all data values but one Calculate the average, given the frequency counts of all the data values Calculate or use a weighted average
B. Compare data representations: No CLE	**Probability, Statistics, & Data Analysis:** Perform a single computation using information from a table or chart Calculate the average, given the number of data values and the sum of the data values Read tables and graphs Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs
C. Represent data algebraically: given a scatterplot, determine the type of function which models the data	**Probability, Statistics, & Data Analysis:** Read tables and graphs Perform computations on data from tables and graphs Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs **Expressions, Equations, & Inequalities:** Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions) Write expressions, equations, and inequalities for common algebra settings

*Locally assessed.

TABLE 2H

MISSOURI Integrated Math II Course Level Expectations	PLAN Mathematics College Readiness Standards
Strand 5: Data and Probability	
Big Idea 3. Develop and evaluate inferences and predictions that are based on data	
A. Develop and evaluate inferences: No CLE	**Probability, Statistics, & Data Analysis:** Perform a single computation using information from a table or chart Calculate the average, given the number of data values and the sum of the data values Read tables and graphs Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs
B. Analyze basic statistical techniques: No CLE	
Big Idea 4. Understand and apply basic concepts of probability	
A. Apply basic concepts of probability: describe the concepts of sample space and probability distribution	**Probability, Statistics, & Data Analysis:** Use the relationship between the probability of an event and the probability of its complement Determine the probability of a simple event Exhibit knowledge of simple counting techniques Compute straightforward probabilities for common situations Use Venn diagrams in counting Apply counting techniques Compute a probability when the event and/or sample space are not given or obvious
B. Use and describe compound events: use and describe the concepts of conditional probability and independent events	**Probability, Statistics, & Data Analysis:** Apply counting techniques Compute a probability when the event and/or sample space are not given or obvious

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TABLE 2I

MISSOURI Integrated Math II Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 1: Number and Operations	
Big Idea 1. Understand numbers, ways of representing numbers, relationships among numbers and number systems	
A. Read, write and compare numbers: compare and order rational and irrational numbers, including finding their approximate locations on a number line	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent **Numbers: Concepts & Properties:** Identify a digit's place value Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor Find and use the least common multiple Order fractions **Graphical Representations:** Identify the location of a point with a positive coordinate on the number line Locate points on the number line and in the first quadrant
B. Represent and use rational numbers: use real numbers and various models, drawings, etc. to solve problems	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages Solve complex arithmetic problems involving percent of increase or decrease and problems requiring integration of several concepts from pre-algebra and/or pre-geometry (e.g., comparing percentages or averages, using several ratios, and finding ratios in geometry settings) **Probability, Statistics, & Data Analysis:** Perform a single computation using information from a table or chart Read tables and graphs Perform computations on data from tables and graphs Translate from one representation of data to another (e.g., a

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TABLE 2I

MISSOURI Integrated Math II Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 1: Number and Operations	
Big Idea 1. Understand numbers, ways of representing numbers, relationships among numbers and number systems	
	bar graph to a circle graph) Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs Analyze and draw conclusions based on information from figures, tables, and graphs
C. Compose and decompose numbers: No CLE	**Numbers: Concepts & Properties:** Recognize equivalent fractions and fractions in lowest terms Recognize one-digit factors of a number Identify a digit's place value Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor Find and use the least common multiple Order fractions Work with numerical factors Work with scientific notation Work with squares and square roots of numbers Work problems involving positive integer exponents Apply number properties involving prime factorization Apply rules of exponents Draw conclusions based on number concepts, algebraic properties, and/or relationships between expressions and numbers
D. Classify and describe numeric relationships: No CLE	**Numbers: Concepts & Properties:** Recognize equivalent fractions and fractions in lowest terms Recognize one-digit factors of a number Identify a digit's place value Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor Find and use the least common multiple Order fractions Work with numerical factors Work with scientific notation Work with squares and square roots of numbers Work problems involving positive integer exponents Work with cubes and cube roots of numbers Apply number properties involving prime factorization Apply number properties involving even/odd numbers and factors/multiples Apply number properties involving positive/negative

*Locally assessed.

TABLE 2I

MISSOURI Integrated Math II Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 1: Number and Operations	
Big Idea 1. Understand numbers, ways of representing numbers, relationships among numbers and number systems	
	numbers Apply rules of exponents Draw conclusions based on number concepts, algebraic properties, and/or relationships between expressions and numbers

*Locally assessed.

TABLE 2I

MISSOURI Integrated Math II Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 1: Number and Operations	
Big Idea 2. Understand meanings of operations and how they relate to one another	
A. Represent operations: No CLE	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages Solve complex arithmetic problems involving percent of increase or decrease and problems requiring integration of several concepts from pre-algebra and/or pre-geometry (e.g., comparing percentages or averages, using several ratios, and finding ratios in geometry settings)
B. Describe effects of operations: No CLE	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages Solve complex arithmetic problems involving percent of increase or decrease and problems requiring integration of several concepts from pre-algebra and/or pre-geometry (e.g., comparing percentages or averages, using several ratios, and finding ratios in geometry settings) **Numbers: Concepts & Properties:** Recognize one-digit factors of a number Identify a digit's place value

*Locally assessed.

TABLE 2I

MISSOURI Integrated Math II Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 1: Number and Operations	
Big Idea 2. Understand meanings of operations and how they relate to one another	
	Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor Find and use the least common multiple Order fractions Work with numerical factors Work with scientific notation Work with squares and square roots of numbers Work problems involving positive integer exponents Work with cubes and cube roots of numbers Apply number properties involving prime factorization Apply number properties involving even/odd numbers and factors/multiples Apply number properties involving positive/negative numbers Apply rules of exponents Draw conclusions based on number concepts, algebraic properties, and/or relationships between expressions and numbers
C. Apply properties of operations: apply properties of exponents to simplify expressions or solve equations	**Numbers: Concepts & Properties:** Work with scientific notation Work problems involving positive integer exponents Apply rules of exponents Draw conclusions based on number concepts, algebraic properties, and/or relationships between expressions and numbers

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= Measured by ACT Mathematics Test

TABLE 2I

MISSOURI Integrated Math II Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 1: Number and Operations	
Big Idea 2. Understand meanings of operations and how they relate to one another	
D. Apply operations on real and complex numbers: apply operations to real numbers, using mental computation or paper-and-pencil calculations for simple cases and technology for more complicated cases*	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages Solve complex arithmetic problems involving percent of increase or decrease and problems requiring integration of several concepts from pre-algebra and/or pre-geometry (e.g., comparing percentages or averages, using several ratios, and finding ratios in geometry settings)

*Locally assessed.

TABLE 2I

MISSOURI Integrated Math II Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 1: Number and Operations	
Big Idea 3. Compute fluently and make reasonable estimates	
A. Describe or represent mental strategies: No CLE	
B. Develop and demonstrate fluency: No CLE	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages Solve complex arithmetic problems involving percent of increase or decrease and problems requiring integration of several concepts from pre-algebra and/or pre-geometry (e.g., comparing percentages or averages, using several ratios, and finding ratios in geometry settings)
C. Compute problems: No CLE	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages Solve complex arithmetic problems involving percent of increase or decrease and problems requiring integration of several concepts from pre-algebra and/or pre-geometry (e.g., comparing percentages or averages, using several ratios, and finding ratios in geometry settings)

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TABLE 2I

MISSOURI Integrated Math II Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 1: Number and Operations	
Big Idea 3. Compute fluently and make reasonable estimates	
D. Estimate and justify solutions: judge the reasonableness of numerical computations and their results*	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages Solve complex arithmetic problems involving percent of increase or decrease and problems requiring integration of several concepts from pre-algebra and/or pre-geometry (e.g., comparing percentages or averages, using several ratios, and finding ratios in geometry settings) **Properties of Plane Figures:** Draw conclusions based on a set of conditions

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TABLE 2I

MISSOURI Integrated Math II Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 1: Number and Operations	
Big Idea 3. Compute fluently and make reasonable estimates	
E. Use proportional reasoning: solve problems involving proportions*	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages Solve complex arithmetic problems involving percent of increase or decrease and problems requiring integration of several concepts from pre-algebra and/or pre-geometry (e.g., comparing percentages or averages, using several ratios, and finding ratios in geometry settings) **Expressions, Equations, & Inequalities:** Solve routine first-degree equations Solve real-world problems using first-degree equations Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions) Write expressions, equations, and inequalities for common algebra settings Write expressions that require planning and/or manipulating to accurately model a situation Write equations and inequalities that require planning, manipulating, and/or solving

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= Measured by ACT Mathematics Test

TABLE 2I

MISSOURI Integrated Math II Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 2: Algebraic Relationships	
Big Idea 1. Understand patterns, relations and functions	
A. Recognize and extend patterns: No CLE	**Numbers: Concepts & Properties:** Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor Draw conclusions based on number concepts, algebraic properties, and/or relationships between expressions and numbers
B. Create and analyze patterns: generalize patterns using explicitly or recursively defined functions	**Numbers: Concepts & Properties:** Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor Exhibit knowledge of logarithms and geometric sequences
C. Classify objects and representations: compare and contrast various forms of representations of patterns	**Numbers: Concepts & Properties:** Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor Exhibit knowledge of logarithms and geometric sequences
D. Identify and compare functions: understand and compare the properties of linear, exponential and quadratic functions (include domain and range)	**Probability, Statistics, & Data Analysis:** Read tables and graphs Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs Analyze and draw conclusions based on information from figures, tables, and graphs **Graphical Representations:** Locate points on the number line and in the first quadrant Locate points in the coordinate plane Exhibit knowledge of slope Determine the slope of a line from points or equations Match linear graphs with their equations Interpret and use information from graphs in the coordinate plane Use properties of parallel and perpendicular lines to determine an equation of a line or coordinates of a point Identify characteristics of graphs based on a set of conditions or on a general equation such as $y = ax^2 + c$ Solve problems integrating multiple algebraic and/or geometric concepts Analyze and draw conclusions based on information from graphs in the coordinate plane

*Locally assessed.

= Measured by ACT Mathematics Test

TABLE 2I

MISSOURI Integrated Math II Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 2: Algebraic Relationships	
Big Idea 1. Understand patterns, relations and functions	
E. Describe the effects of parameter changes: describe the effects of parameter changes on quadratic and exponential functions	**Probability, Statistics, & Data Analysis:** Read tables and graphs Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs Analyze and draw conclusions based on information from figures, tables, and graphs **Numbers: Concepts & Properties:** Exhibit knowledge of logarithms and geometric sequences **Graphical Representations:** Locate points on the number line and in the first quadrant Locate points in the coordinate plane Exhibit knowledge of slope Determine the slope of a line from points or equations Match linear graphs with their equations Interpret and use information from graphs in the coordinate plane Use properties of parallel and perpendicular lines to determine an equation of a line or coordinates of a point Recognize special characteristics of parabolas and circles (e.g., the vertex of a parabola and the center or radius of a circle) Identify characteristics of graphs based on a set of conditions or on a general equation such as $y = ax^2 + c$ Solve problems integrating multiple algebraic and/or geometric concepts Analyze and draw conclusions based on information from graphs in the coordinate plane **Functions:** Evaluate quadratic functions, expressed in function notation, at integer values Evaluate polynomial functions, expressed in function notation, at integer values Evaluate composite functions at integer values Write an expression for the composite of two simple functions

*Locally assessed.

= Measured by ACT Mathematics Test

TABLE 2I

MISSOURI Integrated Math II Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 2: Algebraic Relationships	
Big Idea 2. Represent and analyze mathematical situations and structures using algebraic symbols	
A. Represent mathematical situations: use symbolic algebra to represent and solve problems that involve quadratic relationships, including recursive relationships	**Numbers: Concepts & Properties:** Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor Exhibit knowledge of logarithms and geometric sequences **Expressions, Equations, & Inequalities:** Exhibit knowledge of basic expressions (e.g., identify an expression for a total as $b + g$) Solve equations in the form $x + a = b$, where a and b are whole numbers or decimals Solve one-step equations having integer or decimal answers Solve routine first-degree equations Perform straightforward word-to-symbol translations Solve real-world problems using first-degree equations Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions) Identify solutions to simple quadratic equations Factor simple quadratics (e.g., the difference of squares and perfect square trinomials) Solve first-degree inequalities that do not require reversing the inequality sign Manipulate expressions and equations Write expressions, equations, and inequalities for common algebra settings Solve linear inequalities that require reversing the inequality sign Solve quadratic equations Write expressions that require planning and/or manipulating to accurately model a situation Write equations and inequalities that require planning, manipulating, and/or solving

*Locally assessed.

TABLE 2I

MISSOURI Integrated Math II Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 2: Algebraic Relationships	
Big Idea 2. Represent and analyze mathematical situations and structures using algebraic symbols	
B. Describe and use mathematical manipulation: describe and use algebraic manipulations, including factoring and rules of integer exponents	**Numbers: Concepts & Properties:** Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor Exhibit knowledge of logarithms and geometric sequences **Expressions, Equations, & Inequalities:** Combine like terms (e.g., $2x + 5x$) Add and subtract simple algebraic expressions Multiply two binomials Add, subtract, and multiply polynomials Manipulate expressions and equations Write expressions that require planning and/or manipulating to accurately model a situation Write equations and inequalities that require planning, manipulating, and/or solving
C. Utilize equivalent forms: use and solve equivalent forms of equations and inequalities (piece-wise and quadratic)	**Expressions, Equations, & Inequalities:** Solve equations in the form $x + a = b$, where a and b are whole numbers or decimals Solve one-step equations having integer or decimal answers Solve routine first-degree equations Solve real-world problems using first-degree equations Solve first-degree inequalities that do not require reversing the inequality sign Manipulate expressions and equations Solve linear inequalities that require reversing the inequality sign Solve absolute value equations Solve quadratic equations Write expressions that require planning and/or manipulating to accurately model a situation Write equations and inequalities that require planning, manipulating, and/or solving
D. Utilize systems: use and solve systems of linear equations or inequalities with 2 variables	**Expressions, Equations, & Inequalities:** Find solutions to systems of linear equations Write equations and inequalities that require planning, manipulating, and/or solving

*Locally assessed.

TABLE 2I

MISSOURI Integrated Math II Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 2: Algebraic Relationships	
Big Idea 3. Use mathematical models to represent and understand quantitative relationships	
A. Use mathematical models: identify quantitative relationships and determine the type(s) of functions that might model the situation to solve the problem	**Probability, Statistics, & Data Analysis:** Read tables and graphs Perform computations on data from tables and graphs Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs Analyze and draw conclusions based on information from figures, tables, and graphs **Expressions, Equations, & Inequalities:** Perform straightforward word-to-symbol translations Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions) Manipulate expressions and equations Write expressions, equations, and inequalities for common algebra settings Write expressions that require planning and/or manipulating to accurately model a situation Write equations and inequalities that require planning, manipulating, and/or solving

*Locally assessed.

= Measured by ACT Mathematics Test

TABLE 2I

MISSOURI Integrated Math II Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 2: Algebraic Relationships	
Big Idea 4. Analyze change in various contexts	
A. Analyze change: analyze quadratic functions by investigating rates of change, intercepts and zeros	**Probability, Statistics, & Data Analysis:** Perform a single computation using information from a table or chart Read tables and graphs Perform computations on data from tables and graphs Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs Analyze and draw conclusions based on information from figures, tables, and graphs **Graphical Representations:** Locate points on the number line and in the first quadrant Locate points in the coordinate plane Exhibit knowledge of slope Determine the slope of a line from points or equations Interpret and use information from graphs in the coordinate plane Recognize special characteristics of parabolas and circles (e.g., the vertex of a parabola and the center or radius of a circle) Identify characteristics of graphs based on a set of conditions or on a general equation such as $y = ax^2 + c$ Solve problems integrating multiple algebraic and/or geometric concepts Analyze and draw conclusions based on information from graphs in the coordinate plane

*Locally assessed.

TABLE 2I

MISSOURI Integrated Math II Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 3: Geometric and Spatial Relationships	
Big Idea 1. Analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships	
A. Describe and use geometric relationships: use trigonometric relationships with right triangles to determine lengths and angle measures	**Functions:** Express the sine, cosine, and tangent of an angle in a right triangle as a ratio of given side lengths Apply basic trigonometric ratios to solve right-triangle problems Use trigonometric concepts and basic identities to solve problems Exhibit knowledge of unit circle trigonometry
B. Apply geometric relationships: apply relationships among surface areas and among volumes of similar objects*	**Measurement:** Use relationships involving area, perimeter, and volume of geometric figures to compute another measure Use scale factors to determine the magnitude of a size change Compute the area of composite geometric figures when planning or visualization is required
C. Compose and decompose shapes: No CLE	**Measurement:** Estimate or calculate the length of a line segment based on other lengths given on a geometric figure Compute the perimeter of polygons when all side lengths are given Compute the area of rectangles when whole number dimensions are given Compute the area and perimeter of triangles and rectangles in simple problems Use geometric formulas when all necessary information is given Compute the area of triangles and rectangles when one or more additional simple steps are required Compute the area and circumference of circles after identifying necessary information Compute the perimeter of simple composite geometric figures with unknown side lengths Use relationships involving area, perimeter, and volume of geometric figures to compute another measure Compute the area of composite geometric figures when planning or visualization is required

*Locally assessed.

TABLE 2I

MISSOURI Integrated Math II Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 3: Geometric and Spatial Relationships	
Big Idea 2. Specify locations and describe spatial relationships using coordinate geometry and other representational systems	
A. Use coordinate systems: make conjectures and solve problems involving 2-dimensional objects represented with Cartesian coordinates	**Graphical Representations:** Locate points on the number line and in the first quadrant Locate points in the coordinate plane Find the midpoint of a line segment Interpret and use information from graphs in the coordinate plane Use the distance formula Solve problems integrating multiple algebraic and/or geometric concepts Analyze and draw conclusions based on information from graphs in the coordinate plane
Big Idea 3. Apply transformations and use symmetry to analyze mathematical situations	
A. Use transformations on objects: use and apply constructions and matrices to represent translations, reflections, rotations, and dilations	**Graphical Representations:** Solve problems integrating multiple algebraic and/or geometric concepts Analyze and draw conclusions based on information from graphs in the coordinate plane
B. Use transformations on functions: translate, dilate and reflect quadratic and exponential functions	**Graphical Representations:** Solve problems integrating multiple algebraic and/or geometric concepts Analyze and draw conclusions based on information from graphs in the coordinate plane
C. Use symmetry: No CLE	**Graphical Representations:** Solve problems integrating multiple algebraic and/or geometric concepts Analyze and draw conclusions based on information from graphs in the coordinate plane

*Locally assessed.

= Measured by ACT Mathematics Test

TABLE 2I

MISSOURI Integrated Math II Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 3: Geometric and Spatial Relationships	
Big Idea 4. Use visualization, spatial reasoning and geometric modeling to solve problems	
A. Recognize and draw three-dimensional representations: No CLE	**Graphical Representations:** Solve problems integrating multiple algebraic and/or geometric concepts Analyze and draw conclusions based on information from graphs in the coordinate plane
B. Draw and use visual models: draw or use visual models to represent and solve problems*	**Probability, Statistics, & Data Analysis:** Perform a single computation using information from a table or chart Calculate the average, given the number of data values and the sum of the data values Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs Analyze and draw conclusions based on information from figures, tables, and graphs **Graphical Representations:** Locate points on the number line and in the first quadrant Locate points in the coordinate plane Interpret and use information from graphs in the coordinate plane Solve problems integrating multiple algebraic and/or geometric concepts Analyze and draw conclusions based on information from graphs in the coordinate plane

*Locally assessed.

TABLE 2I

MISSOURI Integrated Math II Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 4: Measurement	
Big Idea 1. Understand measurable attributes of objects and the units, systems and processes of measurement	
A. Determine unit of measurement: No CLE	**Basic Operations & Applications:** Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour)
B. Identify equivalent measures: No CLE	**Basic Operations & Applications:** Perform common conversions (e.g., inches to feet or hours to minutes) Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour)
C. Tell and use units of time: No CLE	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average
D. Count and compute money: No CLE	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average

*Locally assessed.

TABLE 2I

MISSOURI Integrated Math II Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 4: Measurement	
Big Idea 2. Apply appropriate techniques, tools and formulas to determine measurements	
A. Use standard or non-standard measurement: No CLE	**Measurement:** Estimate or calculate the length of a line segment based on other lengths given on a geometric figure Compute the perimeter of polygons when all side lengths are given Compute the area and perimeter of triangles and rectangles in simple problems Use geometric formulas when all necessary information is given Compute the area of triangles and rectangles when one or more additional simple steps are required Compute the area and circumference of circles after identifying necessary information Compute the perimeter of simple composite geometric figures with unknown side lengths Use relationships involving area, perimeter, and volume of geometric figures to compute another measure Compute the area of composite geometric figures when planning or visualization is required
B. Use angle measurement: No CLE	**Properties of Plane Figures:** Exhibit some knowledge of the angles associated with parallel lines Find the measure of an angle using properties of parallel lines Exhibit knowledge of basic angle properties and special sums of angle measures (e.g., 90°, 180°, and 360°) Use several angle properties to find an unknown angle measure Use properties of isosceles triangles Apply properties of 30°-60°-90°, 45°-45°-90°, similar, and congruent triangles Draw conclusions based on a set of conditions Solve multistep geometry problems that involve integrating concepts, planning, visualization, and/or making connections with other content areas Use relationships among angles, arcs, and distances in a circle
C. Apply geometric measurements: No CLE	**Measurement:** Compute the perimeter of simple composite geometric figures with unknown side lengths Use relationships involving area, perimeter, and volume of geometric figures to compute another measure Compute the area of composite geometric figures when planning or visualization is required

*Locally assessed.

= Measured by ACT Mathematics Test

TABLE 2I

MISSOURI Integrated Math II Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 4: Measurement	
Big Idea 2. Apply appropriate techniques, tools and formulas to determine measurements	
D. Analyze precision: analyze effects of computation on accuracy and precision in measurement*	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Perform common conversions (e.g., inches to feet or hours to minutes) Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour)
E. Use relationships within a measurement system: No CLE	**Basic Operations & Applications:** Perform common conversions (e.g., inches to feet or hours to minutes) Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour)

*Locally assessed.

TABLE 2I

MISSOURI Integrated Math II Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 5: Data and Probability	
Big Idea 1. Formulate questions that can be addressed with data and collect, organize and display relevant data to answer them	
A. Formulate questions: No CLE	
B. Classify and organize data: No CLE	**Probability, Statistics, & Data Analysis:** Perform a single computation using information from a table or chart Calculate the average, given the number of data values and the sum of the data values Read tables and graphs Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs Analyze and draw conclusions based on information from figures, tables, and graphs
C. Represent and interpret data: No CLE	**Probability, Statistics, & Data Analysis:** Perform a single computation using information from a table or chart Calculate the average, given the number of data values and the sum of the data values Read tables and graphs Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs Analyze and draw conclusions based on information from figures, tables, and graphs

*Locally assessed.

TABLE 2I

MISSOURI Integrated Math II Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 5: Data and Probability	
Big Idea 2. Select and use appropriate statistical methods to analyze data	
A. Describe and analyze data: apply statistical concepts to solve problems and distinguish between a statistic and a parameter	**Probability, Statistics, & Data Analysis:** Calculate the average of a list of positive whole numbers Calculate the average of a list of numbers Calculate the average, given the number of data values and the sum of the data values Calculate the missing data value, given the average and all data values but one Calculate the average, given the frequency counts of all the data values Calculate or use a weighted average Distinguish between mean, median, and mode for a list of numbers
B. Compare data representations: No CLE	**Probability, Statistics, & Data Analysis:** Perform a single computation using information from a table or chart Calculate the average, given the number of data values and the sum of the data values Read tables and graphs Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs Analyze and draw conclusions based on information from figures, tables, and graphs
C. Represent data algebraically: given a scatterplot, determine the type of function which models the data	**Probability, Statistics, & Data Analysis:** Read tables and graphs Perform computations on data from tables and graphs Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs Analyze and draw conclusions based on information from figures, tables, and graphs **Expressions, Equations, & Inequalities:** Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions) Write expressions, equations, and inequalities for common algebra settings Write expressions that require planning and/or manipulating to accurately model a situation Write equations and inequalities that require planning, manipulating, and/or solving

*Locally assessed.

= Measured by ACT Mathematics Test

TABLE 2I

MISSOURI Integrated Math II Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 5: Data and Probability	
Big Idea 3. Develop and evaluate inferences and predictions that are based on data	
A. Develop and evaluate inferences: No CLE	**Probability, Statistics, & Data Analysis:** Perform a single computation using information from a table or chart Calculate the average, given the number of data values and the sum of the data values Read tables and graphs Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs Analyze and draw conclusions based on information from figures, tables, and graphs
B. Analyze basic statistical techniques: No CLE	
Big Idea 4. Understand and apply basic concepts of probability	
A. Apply basic concepts of probability: describe the concepts of sample space and probability distribution	**Probability, Statistics, & Data Analysis:** Use the relationship between the probability of an event and the probability of its complement Determine the probability of a simple event Exhibit knowledge of simple counting techniques Compute straightforward probabilities for common situations Use Venn diagrams in counting Apply counting techniques Compute a probability when the event and/or sample space are not given or obvious Exhibit knowledge of conditional and joint probability
B. Use and describe compound events: use and describe the concepts of conditional probability and independent events	**Probability, Statistics, & Data Analysis:** Apply counting techniques Compute a probability when the event and/or sample space are not given or obvious Exhibit knowledge of conditional and joint probability

*Locally assessed.

= Measured by ACT Mathematics Test

TABLE 2J

MISSOURI Algebra II Course Level Expectations	PLAN Mathematics College Readiness Standards
Strand 1: Number and Operations	
Big Idea 1. Understand numbers, ways of representing numbers, relationships among numbers and number systems	
A. Read, write and compare numbers: compare and order rational and irrational numbers, including finding their approximate locations on a number line	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent **Numbers: Concepts & Properties:** Identify a digit's place value Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor Find and use the least common multiple Order fractions **Graphical Representations:** Identify the location of a point with a positive coordinate on the number line Locate points on the number line and in the first quadrant
B. Represent and use rational numbers: use real numbers and various models, drawing, etc. to solve problems	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages **Probability, Statistics, & Data Analysis:** Perform a single computation using information from a table or chart Read tables and graphs Perform computations on data from tables and graphs Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs

*Locally assessed.

= Measured by PLAN Mathematics Test

TABLE 2J

MISSOURI Algebra II Course Level Expectations	PLAN Mathematics College Readiness Standards
Strand 1: Number and Operations	
Big Idea 1. Understand numbers, ways of representing numbers, relationships among numbers and number systems	
C. Compose and decompose numbers: use a variety of representations to demonstrate an understanding of very large and very small numbers*	**Numbers: Concepts & Properties:** Recognize equivalent fractions and fractions in lowest terms Recognize one-digit factors of a number Identify a digit's place value Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor Find and use the least common multiple Order fractions Work with numerical factors Work with scientific notation Work with squares and square roots of numbers Work problems involving positive integer exponents Apply number properties involving prime factorization Apply rules of exponents
D. Classify and describe numeric relationships: No CLE	**Numbers: Concepts & Properties:** Recognize equivalent fractions and fractions in lowest terms Recognize one-digit factors of a number Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor Find and use the least common multiple Order fractions Work with numerical factors Work with scientific notation Work with squares and square roots of numbers Work problems involving positive integer exponents Work with cubes and cube roots of numbers Apply number properties involving prime factorization Apply number properties involving even/odd numbers and factors/multiples Apply number properties involving positive/negative numbers Apply rules of exponents

*Locally assessed.

= Measured by PLAN Mathematics Test

TABLE 2J

MISSOURI Algebra II Course Level Expectations	PLAN Mathematics College Readiness Standards
Strand 1: Number and Operations	
Big Idea 2. Understand meanings of operations and how they relate to one another	
A. Represent operations: No CLE	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages
B. Describe effects of operations: No CLE	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages

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TABLE 2J

MISSOURI Algebra II Course Level Expectations	PLAN Mathematics College Readiness Standards
Strand 1: Number and Operations	
Big Idea 2. Understand meanings of operations and how they relate to one another	
C. Apply properties of operations: No CLE	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages
D. Apply operations on real and complex numbers: apply operations to matrices and complex numbers, using mental computation or paper-and-pencil calculations for simple cases and technology for more complicated cases*	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages

*Locally assessed.

= Measured by PLAN Mathematics Test

TABLE 2J

MISSOURI Algebra II Course Level Expectations	PLAN Mathematics College Readiness Standards
Strand 1: Number and Operations	
Big Idea 3. Compute fluently and make reasonable estimates	
A. Describe or represent mental strategies: No CLE	
B. Develop and demonstrate fluency: No CLE	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages
C. Compute problems: No CLE	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages

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= Measured by PLAN Mathematics Test

TABLE 2J

MISSOURI Algebra II Course Level Expectations	PLAN Mathematics College Readiness Standards
Strand 1: Number and Operations	
Big Idea 3. Compute fluently and make reasonable estimates	
D. Estimate and justify solutions: judge the reasonableness of numerical computations and their results, including complex numbers*	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages
E. Use proportional reasoning: solve problems involving proportions*	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Perform common conversions (e.g., inches to feet or hours to minutes) Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages **Expressions, Equations, & Inequalities:** Solve routine first-degree equations Solve real-world problems using first-degree equations Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions) Write expressions, equations, and inequalities for common algebra settings

*Locally assessed.

= Measured by PLAN Mathematics Test

TABLE 2J

MISSOURI Algebra II Course Level Expectations	PLAN Mathematics College Readiness Standards
Strand 2: Algebraic Relationships	
Big Idea 1. Understand patterns, relations and functions	
A. Recognize and extend patterns: No CLE	**Numbers: Concepts & Properties:** Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor
B. Create and analyze patterns: generalize patterns using explicitly or recursively defined functions	**Numbers: Concepts & Properties:** Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor **Expressions, Equations, & Inequalities:** Manipulate expressions and equations Write expressions, equations, and inequalities for common algebra settings
C. Classify objects and representations: compare and contrast various forms of representations of patterns	**Numbers: Concepts & Properties:** Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor **Expressions, Equations, & Inequalities:** Manipulate expressions and equations Write expressions, equations, and inequalities for common algebra settings
D. Identify and compare functions: compare properties of linear, exponential, logarithmic and rational functions	**Probability, Statistics, & Data Analysis:** Read tables and graphs Perform computations on data from tables and graphs Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs **Graphical Representations:** Locate points on the number line and in the first quadrant Locate points in the coordinate plane Exhibit knowledge of slope Determine the slope of a line from points or equations Match linear graphs with their equations Interpret and use information from graphs in the coordinate plane Use properties of parallel and perpendicular lines to determine an equation of a line or coordinates of a point

*Locally assessed.

= Measured by PLAN Mathematics Test

TABLE 2J

MISSOURI Algebra II Course Level Expectations	PLAN Mathematics College Readiness Standards
Strand 2: Algebraic Relationships	
Big Idea 1. Understand patterns, relations and functions	
E. Describe the effects of parameter changes: describe the effects of parameter changes on functions	**Probability, Statistics, & Data Analysis:** Read tables and graphs Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs **Graphical Representations:** Locate points on the number line and in the first quadrant Locate points in the coordinate plane Exhibit knowledge of slope Determine the slope of a line from points or equations Match linear graphs with their equations Interpret and use information from graphs in the coordinate plane Use properties of parallel and perpendicular lines to determine an equation of a line or coordinates of a point

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TABLE 2J

MISSOURI Algebra II Course Level Expectations	PLAN Mathematics College Readiness Standards
Strand 2: Algebraic Relationships	
Big Idea 2. Represent and analyze mathematical situations and structures using algebraic symbols	
A. Represent mathematical situations: use symbolic algebra to represent and solve problems that involve exponential, quadratic and logarithmic relationships	**Expressions, Equations, & Inequalities:** Exhibit knowledge of basic expressions (e.g., identify an expression for a total as $b + g$) Solve equations in the form $x + a = b$, where a and b are whole numbers or decimals Solve one-step equations having integer or decimal answers Solve routine first-degree equations Perform straightforward word-to-symbol translations Solve real-world problems using first-degree equations Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions) Identify solutions to simple quadratic equations Solve first-degree inequalities that do not require reversing the inequality sign Manipulate expressions and equations Write expressions, equations, and inequalities for common algebra settings Solve linear inequalities that require reversing the inequality sign Solve quadratic equations
B. Describe and use mathematical manipulation: describe and use algebraic manipulations, inverse or composition of functions	**Expressions, Equations, & Inequalities:** Combine like terms (e.g., $2x + 5x$) Add and subtract simple algebraic expressions Multiply two binomials Add, subtract, and multiply polynomials Factor simple quadratics (e.g., the difference of squares and perfect square trinomials) Manipulate expressions and equations
C. Utilize equivalent forms: use and solve equivalent forms of equations and inequalities	**Expressions, Equations, & Inequalities:** Solve equations in the form $x + a = b$, where a and b are whole numbers or decimals Solve one-step equations having integer or decimal answers Solve routine first-degree equations Solve real-world problems using first-degree equations Solve first-degree inequalities that do not require reversing the inequality sign Manipulate expressions and equations Solve linear inequalities that require reversing the inequality sign Solve absolute value equations Solve quadratic equations

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TABLE 2J

MISSOURI Algebra II Course Level Expectations	PLAN Mathematics College Readiness Standards
Strand 2: Algebraic Relationships	
Big Idea 2. Represent and analyze mathematical situations and structures using algebraic symbols	
D. Utilize systems: use and solve systems of linear and quadratic equations or inequalities with 2 variables	**Expressions, Equations, & Inequalities:** Find solutions to systems of linear equations
Big Idea 3. Use mathematical models to represent and understand quantitative relationships	
A. Use mathematical models: identify quantitative relationships and determine the type(s) of functions that might model the situation to solve the problem	**Probability, Statistics, & Data Analysis:** Read tables and graphs Perform computations on data from tables and graphs Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs **Expressions, Equations, & Inequalities:** Perform straightforward word-to-symbol translations Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions) Manipulate expressions and equations Write expressions, equations, and inequalities for common algebra settings
Big Idea 4. Analyze change in various contexts	
A. Analyze change: analyze exponential and logarithmic functions by investigating rates of change, intercepts and asymptotes	**Probability, Statistics, & Data Analysis:** Perform a single computation using information from a table or chart Read tables and graphs Perform computations on data from tables and graphs Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs **Graphical Representations:** Locate points on the number line and in the first quadrant Locate points in the coordinate plane Exhibit knowledge of slope Determine the slope of a line from points or equations Interpret and use information from graphs in the coordinate plane

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TABLE 2J

MISSOURI Algebra II Course Level Expectations	PLAN Mathematics College Readiness Standards
Strand 3: Geometric and Spatial Relationships	
Big Idea 1. Analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships	
A. Describe and use geometric relationships: use trigonometric relationships with right triangles to determine lengths and angle measures	
B. Apply geometric relationships: No CLE	**Properties of Plane Figures:** Exhibit some knowledge of the angles associated with parallel lines Find the measure of an angle using properties of parallel lines Exhibit knowledge of basic angle properties and special sums of angle measures (e.g., 90°, 180°, and 360°) Use several angle properties to find an unknown angle measure Use properties of isosceles triangles Apply properties of 30°-60°-90°, 45°-45°-90°, similar, and congruent triangles
C. Compose and decompose shapes: No CLE	**Measurement:** Estimate or calculate the length of a line segment based on other lengths given on a geometric figure Compute the perimeter of polygons when all side lengths are given Compute the area and perimeter of triangles and rectangles in simple problems Use geometric formulas when all necessary information is given Compute the area of triangles and rectangles when one or more additional simple steps are required Compute the area and circumference of circles after identifying necessary information Compute the perimeter of simple composite geometric figures with unknown side lengths Use relationships involving area, perimeter, and volume of geometric figures to compute another measure
Big Idea 2. Specify locations and describe spatial relationships using coordinate geometry and other representational systems	
A. Use coordinate systems: No CLE	**Graphical Representations:** Locate points on the number line and in the first quadrant Locate points in the coordinate plane Find the midpoint of a line segment Interpret and use information from graphs in the coordinate plane Use the distance formula

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TABLE 2J

MISSOURI Algebra II Course Level Expectations	PLAN Mathematics College Readiness Standards
Strand 3: Geometric and Spatial Relationships	
Big Idea 3. Apply transformations and use symmetry to analyze mathematical situations	
A. Use transformations on objects: No CLE	
B. Use transformations on functions: translate, dilate and reflect functions	
C. Use symmetry: No CLE	
Big Idea 4. Use visualization, spatial reasoning and geometric modeling to solve problems	
A. Recognize and draw three-dimensional representations: No CLE	
B. Draw and use visual models: draw or use visual models to represent and solve problems*	**Probability, Statistics, & Data Analysis:** Perform a single computation using information from a table or chart Calculate the average, given the number of data values and the sum of the data values Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs **Graphical Representations:** Locate points on the number line and in the first quadrant Locate points in the coordinate plane Interpret and use information from graphs in the coordinate plane

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TABLE 2J

MISSOURI Algebra II Course Level Expectations	PLAN Mathematics College Readiness Standards
Strand 4: Measurement	
Big Idea 1. Understand measurable attributes of objects and the units, systems and processes of measurement	
A. Determine unit of measurement: No CLE	**Basic Operations & Applications:** Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour)
B. Identify equivalent measures: No CLE	**Basic Operations & Applications:** Perform common conversions (e.g., inches to feet or hours to minutes) Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour)
C. Tell and use units of time: No CLE	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average
D. Count and compute money: No CLE	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average

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TABLE 2J

MISSOURI Algebra II Course Level Expectations	PLAN Mathematics College Readiness Standards
Strand 4: Measurement	
Big Idea 2. Apply appropriate techniques, tools and formulas to determine measurements	
A. Use standard or non-standard measurement: No CLE	**Measurement:** Estimate or calculate the length of a line segment based on other lengths given on a geometric figure Compute the perimeter of polygons when all side lengths are given Compute the area and perimeter of triangles and rectangles in simple problems Use geometric formulas when all necessary information is given Compute the area of triangles and rectangles when one or more additional simple steps are required Compute the area and circumference of circles after identifying necessary information Compute the perimeter of simple composite geometric figures with unknown side lengths Use relationships involving area, perimeter, and volume of geometric figures to compute another measure
B. Use angle measurement: No CLE	**Properties of Plane Figures:** Exhibit some knowledge of the angles associated with parallel lines Find the measure of an angle using properties of parallel lines Exhibit knowledge of basic angle properties and special sums of angle measures (e.g., 90°, 180°, and 360°) Use several angle properties to find an unknown angle measure Use properties of isosceles triangles Apply properties of 30°-60°-90°, 45°-45°-90°, similar, and congruent triangles
C. Apply geometric measurements: No CLE	**Measurement:** Compute the perimeter of simple composite geometric figures with unknown side lengths Use relationships involving area, perimeter, and volume of geometric figures to compute another measure
D. Analyze precision: apply concepts of successive approximation	**Basic Operations & Applications:** Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages

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TABLE 2J

MISSOURI Algebra II Course Level Expectations	PLAN Mathematics College Readiness Standards
Strand 4: Measurement	
Big Idea 2. Apply appropriate techniques, tools and formulas to determine measurements	
E. Use relationships within a measurement system: use unit analysis to solve problems involving rates, such as speed, density or population density*	**Basic Operations & Applications:** Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages **Expressions, Equations, & Inequalities:** Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions) Write expressions, equations, and inequalities for common algebra settings

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TABLE 2J

MISSOURI Algebra II Course Level Expectations	PLAN Mathematics College Readiness Standards
Strand 5: Data and Probability	
Big Idea 1. Formulate questions that can be addressed with data and collect, organize and display relevant data to answer them	
A. Formulate questions: No CLE	
B. Classify and organize data: No CLE	**Probability, Statistics, & Data Analysis:** Perform a single computation using information from a table or chart Calculate the average, given the number of data values and the sum of the data values Read tables and graphs Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs
C. Represent and interpret data: select and use appropriate graphical representation of data and given one-variable quantitative data, describe its shape and calculate summary statistics	**Basic Operations & Applications:** Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages **Probability, Statistics, & Data Analysis:** Perform a single computation using information from a table or chart Calculate the average, given the number of data values and the sum of the data values Read tables and graphs Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs

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TABLE 2J

MISSOURI Algebra II Course Level Expectations	PLAN Mathematics College Readiness Standards
Strand 5: Data and Probability	
Big Idea 2. Select and use appropriate statistical methods to analyze data	
A. Describe and analyze data: apply statistical measures of center to solve problems	**Probability, Statistics, & Data Analysis:** Calculate the average of a list of positive whole numbers Calculate the average of a list of numbers Calculate the average, given the number of data values and the sum of the data values Calculate the missing data value, given the average and all data values but one Calculate the average, given the frequency counts of all the data values Calculate or use a weighted average
B. Compare data representations: No CLE	**Probability, Statistics, & Data Analysis:** Perform a single computation using information from a table or chart Calculate the average, given the number of data values and the sum of the data values Read tables and graphs Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs
C. Represent data algebraically: given a scatterplot, determine a type of function which models the data	**Probability, Statistics, & Data Analysis:** Read tables and graphs Perform computations on data from tables and graphs Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs **Expressions, Equations, & Inequalities:** Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions) Write expressions, equations, and inequalities for common algebra settings

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TABLE 2J

MISSOURI Algebra II Course Level Expectations	PLAN Mathematics College Readiness Standards
Strand 5: Data and Probability	
Big Idea 3. Develop and evaluate inferences and predictions that are based on data	
A. Develop and evaluate inferences: No CLE	**Probability, Statistics, & Data Analysis:** Perform a single computation using information from a table or chart Calculate the average, given the number of data values and the sum of the data values Read tables and graphs Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs
B. Analyze basic statistical techniques: No CLE	
Big Idea 4. Understand and apply basic concepts of probability	
A. Apply basic concepts of probability: describe the concepts of sample space and probability distribution	**Probability, Statistics, & Data Analysis:** Use the relationship between the probability of an event and the probability of its complement Determine the probability of a simple event Exhibit knowledge of simple counting techniques Compute straightforward probabilities for common situations Use Venn diagrams in counting Apply counting techniques Compute a probability when the event and/or sample space are not given or obvious
B. Use and describe compound events: use and describe the concepts of conditional probability and independent events and how to compute the probability of a compound event	**Probability, Statistics, & Data Analysis:** Apply counting techniques Compute a probability when the event and/or sample space are not given or obvious

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TABLE 2K

MISSOURI Algebra II Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 1: Number and Operations	
Big Idea 1. Understand numbers, ways of representing numbers, relationships among numbers and number systems	
A. Read, write and compare numbers: compare and order rational and irrational numbers, including finding their approximate locations on a number line	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent **Numbers: Concepts & Properties:** Identify a digit's place value Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor Find and use the least common multiple Order fractions **Graphical Representations:** Identify the location of a point with a positive coordinate on the number line Locate points on the number line and in the first quadrant
B. Represent and use rational numbers: use real numbers and various models, drawing, etc. to solve problems	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages Solve complex arithmetic problems involving percent of increase or decrease and problems requiring integration of several concepts from pre-algebra and/or pre-geometry (e.g., comparing percentages or averages, using several ratios, and finding ratios in geometry settings) **Probability, Statistics, & Data Analysis:** Perform a single computation using information from a table or chart Read tables and graphs Perform computations on data from tables and graphs

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TABLE 2K

MISSOURI Algebra II Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 1: Number and Operations	
Big Idea 1. Understand numbers, ways of representing numbers, relationships among numbers and number systems	
	Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs Analyze and draw conclusions based on information from figures, tables, and graphs
C. Compose and decompose numbers: use a variety of representations to demonstrate an understanding of very large and very small numbers*	**Numbers: Concepts & Properties:** Recognize equivalent fractions and fractions in lowest terms Recognize one-digit factors of a number Identify a digit's place value Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor Find and use the least common multiple Order fractions Work with numerical factors Work with scientific notation Work with squares and square roots of numbers Work problems involving positive integer exponents Apply number properties involving prime factorization Apply rules of exponents Draw conclusions based on number concepts, algebraic properties, and/or relationships between expressions and numbers
D. Classify and describe numeric relationships: No CLE	**Numbers: Concepts & Properties:** Recognize equivalent fractions and fractions in lowest terms Recognize one-digit factors of a number Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor Find and use the least common multiple Order fractions Work with numerical factors Work with scientific notation Work with squares and square roots of numbers Work problems involving positive integer exponents Work with cubes and cube roots of numbers Apply number properties involving prime factorization Apply number properties involving even/odd numbers and factors/multiples

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TABLE 2K

MISSOURI Algebra II Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 1: Number and Operations	
Big Idea 1. Understand numbers, ways of representing numbers, relationships among numbers and number systems	
	Apply number properties involving positive/negative numbers Apply rules of exponents Draw conclusions based on number concepts, algebraic properties, and/or relationships between expressions and numbers

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TABLE 2K

MISSOURI Algebra II Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 1: Number and Operations	
Big Idea 2. Understand meanings of operations and how they relate to one another	
A. Represent operations: No CLE	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages Solve complex arithmetic problems involving percent of increase or decrease and problems requiring integration of several concepts from pre-algebra and/or pre-geometry (e.g., comparing percentages or averages, using several ratios, and finding ratios in geometry settings)
B. Describe effects of operations: No CLE	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages Solve complex arithmetic problems involving percent of increase or decrease and problems requiring integration of several concepts from pre-algebra and/or pre-geometry (e.g., comparing percentages or averages, using several ratios, and finding ratios in geometry settings) **Numbers: Concepts & Properties:** Draw conclusions based on number concepts, algebraic properties, and/or relationships between expressions and numbers

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TABLE 2K

MISSOURI Algebra II Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 1: Number and Operations	
Big Idea 2. Understand meanings of operations and how they relate to one another	
C. Apply properties of operations: No CLE	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages Solve complex arithmetic problems involving percent of increase or decrease and problems requiring integration of several concepts from pre-algebra and/or pre-geometry (e.g., comparing percentages or averages, using several ratios, and finding ratios in geometry settings)
D. Apply operations on real and complex numbers: apply operations to matrices and complex numbers, using mental computation or paper-and-pencil calculations for simple cases and technology for more complicated cases*	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages Solve complex arithmetic problems involving percent of increase or decrease and problems requiring integration of several concepts from pre-algebra and/or pre-geometry (e.g., comparing percentages or averages, using several ratios, and finding ratios in geometry settings) **Numbers: Concepts & Properties:** Exhibit some knowledge of the complex numbers Multiply two complex numbers Apply properties of complex numbers

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TABLE 2K

MISSOURI Algebra II Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 1: Number and Operations	
Big Idea 3. Compute fluently and make reasonable estimates	
A. Describe or represent mental strategies: No CLE	
B. Develop and demonstrate fluency: No CLE	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages Solve complex arithmetic problems involving percent of increase or decrease and problems requiring integration of several concepts from pre-algebra and/or pre-geometry (e.g., comparing percentages or averages, using several ratios, and finding ratios in geometry settings)
C. Compute problems: No CLE	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages Solve complex arithmetic problems involving percent of increase or decrease and problems requiring integration of several concepts from pre-algebra and/or pre-geometry (e.g., comparing percentages or averages, using several ratios, and finding ratios in geometry settings)

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TABLE 2K

MISSOURI Algebra II Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 1: Number and Operations	
Big Idea 3. Compute fluently and make reasonable estimates	
D. Estimate and justify solutions: judge the reasonableness of numerical computations and their results, including complex numbers*	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages Solve complex arithmetic problems involving percent of increase or decrease and problems requiring integration of several concepts from pre-algebra and/or pre-geometry (e.g., comparing percentages or averages, using several ratios, and finding ratios in geometry settings) **Properties of Plane Figures:** Draw conclusions based on a set of conditions
E. Use proportional reasoning: solve problems involving proportions*	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Perform common conversions (e.g., inches to feet or hours to minutes) Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages Solve complex arithmetic problems involving percent of increase or decrease and problems requiring integration of several concepts from pre-algebra and/or pre-geometry (e.g., comparing percentages or averages, using several ratios, and finding ratios in geometry settings)

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TABLE 2K

MISSOURI Algebra II Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 1: Number and Operations	
Big Idea 3. Compute fluently and make reasonable estimates	
	Expressions, Equations, & Inequalities: Solve routine first-degree equations Solve real-world problems using first-degree equations Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions) Write expressions, equations, and inequalities for common algebra settings Write expressions that require planning and/or manipulating to accurately model a situation Write equations and inequalities that require planning, manipulating, and/or solving

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TABLE 2K

MISSOURI Algebra II Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 2: Algebraic Relationships	
Big Idea 1. Understand patterns, relations and functions	
A. Recognize and extend patterns: No CLE	**Numbers: Concepts & Properties:** Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor Draw conclusions based on number concepts, algebraic properties, and/or relationships between expressions and numbers
B. Create and analyze patterns: generalize patterns using explicitly or recursively defined functions	**Numbers: Concepts & Properties:** Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor Draw conclusions based on number concepts, algebraic properties, and/or relationships between expressions and numbers **Expressions, Equations, & Inequalities:** Manipulate expressions and equations Write expressions, equations, and inequalities for common algebra settings Write expressions that require planning and/or manipulating to accurately model a situation Write equations and inequalities that require planning, manipulating, and/or solving
C. Classify objects and representations: compare and contrast various forms of representations of patterns	**Numbers: Concepts & Properties:** Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor Draw conclusions based on number concepts, algebraic properties, and/or relationships between expressions and numbers **Expressions, Equations, & Inequalities:** Manipulate expressions and equations Write expressions, equations, and inequalities for common algebra settings Write expressions that require planning and/or manipulating to accurately model a situation Write equations and inequalities that require planning, manipulating, and/or solving
D. Identify and compare functions: compare properties of linear, exponential, logarithmic and rational functions	**Probability, Statistics, & Data Analysis:** Read tables and graphs Perform computations on data from tables and graphs Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs Analyze and draw conclusions based on information from figures, tables, and graphs

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TABLE 2K

MISSOURI Algebra II Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 2: Algebraic Relationships	
Big Idea 1. Understand patterns, relations and functions	
	Graphical Representations: Locate points on the number line and in the first quadrant Locate points in the coordinate plane Exhibit knowledge of slope Determine the slope of a line from points or equations Match linear graphs with their equations Interpret and use information from graphs in the coordinate plane Use properties of parallel and perpendicular lines to determine an equation of a line or coordinates of a point Recognize special characteristics of parabolas and circles (e.g., the vertex of a parabola and the center or radius of a circle) Identify characteristics of graphs based on a set of conditions or on a general equation such as $y = ax^2 + c$ Solve problems integrating multiple algebraic and/or geometric concepts Analyze and draw conclusions based on information from graphs in the coordinate plane
E. Describe the effects of parameter changes: describe the effects of parameter changes on functions	**Probability, Statistics, & Data Analysis:** Read tables and graphs Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs Analyze and draw conclusions based on information from figures, tables, and graphs **Graphical Representations:** Locate points on the number line and in the first quadrant Locate points in the coordinate plane Exhibit knowledge of slope Determine the slope of a line from points or equations Match linear graphs with their equations Interpret and use information from graphs in the coordinate plane Use properties of parallel and perpendicular lines to determine an equation of a line or coordinates of a point Recognize special characteristics of parabolas and circles (e.g., the vertex of a parabola and the center or radius of a circle) Identify characteristics of graphs based on a set of conditions or on a general equation such as $y = ax^2 + c$ Solve problems integrating multiple algebraic and/or geometric concepts Analyze and draw conclusions based on information from graphs in the coordinate plane

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MISSOURI Algebra II Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 2: Algebraic Relationships	
Big Idea 2. Represent and analyze mathematical situations and structures using algebraic symbols	
A. Represent mathematical situations: use symbolic algebra to represent and solve problems that involve exponential, quadratic and logarithmic relationships	**Expressions, Equations, & Inequalities:** Exhibit knowledge of basic expressions (e.g., identify an expression for a total as $b + g$) Solve equations in the form $x + a = b$, where a and b are whole numbers or decimals Solve one-step equations having integer or decimal answers Solve routine first-degree equations Perform straightforward word-to-symbol translations Solve real-world problems using first-degree equations Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions) Identify solutions to simple quadratic equations Solve first-degree inequalities that do not require reversing the inequality sign Manipulate expressions and equations Write expressions, equations, and inequalities for common algebra settings Solve linear inequalities that require reversing the inequality sign Solve quadratic equations Write expressions that require planning and/or manipulating to accurately model a situation Write equations and inequalities that require planning, manipulating, and/or solving
B. Describe and use mathematical manipulation: describe and use algebraic manipulations, inverse or composition of functions	**Expressions, Equations, & Inequalities:** Combine like terms (e.g., $2x + 5x$) Add and subtract simple algebraic expressions Multiply two binomials Add, subtract, and multiply polynomials Factor simple quadratics (e.g., the difference of squares and perfect square trinomials) Manipulate expressions and equations Write expressions that require planning and/or manipulating to accurately model a situation Write equations and inequalities that require planning, manipulating, and/or solving **Functions:** Write an expression for the composite of two simple functions

*Locally assessed.

= Measured by ACT Mathematics Test

TABLE 2K

MISSOURI Algebra II Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 2: Algebraic Relationships	
Big Idea 2. Represent and analyze mathematical situations and structures using algebraic symbols	
C. Utilize equivalent forms: use and solve equivalent forms of equations and inequalities	**Expressions, Equations, & Inequalities:** Solve equations in the form $x + a = b$, where a and b are whole numbers or decimals Solve one-step equations having integer or decimal answers Solve routine first-degree equations Solve real-world problems using first-degree equations Solve first-degree inequalities that do not require reversing the inequality sign Manipulate expressions and equations Solve linear inequalities that require reversing the inequality sign Solve absolute value equations Solve quadratic equations Write expressions that require planning and/or manipulating to accurately model a situation Write equations and inequalities that require planning, manipulating, and/or solving
D. Utilize systems: use and solve systems of linear and quadratic equations or inequalities with 2 variables	**Expressions, Equations, & Inequalities:** Find solutions to systems of linear equations Write equations and inequalities that require planning, manipulating, and/or solving

*Locally assessed.

= Measured by ACT Mathematics Test

TABLE 2K

MISSOURI Algebra II Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 2: Algebraic Relationships	
Big Idea 3. Use mathematical models to represent and understand quantitative relationships	
A. Use mathematical models: identify quantitative relationships and determine the type(s) of functions that might model the situation to solve the problem	**Probability, Statistics, & Data Analysis:** Read tables and graphs Perform computations on data from tables and graphs Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs Analyze and draw conclusions based on information from figures, tables, and graphs **Expressions, Equations, & Inequalities:** Perform straightforward word-to-symbol translations Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions) Manipulate expressions and equations Write expressions, equations, and inequalities for common algebra settings Write expressions that require planning and/or manipulating to accurately model a situation Write equations and inequalities that require planning, manipulating, and/or solving

*Locally assessed.

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TABLE 2K

MISSOURI Algebra II Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 2: Algebraic Relationships	
Big Idea 4. Analyze change in various contexts	
A. Analyze change: analyze exponential and logarithmic functions by investigating rates of change, intercepts and asymptotes	**Probability, Statistics, & Data Analysis:** Perform a single computation using information from a table or chart Read tables and graphs Perform computations on data from tables and graphs Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs Analyze and draw conclusions based on information from figures, tables, and graphs **Numbers: Concepts & Properties:** Exhibit knowledge of logarithms and geometric sequences **Graphical Representations:** Locate points on the number line and in the first quadrant Locate points in the coordinate plane Exhibit knowledge of slope Determine the slope of a line from points or equations Interpret and use information from graphs in the coordinate plane Recognize special characteristics of parabolas and circles (e.g., the vertex of a parabola and the center or radius of a circle) Identify characteristics of graphs based on a set of conditions or on a general equation such as $y = ax^2 + c$ Solve problems integrating multiple algebraic and/or geometric concepts Analyze and draw conclusions based on information from graphs in the coordinate plane

*Locally assessed.

= Measured by ACT Mathematics Test

TABLE 2K

MISSOURI Algebra II Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 3: Geometric and Spatial Relationships	
Big Idea 1. Analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships	
A. Describe and use geometric relationships: use trigonometric relationships with right triangles to determine lengths and angle measures	**Functions:** Express the sine, cosine, and tangent of an angle in a right triangle as a ratio of given side lengths Apply basic trigonometric ratios to solve right-triangle problems Use trigonometric concepts and basic identities to solve problems Exhibit knowledge of unit circle trigonometry
B. Apply geometric relationships: No CLE	**Properties of Plane Figures:** Exhibit some knowledge of the angles associated with parallel lines Find the measure of an angle using properties of parallel lines Exhibit knowledge of basic angle properties and special sums of angle measures (e.g., 90°, 180°, and 360°) Use several angle properties to find an unknown angle measure Use properties of isosceles triangles Apply properties of 30°-60°-90°, 45°-45°-90°, similar, and congruent triangles Draw conclusions based on a set of conditions Solve multistep geometry problems that involve integrating concepts, planning, visualization, and/or making connections with other content areas Use relationships among angles, arcs, and distances in a circle
C. Compose and decompose shapes: No CLE	**Measurement:** Estimate or calculate the length of a line segment based on other lengths given on a geometric figure Compute the perimeter of polygons when all side lengths are given Compute the area and perimeter of triangles and rectangles in simple problems Use geometric formulas when all necessary information is given Compute the area of triangles and rectangles when one or more additional simple steps are required Compute the area and circumference of circles after identifying necessary information Compute the perimeter of simple composite geometric figures with unknown side lengths Use relationships involving area, perimeter, and volume of geometric figures to compute another measure Compute the area of composite geometric figures when planning or visualization is required

*Locally assessed.

= Measured by ACT Mathematics Test

TABLE 2K

MISSOURI Algebra II Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 3: Geometric and Spatial Relationships	
Big Idea 2. Specify locations and describe spatial relationships using coordinate geometry and other representational systems	
A. Use coordinate systems: No CLE	**Graphical Representations:** Locate points on the number line and in the first quadrant Locate points in the coordinate plane Find the midpoint of a line segment Interpret and use information from graphs in the coordinate plane Use the distance formula Solve problems integrating multiple algebraic and/or geometric concepts Analyze and draw conclusions based on information from graphs in the coordinate plane
Big Idea 3. Apply transformations and use symmetry to analyze mathematical situations	
A. Use transformations on objects: No CLE	**Graphical Representations:** Solve problems integrating multiple algebraic and/or geometric concepts Analyze and draw conclusions based on information from graphs in the coordinate plane
B. Use transformations on functions: translate, dilate and reflect functions	**Graphical Representations:** Solve problems integrating multiple algebraic and/or geometric concepts Analyze and draw conclusions based on information from graphs in the coordinate plane
C. Use symmetry: No CLE	**Graphical Representations:** Solve problems integrating multiple algebraic and/or geometric concepts Analyze and draw conclusions based on information from graphs in the coordinate plane

*Locally assessed.

= Measured by ACT Mathematics Test

TABLE 2K

MISSOURI Algebra II Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 3: Geometric and Spatial Relationships	
Big Idea 4. Use visualization, spatial reasoning and geometric modeling to solve problems	
A. Recognize and draw three-dimensional representations: No CLE	**Graphical Representations:** Solve problems integrating multiple algebraic and/or geometric concepts Analyze and draw conclusions based on information from graphs in the coordinate plane
B. Draw and use visual models: draw or use visual models to represent and solve problems*	**Probability, Statistics, & Data Analysis:** Perform a single computation using information from a table or chart Calculate the average, given the number of data values and the sum of the data values Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs Analyze and draw conclusions based on information from figures, tables, and graphs **Graphical Representations:** Locate points on the number line and in the first quadrant Locate points in the coordinate plane Interpret and use information from graphs in the coordinate plane Solve problems integrating multiple algebraic and/or geometric concepts Analyze and draw conclusions based on information from graphs in the coordinate plane

*Locally assessed.

TABLE 2K

MISSOURI Algebra II Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 4: Measurement	
Big Idea 1. Understand measurable attributes of objects and the units, systems and processes of measurement	
A. Determine unit of measurement: No CLE	**Basic Operations & Applications:** Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour)
B. Identify equivalent measures: No CLE	**Basic Operations & Applications:** Perform common conversions (e.g., inches to feet or hours to minutes) Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour)
C. Tell and use units of time: No CLE	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average
D. Count and compute money: No CLE	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average

*Locally assessed.

= Measured by ACT Mathematics Test

TABLE 2K

MISSOURI Algebra II Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 4: Measurement	
Big Idea 2. Apply appropriate techniques, tools and formulas to determine measurements	
A. Use standard or non-standard measurement: No CLE	**Measurement:** Estimate or calculate the length of a line segment based on other lengths given on a geometric figure Compute the perimeter of polygons when all side lengths are given Compute the area and perimeter of triangles and rectangles in simple problems Use geometric formulas when all necessary information is given Compute the area of triangles and rectangles when one or more additional simple steps are required Compute the area and circumference of circles after identifying necessary information Compute the perimeter of simple composite geometric figures with unknown side lengths Use relationships involving area, perimeter, and volume of geometric figures to compute another measure Compute the area of composite geometric figures when planning or visualization is required
B. Use angle measurement: No CLE	**Properties of Plane Figures:** Exhibit some knowledge of the angles associated with parallel lines Find the measure of an angle using properties of parallel lines Exhibit knowledge of basic angle properties and special sums of angle measures (e.g., 90°, 180°, and 360°) Use several angle properties to find an unknown angle measure Use properties of isosceles triangles Apply properties of 30°-60°-90°, 45°-45°-90°, similar, and congruent triangles Draw conclusions based on a set of conditions Solve multistep geometry problems that involve integrating concepts, planning, visualization, and/or making connections with other content areas Use relationships among angles, arcs, and distances in a circle
C. Apply geometric measurements: No CLE	**Measurement:** Compute the perimeter of simple composite geometric figures with unknown side lengths Use relationships involving area, perimeter, and volume of geometric figures to compute another measure Compute the area of composite geometric figures when planning or visualization is required

*Locally assessed.

= Measured by ACT Mathematics Test

TABLE 2K

MISSOURI Algebra II Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 4: Measurement	
Big Idea 2. Apply appropriate techniques, tools and formulas to determine measurements	
D. Analyze precision: apply concepts of successive approximation	**Basic Operations & Applications:** Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages Solve complex arithmetic problems involving percent of increase or decrease and problems requiring integration of several concepts from pre-algebra and/or pre-geometry (e.g., comparing percentages or averages, using several ratios, and finding ratios in geometry settings)
E. Use relationships within a measurement system: use unit analysis to solve problems involving rates, such as speed, density or population density*	**Basic Operations & Applications:** Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages Solve complex arithmetic problems involving percent of increase or decrease and problems requiring integration of several concepts from pre-algebra and/or pre-geometry (e.g., comparing percentages or averages, using several ratios, and finding ratios in geometry settings) **Expressions, Equations, & Inequalities:** Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions) Write expressions, equations, and inequalities for common algebra settings Write expressions that require planning and/or manipulating to accurately model a situation Write equations and inequalities that require planning, manipulating, and/or solving

*Locally assessed.

= Measured by ACT Mathematics Test

TABLE 2K

MISSOURI Algebra II Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 5: Data and Probability	
Big Idea 1. Formulate questions that can be addressed with data and collect, organize and display relevant data to answer them	
A. Formulate questions: No CLE	
B. Classify and organize data: No CLE	**Probability, Statistics, & Data Analysis:** Perform a single computation using information from a table or chart Calculate the average, given the number of data values and the sum of the data values Read tables and graphs Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs Analyze and draw conclusions based on information from figures, tables, and graphs
C. Represent and interpret data: select and use appropriate graphical representation of data and given one-variable quantitative data, describe its shape and calculate summary statistics	**Basic Operations & Applications:** Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages Solve complex arithmetic problems involving percent of increase or decrease and problems requiring integration of several concepts from pre-algebra and/or pre-geometry (e.g., comparing percentages or averages, using several ratios, and finding ratios in geometry settings) **Probability, Statistics, & Data Analysis:** Perform a single computation using information from a table or chart Calculate the average, given the number of data values and the sum of the data values Read tables and graphs Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs Analyze and draw conclusions based on information from figures, tables, and graphs

*Locally assessed.

= Measured by ACT Mathematics Test

TABLE 2K

MISSOURI Algebra II Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 5: Data and Probability	
Big Idea 2. Select and use appropriate statistical methods to analyze data	
A. Describe and analyze data: apply statistical measures of center to solve problems	**Probability, Statistics, & Data Analysis:** Calculate the average of a list of positive whole numbers Calculate the average of a list of numbers Calculate the average, given the number of data values and the sum of the data values Calculate the missing data value, given the average and all data values but one Calculate the average, given the frequency counts of all the data values Calculate or use a weighted average Distinguish between mean, median, and mode for a list of numbers
B. Compare data representations: No CLE	**Probability, Statistics, & Data Analysis:** Perform a single computation using information from a table or chart Calculate the average, given the number of data values and the sum of the data values Read tables and graphs Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs Analyze and draw conclusions based on information from figures, tables, and graphs
C. Represent data algebraically: given a scatterplot, determine a type of function which models the data	**Probability, Statistics, & Data Analysis:** Read tables and graphs Perform computations on data from tables and graphs Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs Analyze and draw conclusions based on information from figures, tables, and graphs **Expressions, Equations, & Inequalities:** Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions) Write expressions, equations, and inequalities for common algebra settings Write expressions that require planning and/or manipulating to accurately model a situation Write equations and inequalities that require planning, manipulating, and/or solving

*Locally assessed.

= Measured by ACT Mathematics Test

TABLE 2K

MISSOURI Algebra II Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 5: Data and Probability	
Big Idea 3. Develop and evaluate inferences and predictions that are based on data	
A. Develop and evaluate inferences: No CLE	**Probability, Statistics, & Data Analysis:** Perform a single computation using information from a table or chart Calculate the average, given the number of data values and the sum of the data values Read tables and graphs Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs Analyze and draw conclusions based on information from figures, tables, and graphs
B. Analyze basic statistical techniques: No CLE	
Big Idea 4. Understand and apply basic concepts of probability	
A. Apply basic concepts of probability: describe the concepts of sample space and probability distribution	**Probability, Statistics, & Data Analysis:** Use the relationship between the probability of an event and the probability of its complement Determine the probability of a simple event Exhibit knowledge of simple counting techniques Compute straightforward probabilities for common situations Use Venn diagrams in counting Apply counting techniques Compute a probability when the event and/or sample space are not given or obvious Exhibit knowledge of conditional and joint probability
B. Use and describe compound events: use and describe the concepts of conditional probability and independent events and how to compute the probability of a compound event	**Probability, Statistics, & Data Analysis:** Apply counting techniques Compute a probability when the event and/or sample space are not given or obvious Exhibit knowledge of conditional and joint probability

*Locally assessed.

= Measured by ACT Mathematics Test

TABLE 2L

MISSOURI Integrated Math III Course Level Expectations	PLAN Mathematics College Readiness Standards
Strand 1: Number and Operations	
Big Idea 1. Understand numbers, ways of representing numbers, relationships among numbers and number systems	
A. Read, write and compare numbers: compare and order rational and irrational numbers, including finding their approximate locations on a number line	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent **Numbers: Concepts & Properties:** Identify a digit's place value Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor Find and use the least common multiple Order fractions **Graphical Representations:** Identify the location of a point with a positive coordinate on the number line Locate points on the number line and in the first quadrant
B. Represent and use rational numbers: use real numbers and various models, drawings, etc. to solve problems	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages **Probability, Statistics, & Data Analysis:** Perform a single computation using information from a table or chart Read tables and graphs Perform computations on data from tables and graphs Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs

*Locally assessed.

TABLE 2L

MISSOURI Integrated Math III Course Level Expectations	PLAN Mathematics College Readiness Standards
Strand 1: Number and Operations	
Big Idea 1. Understand numbers, ways of representing numbers, relationships among numbers and number systems	
C. Compose and decompose numbers: No CLE	**Numbers: Concepts & Properties:** Recognize equivalent fractions and fractions in lowest terms Recognize one-digit factors of a number Identify a digit's place value Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor Find and use the least common multiple Order fractions Work with numerical factors Work with scientific notation Work with squares and square roots of numbers Work problems involving positive integer exponents Apply number properties involving prime factorization Apply rules of exponents
D. Classify and describe numeric relationships: No CLE	**Numbers: Concepts & Properties:** Recognize equivalent fractions and fractions in lowest terms Recognize one-digit factors of a number Identify a digit's place value Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor Find and use the least common multiple Order fractions Work with numerical factors Work with scientific notation Work with squares and square roots of numbers Work problems involving positive integer exponents Work with cubes and cube roots of numbers Apply number properties involving prime factorization Apply number properties involving even/odd numbers and factors/multiples Apply number properties involving positive/negative numbers Apply rules of exponents

*Locally assessed.

= Measured by PLAN Mathematics Test

TABLE 2L

MISSOURI Integrated Math III Course Level Expectations	PLAN Mathematics College Readiness Standards
Strand 1: Number and Operations	
Big Idea 2. Understand meanings of operations and how they relate to one another	
A. Represent operations: No CLE	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages
B. Describe effects of operations: No CLE	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages **Numbers: Concepts & Properties:** Recognize one-digit factors of a number Identify a digit's place value Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor Find and use the least common multiple Order fractions Work with numerical factors Work with scientific notation Work with squares and square roots of numbers Work problems involving positive integer exponents Work with cubes and cube roots of numbers

*Locally assessed.

= Measured by PLAN Mathematics Test

TABLE 2L

MISSOURI Integrated Math III Course Level Expectations	PLAN Mathematics College Readiness Standards
Strand 1: Number and Operations	
Big Idea 2. Understand meanings of operations and how they relate to one another	
	Apply number properties involving prime factorization Apply number properties involving even/odd numbers and factors/multiples Apply number properties involving positive/negative numbers Apply rules of exponents
C. Apply properties of operations: apply properties of logarithms to simplify expressions or solve equations	**Basic Operations & Applications:** Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages **Numbers: Concepts & Properties:** Work with numerical factors Work problems involving positive integer exponents Apply rules of exponents **Expressions, Equations, & Inequalities:** Manipulate expressions and equations Write expressions, equations, and inequalities for common algebra settings
D. Apply operations on real and complex numbers: apply operations to matrices and complex numbers, using mental computation or paper-and-pencil calculations for simple cases and technology for more complicated cases*	**Basic Operations & Applications:** Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages

*Locally assessed.

= Measured by PLAN Mathematics Test

TABLE 2L

MISSOURI Integrated Math III Course Level Expectations	PLAN Mathematics College Readiness Standards
Strand 1: Number and Operations	
Big Idea 3. Compute fluently and make reasonable estimates	
A. Describe or represent mental strategies: No CLE	
B. Develop and demonstrate fluency: No CLE	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages
C. Compute problems: No CLE	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages

*Locally assessed.

= Measured by PLAN Mathematics Test

TABLE 2L

MISSOURI Integrated Math III Course Level Expectations	PLAN Mathematics College Readiness Standards
Strand 1: Number and Operations	
Big Idea 3. Compute fluently and make reasonable estimates	
D. Estimate and justify solutions: judge the reasonableness of numerical computations and their results*	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages
E. Use proportional reasoning: solve problems involving proportions*	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages **Expressions, Equations, & Inequalities:** Solve routine first-degree equations Solve real-world problems using first-degree equations Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions) Write expressions, equations, and inequalities for common algebra settings

*Locally assessed.

TABLE 2L

MISSOURI Integrated Math III Course Level Expectations	PLAN Mathematics College Readiness Standards
Strand 2: Algebraic Relationships	
Big Idea 1. Understand patterns, relations and functions	
A. Recognize and extend patterns: No CLE	**Numbers: Concepts & Properties:** Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor
B. Create and analyze patterns: generalize patterns using explicitly or recursively defined functions	**Numbers: Concepts & Properties:** Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor **Expressions, Equations, & Inequalities:** Manipulate expressions and equations Write expressions, equations, and inequalities for common algebra settings
C. Classify objects and representations: compare and contrast various forms of representations of patterns	**Numbers: Concepts & Properties:** Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor **Expressions, Equations, & Inequalities:** Manipulate expressions and equations Write expressions, equations, and inequalities for common algebra settings
D. Identify and compare functions: understand and compare the properties of linear, quadratic, exponential, logarithmic, rational and periodic functions (include asymptotes)	**Probability, Statistics, & Data Analysis:** Read tables and graphs Perform computations on data from tables and graphs Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs **Graphical Representations:** Locate points on the number line and in the first quadrant Locate points in the coordinate plane Exhibit knowledge of slope Determine the slope of a line from points or equations Match linear graphs with their equations Interpret and use information from graphs in the coordinate plane Use properties of parallel and perpendicular lines to determine an equation of a line or coordinates of a point

*Locally assessed.

= Measured by PLAN Mathematics Test

TABLE 2L

MISSOURI Integrated Math III Course Level Expectations	PLAN Mathematics College Readiness Standards
Strand 2: Algebraic Relationships	
Big Idea 1. Understand patterns, relations and functions	
E. Describe the effects of parameter changes: describe the effects of parameter changes on logarithmic and exponential functions	**Probability, Statistics, & Data Analysis:** Read tables and graphs Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs **Numbers: Concepts & Properties:** Work with scientific notation Work problems involving positive integer exponents Apply rules of exponents **Graphical Representations:** Locate points on the number line and in the first quadrant Locate points in the coordinate plane Exhibit knowledge of slope Determine the slope of a line from points or equations Match linear graphs with their equations Interpret and use information from graphs in the coordinate plane Use properties of parallel and perpendicular lines to determine an equation of a line or coordinates of a point

*Locally assessed.

= Measured by PLAN Mathematics Test

TABLE 2L

MISSOURI Integrated Math III Course Level Expectations	PLAN Mathematics College Readiness Standards
Strand 2: Algebraic Relationships	
Big Idea 2. Represent and analyze mathematical situations and structures using algebraic symbols	
A. Represent mathematical situations: use symbolic algebra to represent and solve problems that involve exponential and logarithmic relationships, including recursive and parametric relationships	**Expressions, Equations, & Inequalities:** Exhibit knowledge of basic expressions (e.g., identify an expression for a total as $b + g$) Solve equations in the form $x + a = b$, where a and b are whole numbers or decimals Solve one-step equations having integer or decimal answers Solve routine first-degree equations Perform straightforward word-to-symbol translations Solve real-world problems using first-degree equations Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions) Identify solutions to simple quadratic equations Factor simple quadratics (e.g., the difference of squares and perfect square trinomials) Solve first-degree inequalities that do not require reversing the inequality sign Manipulate expressions and equations Solve linear inequalities that require reversing the inequality sign Solve quadratic equations
B. Describe and use mathematical manipulation: describe and use algebraic manipulations, including inverse of functions, composition of functions and rules of exponents	**Numbers: Concepts & Properties:** Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor Work with numerical factors Work problems involving positive integer exponents Apply rules of exponents **Expressions, Equations, & Inequalities:** Combine like terms (e.g., $2x + 5x$) Add and subtract simple algebraic expressions Multiply two binomials Add, subtract, and multiply polynomials Manipulate expressions and equations

*Locally assessed.

= Measured by PLAN Mathematics Test

TABLE 2L

MISSOURI Integrated Math III Course Level Expectations	PLAN Mathematics College Readiness Standards
Strand 2: Algebraic Relationships	
Big Idea 2. Represent and analyze mathematical situations and structures using algebraic symbols	
C. Utilize equivalent forms: use and solve equivalent forms of equations and inequalities (exponential, logarithmic and rational)	**Numbers: Concepts & Properties:** Work with scientific notation Work problems involving positive integer exponents Apply rules of exponents **Expressions, Equations, & Inequalities:** Solve equations in the form $x + a = b$, where a and b are whole numbers or decimals Solve one-step equations having integer or decimal answers Solve routine first-degree equations Solve real-world problems using first-degree equations Solve first-degree inequalities that do not require reversing the inequality sign Manipulate expressions and equations Solve linear inequalities that require reversing the inequality sign Solve absolute value equations Solve quadratic equations
D. Utilize systems: use and solve systems of linear and quadratic equations or inequalities with 2 variables	**Expressions, Equations, & Inequalities:** Find solutions to systems of linear equations

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TABLE 2L

MISSOURI Integrated Math III Course Level Expectations	PLAN Mathematics College Readiness Standards
Strand 2: Algebraic Relationships	
Big Idea 3. Use mathematical models to represent and understand quantitative relationships	
A. Use mathematical models: identify quantitative relationships and determine the type(s) of functions that might model the situation to solve the problem (including recursive forms)	**Probability, Statistics, & Data Analysis:** Read tables and graphs Perform computations on data from tables and graphs Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs **Expressions, Equations, & Inequalities:** Perform straightforward word-to-symbol translations Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions) Manipulate expressions and equations Write expressions, equations, and inequalities for common algebra settings
Big Idea 4. Analyze change in various contexts	
A. Analyze change: analyze exponential and logarithmic functions by investigating rates of change, intercepts and asymptotes	**Probability, Statistics, & Data Analysis:** Perform a single computation using information from a table or chart Read tables and graphs Perform computations on data from tables and graphs Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs **Numbers: Concepts & Properties:** Work with scientific notation Work problems involving positive integer exponents Apply rules of exponents **Graphical Representations:** Locate points on the number line and in the first quadrant Locate points in the coordinate plane Exhibit knowledge of slope Determine the slope of a line from points or equations Interpret and use information from graphs in the coordinate plane

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TABLE 2L

MISSOURI Integrated Math III Course Level Expectations	PLAN Mathematics College Readiness Standards
Strand 3: Geometric and Spatial Relationships	
Big Idea 1. Analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships	
A. Describe and use geometric relationships: use inductive and deductive reasoning to determine lengths and angle measures in all types of triangles and to establish the validity of geometric conjectures, proved theorems and critique arguments made by others	**Properties of Plane Figures:** Exhibit some knowledge of the angles associated with parallel lines Find the measure of an angle using properties of parallel lines Exhibit knowledge of basic angle properties and special sums of angle measures (e.g., 90°, 180°, and 360°) Use several angle properties to find an unknown angle measure Recognize Pythagorean triples Use properties of isosceles triangles Apply properties of 30°-60°-90°, 45°-45°-90°, similar, and congruent triangles Use the Pythagorean theorem
B. Apply geometric relationships: determine the effect on surface area or volume of changing one measurement*	**Measurement:** Use relationships involving area, perimeter, and volume of geometric figures to compute another measure
C. Compose and decompose shapes: No CLE	**Measurement:** Estimate or calculate the length of a line segment based on other lengths given on a geometric figure Compute the perimeter of polygons when all side lengths are given Compute the area of rectangles when whole number dimensions are given Compute the area and perimeter of triangles and rectangles in simple problems Use geometric formulas when all necessary information is given Compute the area of triangles and rectangles when one or more additional simple steps are required Compute the area and circumference of circles after identifying necessary information Compute the perimeter of simple composite geometric figures with unknown side lengths Use relationships involving area, perimeter, and volume of geometric figures to compute another measure

*Locally assessed.

TABLE 2L

MISSOURI Integrated Math III Course Level Expectations	PLAN Mathematics College Readiness Standards
Strand 3: Geometric and Spatial Relationships	
Big Idea 2. Specify locations and describe spatial relationships using coordinate geometry and other representational systems	
A. Use coordinate systems: No CLE	**Graphical Representations:** Locate points on the number line and in the first quadrant Locate points in the coordinate plane Find the midpoint of a line segment Interpret and use information from graphs in the coordinate plane Use the distance formula
Big Idea 3. Apply transformations and use symmetry to analyze mathematical situations	
A. Use transformations on objects: No CLE	
B. Use transformations on functions: perform simple transformations and their compositions on linear, quadratic, logarithmic and exponential functions	
C. Use symmetry: No CLE	
Big Idea 4. Use visualization, spatial reasoning and geometric modeling to solve problems	
A. Recognize and draw three-dimensional representations: draw representations of 3-dimensional geometric objects from different perspectives using a variety of tools	
B. Draw and use visual models: draw or use visual models to represent and solve problems*	**Probability, Statistics, & Data Analysis:** Perform a single computation using information from a table or chart Calculate the average, given the number of data values and the sum of the data values Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs **Graphical Representations:** Locate points on the number line and in the first quadrant Locate points in the coordinate plane Interpret and use information from graphs in the coordinate plane

*Locally assessed.

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TABLE 2L

MISSOURI Integrated Math III Course Level Expectations	PLAN Mathematics College Readiness Standards
Strand 4: Measurement	
Big Idea 1. Understand measurable attributes of objects and the units, systems and processes of measurement	
A. Determine unit of measurement: No CLE	**Basic Operations & Applications:** Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour)
B. Identify equivalent measures: compare and contrast between angle and radian measure*	**Properties of Plane Figures:** Use several angle properties to find an unknown angle measure
C. Tell and use units of time: No CLE	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average
D. Count and compute money: No CLE	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average

*Locally assessed.

TABLE 2L

MISSOURI Integrated Math III Course Level Expectations	PLAN Mathematics College Readiness Standards
Strand 4: Measurement	
Big Idea 2. Apply appropriate techniques, tools and formulas to determine measurements	
A. Use standard or non-standard measurement: No CLE	**Measurement:** Estimate or calculate the length of a line segment based on other lengths given on a geometric figure Compute the perimeter of polygons when all side lengths are given Compute the area and perimeter of triangles and rectangles in simple problems Use geometric formulas when all necessary information is given Compute the area of triangles and rectangles when one or more additional simple steps are required Compute the area and circumference of circles after identifying necessary information Compute the perimeter of simple composite geometric figures with unknown side lengths Use relationships involving area, perimeter, and volume of geometric figures to compute another measure
B. Use angle measurement: solve problems of angle measure of parallel lines cut by a transversal	**Properties of Plane Figures:** Exhibit some knowledge of the angles associated with parallel lines Find the measure of an angle using properties of parallel lines Exhibit knowledge of basic angle properties and special sums of angle measures (e.g., 90°, 180°, and 360°) Use several angle properties to find an unknown angle measure Apply properties of 30°-60°-90°, 45°-45°-90°, similar, and congruent triangles
C. Apply geometric measurements: No CLE	**Measurement:** Estimate or calculate the length of a line segment based on other lengths given on a geometric figure Compute the perimeter of polygons when all side lengths are given Compute the area of rectangles when whole number dimensions are given Compute the area and perimeter of triangles and rectangles in simple problems Use geometric formulas when all necessary information is given Compute the area of triangles and rectangles when one or more additional simple steps are required Compute the area and circumference of circles after identifying necessary information Compute the perimeter of simple composite geometric figures with unknown side lengths Use relationships involving area, perimeter, and volume of geometric figures to compute another measure

*Locally assessed.

TABLE 2L

MISSOURI Integrated Math III Course Level Expectations	PLAN Mathematics College Readiness Standards
Strand 4: Measurement	
Big Idea 2. Apply appropriate techniques, tools and formulas to determine measurements	
D. Analyze precision: analyze concepts of successive approximation*	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages
E. Use relationships within a measurement system: use unit analysis to solve problems involving rates, such as speed, density or population density*	**Basic Operations & Applications:** Perform common conversions (e.g., inches to feet or hours to minutes) Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages

*Locally assessed.

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TABLE 2L

MISSOURI Integrated Math III Course Level Expectations	PLAN Mathematics College Readiness Standards
Strand 5: Data and Probability	
Big Idea 1. Formulate questions that can be addressed with data and collect, organize and display relevant data to answer them	
A. Formulate questions: describe the characteristics of well designed studies, including the role of randomization in survey and experimental research	
B. Classify and organize data: No CLE	**Probability, Statistics, & Data Analysis:** Perform a single computation using information from a table or chart Calculate the average, given the number of data values and the sum of the data values Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs
C. Represent and interpret data: display and analyze bivariate data where one variable is categorical and the other is numerical	
Big Idea 2. Select and use appropriate statistical methods to analyze data	
A. Describe and analyze data: No CLE	**Probability, Statistics, & Data Analysis:** Calculate the average of a list of positive whole numbers Calculate the average of a list of numbers Calculate the average, given the number of data values and the sum of the data values Calculate the missing data value, given the average and all data values but one Calculate the average, given the frequency counts of all the data values Calculate or use a weighted average
B. Compare data representations: recognize how linear transformations of single-variable data affect shape, center, and spread	**Probability, Statistics, & Data Analysis:** Calculate the average of a list of positive whole numbers Perform a single computation using information from a table or chart Calculate the average of a list of numbers Calculate the average, given the number of data values and the sum of the data values Read tables and graphs Perform computations on data from tables and graphs Calculate the missing data value, given the average and all data values but one Translate from one representation of data to another (e.g., a bar graph to a circle graph) Calculate the average, given the frequency counts of all the data values Manipulate data from tables and graphs

*Locally assessed.

TABLE 2L

MISSOURI Integrated Math III Course Level Expectations	PLAN Mathematics College Readiness Standards
Strand 5: Data and Probability	
	Calculate or use a weighted average Interpret and use information from figures, tables, and graphs
C. Represent data algebraically: create a scatter plot, describe its shape, determine and analyze regression equations	**Probability, Statistics, & Data Analysis:** Read tables and graphs Perform computations on data from tables and graphs Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs **Expressions, Equations, & Inequalities:** Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions) Write expressions, equations, and inequalities for common algebra settings
Big Idea 3. Develop and evaluate inferences and predictions that are based on data	
A. Develop and evaluate inferences: describe how sample statistics reflect the values of population parameters and use sampling distributions as the basis for informal reference	**Probability, Statistics, & Data Analysis:** Perform a single computation using information from a table or chart Calculate the average, given the number of data values and the sum of the data values Read tables and graphs Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs
B. Analyze basic statistical techniques: No CLE	
Big Idea 4. Understand and apply basic concepts of probability	
A. Apply basic concepts of probability: No CLE	**Probability, Statistics, & Data Analysis:** Use the relationship between the probability of an event and the probability of its complement Determine the probability of a simple event Exhibit knowledge of simple counting techniques Compute straightforward probabilities for common situations Use Venn diagrams in counting Apply counting techniques Compute a probability when the event and/or sample space are not given or obvious
B. Use and describe compound events: use and describe how to compute the probability of a compound event	**Probability, Statistics, & Data Analysis:** Apply counting techniques Compute a probability when the event and/or sample space are not given or obvious

*Locally assessed.

= Measured by PLAN Mathematics Test

TABLE 2L

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TABLE 2M

MISSOURI Integrated Math III Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 1: Number and Operations	
Big Idea 1. Understand numbers, ways of representing numbers, relationships among numbers and number systems	
A. Read, write and compare numbers: compare and order rational and irrational numbers, including finding their approximate locations on a number line	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent **Numbers: Concepts & Properties:** Identify a digit's place value Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor Find and use the least common multiple Order fractions **Graphical Representations:** Identify the location of a point with a positive coordinate on the number line Locate points on the number line and in the first quadrant
B. Represent and use rational numbers: use real numbers and various models, drawings, etc. to solve problems	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages Solve complex arithmetic problems involving percent of increase or decrease and problems requiring integration of several concepts from pre-algebra and/or pre-geometry (e.g., comparing percentages or averages, using several ratios, and finding ratios in geometry settings) **Probability, Statistics, & Data Analysis:** Perform a single computation using information from a table or chart Read tables and graphs Perform computations on data from tables and graphs

*Locally assessed.

TABLE 2M

MISSOURI Integrated Math III Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 1: Number and Operations	
Big Idea 1. Understand numbers, ways of representing numbers, relationships among numbers and number systems	
	Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs Analyze and draw conclusions based on information from figures, tables, and graphs
C. Compose and decompose numbers: No CLE	**Numbers: Concepts & Properties:** Recognize equivalent fractions and fractions in lowest terms Recognize one-digit factors of a number Identify a digit's place value Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor Find and use the least common multiple Order fractions Work with numerical factors Work with scientific notation Work with squares and square roots of numbers Work problems involving positive integer exponents Apply number properties involving prime factorization Apply rules of exponents Draw conclusions based on number concepts, algebraic properties, and/or relationships between expressions and numbers
D. Classify and describe numeric relationships: No CLE	**Numbers: Concepts & Properties:** Recognize equivalent fractions and fractions in lowest terms Recognize one-digit factors of a number Identify a digit's place value Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor Find and use the least common multiple Order fractions Work with numerical factors Work with scientific notation Work with squares and square roots of numbers Work problems involving positive integer exponents Work with cubes and cube roots of numbers Apply number properties involving prime factorization Apply number properties involving even/odd numbers and factors/multiples

*Locally assessed.

= Measured by ACT Mathematics Test

TABLE 2M

MISSOURI Integrated Math III Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 1: Number and Operations	
Big Idea 1. Understand numbers, ways of representing numbers, relationships among numbers and number systems	
	Apply number properties involving positive/negative numbers Apply rules of exponents Draw conclusions based on number concepts, algebraic properties, and/or relationships between expressions and numbers

*Locally assessed.

= Measured by ACT Mathematics Test

TABLE 2M

MISSOURI Integrated Math III Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 1: Number and Operations	
Big Idea 2. Understand meanings of operations and how they relate to one another	
A. Represent operations: No CLE	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages Solve complex arithmetic problems involving percent of increase or decrease and problems requiring integration of several concepts from pre-algebra and/or pre-geometry (e.g., comparing percentages or averages, using several ratios, and finding ratios in geometry settings)
B. Describe effects of operations: No CLE	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages Solve complex arithmetic problems involving percent of increase or decrease and problems requiring integration of several concepts from pre-algebra and/or pre-geometry (e.g., comparing percentages or averages, using several ratios, and finding ratios in geometry settings) **Numbers: Concepts & Properties:** Recognize one-digit factors of a number Identify a digit's place value

*Locally assessed.

TABLE 2M

MISSOURI Integrated Math III Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 1: Number and Operations	
Big Idea 2. Understand meanings of operations and how they relate to one another	
	Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor Find and use the least common multiple Order fractions Work with numerical factors Work with scientific notation Work with squares and square roots of numbers Work problems involving positive integer exponents Work with cubes and cube roots of numbers Apply number properties involving prime factorization Apply number properties involving even/odd numbers and factors/multiples Apply number properties involving positive/negative numbers Apply rules of exponents Draw conclusions based on number concepts, algebraic properties, and/or relationships between expressions and numbers
C. **Apply properties of operations:** apply properties of logarithms to simplify expressions or solve equations	**Basic Operations & Applications:** Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages Solve complex arithmetic problems involving percent of increase or decrease and problems requiring integration of several concepts from pre-algebra and/or pre-geometry (e.g., comparing percentages or averages, using several ratios, and finding ratios in geometry settings) **Numbers: Concepts & Properties:** Work with numerical factors Work problems involving positive integer exponents Apply rules of exponents Draw conclusions based on number concepts, algebraic properties, and/or relationships between expressions and numbers Exhibit knowledge of logarithms and geometric sequences **Expressions, Equations, & Inequalities:** Manipulate expressions and equations Write expressions, equations, and inequalities for common algebra settings Write expressions that require planning and/or manipulating to accurately model a situation Write equations and inequalities that require planning,

*Locally assessed.

TABLE 2M

MISSOURI Integrated Math III Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 1: Number and Operations	
Big Idea 2. Understand meanings of operations and how they relate to one another	
	manipulating, and/or solving
D. Apply operations on real and complex numbers: apply operations to matrices and complex numbers, using mental computation or paper-and-pencil calculations for simple cases and technology for more complicated cases*	**Basic Operations & Applications:** Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages Solve complex arithmetic problems involving percent of increase or decrease and problems requiring integration of several concepts from pre-algebra and/or pre-geometry (e.g., comparing percentages or averages, using several ratios, and finding ratios in geometry settings) **Numbers: Concepts & Properties:** Exhibit some knowledge of the complex numbers Multiply two complex numbers Apply properties of complex numbers

*Locally assessed.

TABLE 2M

MISSOURI Integrated Math III Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 1: Number and Operations	
Big Idea 3. Compute fluently and make reasonable estimates	
A. Describe or represent mental strategies: No CLE	
B. Develop and demonstrate fluency: No CLE	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages Solve complex arithmetic problems involving percent of increase or decrease and problems requiring integration of several concepts from pre-algebra and/or pre-geometry (e.g., comparing percentages or averages, using several ratios, and finding ratios in geometry settings)
C. Compute problems: No CLE	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages Solve complex arithmetic problems involving percent of increase or decrease and problems requiring integration of several concepts from pre-algebra and/or pre-geometry (e.g., comparing percentages or averages, using several ratios, and finding ratios in geometry settings)

*Locally assessed.

TABLE 2M

MISSOURI Integrated Math III Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 1: Number and Operations	
Big Idea 3. Compute fluently and make reasonable estimates	
D. Estimate and justify solutions: judge the reasonableness of numerical computations and their results*	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages Solve complex arithmetic problems involving percent of increase or decrease and problems requiring integration of several concepts from pre-algebra and/or pre-geometry (e.g., comparing percentages or averages, using several ratios, and finding ratios in geometry settings)
E. Use proportional reasoning: solve problems involving proportions*	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages Solve complex arithmetic problems involving percent of increase or decrease and problems requiring integration of several concepts from pre-algebra and/or pre-geometry (e.g., comparing percentages or averages, using several ratios, and finding ratios in geometry settings) **Expressions, Equations, & Inequalities:** Solve routine first-degree equations Solve real-world problems using first-degree equations

*Locally assessed.

TABLE 2M

MISSOURI Integrated Math III Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 1: Number and Operations	
Big Idea 3. Compute fluently and make reasonable estimates	
	Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions) Write expressions, equations, and inequalities for common algebra settings Write expressions that require planning and/or manipulating to accurately model a situation Write equations and inequalities that require planning, manipulating, and/or solving

*Locally assessed.

= Measured by ACT Mathematics Test

TABLE 2M

MISSOURI Integrated Math III Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 2: Algebraic Relationships	
Big Idea 1. Understand patterns, relations and functions	
A. Recognize and extend patterns: No CLE	**Numbers: Concepts & Properties:** Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor Draw conclusions based on number concepts, algebraic properties, and/or relationships between expressions and numbers
B. Create and analyze patterns: generalize patterns using explicitly or recursively defined functions	**Numbers: Concepts & Properties:** Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor Draw conclusions based on number concepts, algebraic properties, and/or relationships between expressions and numbers **Expressions, Equations, & Inequalities:** Manipulate expressions and equations Write expressions, equations, and inequalities for common algebra settings Write expressions that require planning and/or manipulating to accurately model a situation Write equations and inequalities that require planning, manipulating, and/or solving
C. Classify objects and representations: compare and contrast various forms of representations of patterns	**Numbers: Concepts & Properties:** Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor Draw conclusions based on number concepts, algebraic properties, and/or relationships between expressions and numbers **Expressions, Equations, & Inequalities:** Manipulate expressions and equations Write expressions, equations, and inequalities for common algebra settings Write expressions that require planning and/or manipulating to accurately model a situation Write equations and inequalities that require planning, manipulating, and/or solving
D. Identify and compare functions: understand and compare the properties of linear, quadratic, exponential, logarithmic, rational and periodic functions (include asymptotes)	**Probability, Statistics, & Data Analysis:** Read tables and graphs Perform computations on data from tables and graphs Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs Analyze and draw conclusions based on information from figures, tables, and graphs

*Locally assessed.

= Measured by ACT Mathematics Test

TABLE 2M

MISSOURI Integrated Math III Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 2: Algebraic Relationships	
Big Idea 1. Understand patterns, relations and functions	
	Graphical Representations: Locate points on the number line and in the first quadrant Locate points in the coordinate plane Exhibit knowledge of slope Determine the slope of a line from points or equations Match linear graphs with their equations Interpret and use information from graphs in the coordinate plane Use properties of parallel and perpendicular lines to determine an equation of a line or coordinates of a point Recognize special characteristics of parabolas and circles (e.g., the vertex of a parabola and the center or radius of a circle) Identify characteristics of graphs based on a set of conditions or on a general equation such as $y = ax^2 + c$ Solve problems integrating multiple algebraic and/or geometric concepts Analyze and draw conclusions based on information from graphs in the coordinate plane
E. Describe the effects of parameter changes: describe the effects of parameter changes on logarithmic and exponential functions	**Probability, Statistics, & Data Analysis:** Read tables and graphs Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs Analyze and draw conclusions based on information from figures, tables, and graphs **Numbers: Concepts & Properties:** Work with scientific notation Work problems involving positive integer exponents Apply rules of exponents Exhibit knowledge of logarithms and geometric sequences **Graphical Representations:** Locate points on the number line and in the first quadrant Locate points in the coordinate plane Exhibit knowledge of slope Determine the slope of a line from points or equations Match linear graphs with their equations Interpret and use information from graphs in the coordinate plane Use properties of parallel and perpendicular lines to determine an equation of a line or coordinates of a point

*Locally assessed.

TABLE 2M

MISSOURI Integrated Math III Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 2: Algebraic Relationships	
Big Idea 1. Understand patterns, relations and functions	
	Recognize special characteristics of parabolas and circles (e.g., the vertex of a parabola and the center or radius of a circle) Identify characteristics of graphs based on a set of conditions or on a general equation such as $y = ax^2 + c$ Solve problems integrating multiple algebraic and/or geometric concepts Analyze and draw conclusions based on information from graphs in the coordinate plane

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TABLE 2M

MISSOURI Integrated Math III Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 2: Algebraic Relationships	
Big Idea 2. Represent and analyze mathematical situations and structures using algebraic symbols	
A. Represent mathematical situations: use symbolic algebra to represent and solve problems that involve exponential and logarithmic relationships, including recursive and parametric relationships	**Expressions, Equations, & Inequalities:** Exhibit knowledge of basic expressions (e.g., identify an expression for a total as $b + g$) Solve equations in the form $x + a = b$, where a and b are whole numbers or decimals Solve one-step equations having integer or decimal answers Solve routine first-degree equations Perform straightforward word-to-symbol translations Solve real-world problems using first-degree equations Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions) Identify solutions to simple quadratic equations Factor simple quadratics (e.g., the difference of squares and perfect square trinomials) Solve first-degree inequalities that do not require reversing the inequality sign Manipulate expressions and equations Solve linear inequalities that require reversing the inequality sign Solve quadratic equations Write expressions that require planning and/or manipulating to accurately model a situation Write equations and inequalities that require planning, manipulating, and/or solving
B. Describe and use mathematical manipulation: describe and use algebraic manipulations, including inverse of functions, composition of functions and rules of exponents	**Numbers: Concepts & Properties:** Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor Work with numerical factors Work problems involving positive integer exponents Apply rules of exponents Draw conclusions based on number concepts, algebraic properties, and/or relationships between expressions and numbers **Expressions, Equations, & Inequalities:** Combine like terms (e.g., $2x + 5x$) Add and subtract simple algebraic expressions Multiply two binomials Add, subtract, and multiply polynomials Manipulate expressions and equations Write expressions that require planning and/or manipulating to accurately model a situation

*Locally assessed.

= Measured by ACT Mathematics Test

TABLE 2M

MISSOURI Integrated Math III Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 2: Algebraic Relationships	
Big Idea 2. Represent and analyze mathematical situations and structures using algebraic symbols	
	Write equations and inequalities that require planning, manipulating, and/or solving **Functions:** Write an expression for the composite of two simple functions
C. Utilize equivalent forms: use and solve equivalent forms of equations and inequalities (exponential, logarithmic and rational)	**Numbers: Concepts & Properties:** Work with scientific notation Work problems involving positive integer exponents Apply rules of exponents Exhibit knowledge of logarithms and geometric sequences **Expressions, Equations, & Inequalities:** Solve equations in the form $x + a = b$, where a and b are whole numbers or decimals Solve one-step equations having integer or decimal answers Solve routine first-degree equations Solve real-world problems using first-degree equations Solve first-degree inequalities that do not require reversing the inequality sign Manipulate expressions and equations Solve linear inequalities that require reversing the inequality sign Solve absolute value equations Solve quadratic equations Write expressions that require planning and/or manipulating to accurately model a situation Write equations and inequalities that require planning, manipulating, and/or solving
D. Utilize systems: use and solve systems of linear and quadratic equations or inequalities with 2 variables	**Expressions, Equations, & Inequalities:** Find solutions to systems of linear equations Write equations and inequalities that require planning, manipulating, and/or solving

*Locally assessed.

= Measured by ACT Mathematics Test

TABLE 2M

MISSOURI Integrated Math III Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 2: Algebraic Relationships	
Big Idea 3. Use mathematical models to represent and understand quantitative relationships	
A. Use mathematical models: identify quantitative relationships and determine the type(s) of functions that might model the situation to solve the problem (including recursive forms)	**Probability, Statistics, & Data Analysis:** Read tables and graphs Perform computations on data from tables and graphs Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs Analyze and draw conclusions based on information from figures, tables, and graphs **Expressions, Equations, & Inequalities:** Perform straightforward word-to-symbol translations Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions) Manipulate expressions and equations Write expressions, equations, and inequalities for common algebra settings Write expressions that require planning and/or manipulating to accurately model a situation Write equations and inequalities that require planning, manipulating, and/or solving

*Locally assessed.

= Measured by ACT Mathematics Test

TABLE 2M

MISSOURI Integrated Math III Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 2: Algebraic Relationships	
Big Idea 4. Analyze change in various contexts	
A. Analyze change: analyze exponential and logarithmic functions by investigating rates of change, intercepts and asymptotes	**Probability, Statistics, & Data Analysis:** Perform a single computation using information from a table or chart Read tables and graphs Perform computations on data from tables and graphs Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs Analyze and draw conclusions based on information from figures, tables, and graphs **Numbers: Concepts & Properties:** Work with scientific notation Work problems involving positive integer exponents Apply rules of exponents Exhibit knowledge of logarithms and geometric sequences **Graphical Representations:** Locate points on the number line and in the first quadrant Locate points in the coordinate plane Exhibit knowledge of slope Determine the slope of a line from points or equations Interpret and use information from graphs in the coordinate plane Recognize special characteristics of parabolas and circles (e.g., the vertex of a parabola and the center or radius of a circle) Identify characteristics of graphs based on a set of conditions or on a general equation such as $y = ax^2 + c$ Solve problems integrating multiple algebraic and/or geometric concepts Analyze and draw conclusions based on information from graphs in the coordinate plane

*Locally assessed.

TABLE 2M

MISSOURI Integrated Math III Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 3: Geometric and Spatial Relationships	
Big Idea 1. Analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships	
A. Describe and use geometric relationships: use inductive and deductive reasoning to determine lengths and angle measures in all types of triangles and to establish the validity of geometric conjectures, proved theorems and critique arguments made by others	**Properties of Plane Figures:** Exhibit some knowledge of the angles associated with parallel lines Find the measure of an angle using properties of parallel lines Exhibit knowledge of basic angle properties and special sums of angle measures (e.g., 90°, 180°, and 360°) Use several angle properties to find an unknown angle measure Recognize Pythagorean triples Use properties of isosceles triangles Apply properties of 30°-60°-90°, 45°-45°-90°, similar, and congruent triangles Use the Pythagorean theorem Draw conclusions based on a set of conditions Solve multistep geometry problems that involve integrating concepts, planning, visualization, and/or making connections with other content areas Use relationships among angles, arcs, and distances in a circle
B. Apply geometric relationships: determine the effect on surface area or volume of changing one measurement*	**Measurement:** Use relationships involving area, perimeter, and volume of geometric figures to compute another measure Use scale factors to determine the magnitude of a size change Compute the area of composite geometric figures when planning or visualization is required
C. Compose and decompose shapes: No CLE	**Measurement:** Estimate or calculate the length of a line segment based on other lengths given on a geometric figure Compute the perimeter of polygons when all side lengths are given Compute the area of rectangles when whole number dimensions are given Compute the area and perimeter of triangles and rectangles in simple problems Use geometric formulas when all necessary information is given Compute the area of triangles and rectangles when one or more additional simple steps are required Compute the area and circumference of circles after identifying necessary information Compute the perimeter of simple composite geometric figures with unknown side lengths

*Locally assessed.

= Measured by ACT Mathematics Test

TABLE 2M

MISSOURI Integrated Math III Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 3: Geometric and Spatial Relationships	
Big Idea 1. Analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships	
	Use relationships involving area, perimeter, and volume of geometric figures to compute another measure Use scale factors to determine the magnitude of a size change Compute the area of composite geometric figures when planning or visualization is required

*Locally assessed.

TABLE 2M

MISSOURI Integrated Math III Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 3: Geometric and Spatial Relationships	
Big Idea 2. Specify locations and describe spatial relationships using coordinate geometry and other representational systems	
A. Use coordinate systems: No CLE	**Graphical Representations:** Locate points on the number line and in the first quadrant Locate points in the coordinate plane Find the midpoint of a line segment Interpret and use information from graphs in the coordinate plane Use the distance formula Solve problems integrating multiple algebraic and/or geometric concepts Analyze and draw conclusions based on information from graphs in the coordinate plane
Big Idea 3. Apply transformations and use symmetry to analyze mathematical situations	
A. Use transformations on objects: No CLE	**Graphical Representations:** Solve problems integrating multiple algebraic and/or geometric concepts Analyze and draw conclusions based on information from graphs in the coordinate plane
B. Use transformations on functions: perform simple transformations and their compositions on linear, quadratic, logarithmic and exponential functions	**Graphical Representations:** Solve problems integrating multiple algebraic and/or geometric concepts Analyze and draw conclusions based on information from graphs in the coordinate plane
C. Use symmetry: No CLE	**Graphical Representations:** Solve problems integrating multiple algebraic and/or geometric concepts Analyze and draw conclusions based on information from graphs in the coordinate plane

*Locally assessed.

= Measured by ACT Mathematics Test

TABLE 2M

MISSOURI Integrated Math III Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 3: Geometric and Spatial Relationships	
Big Idea 4. Use visualization, spatial reasoning and geometric modeling to solve problems	
A. Recognize and draw three-dimensional representations: draw representations of 3-dimensional geometric objects from different perspectives using a variety of tools	**Graphical Representations:** Solve problems integrating multiple algebraic and/or geometric concepts Analyze and draw conclusions based on information from graphs in the coordinate plane
B. Draw and use visual models: draw or use visual models to represent and solve problems*	**Probability, Statistics, & Data Analysis:** Perform a single computation using information from a table or chart Calculate the average, given the number of data values and the sum of the data values Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs Analyze and draw conclusions based on information from figures, tables, and graphs **Graphical Representations:** Locate points on the number line and in the first quadrant Locate points in the coordinate plane Interpret and use information from graphs in the coordinate plane Solve problems integrating multiple algebraic and/or geometric concepts Analyze and draw conclusions based on information from graphs in the coordinate plane

*Locally assessed.

TABLE 2M

MISSOURI Integrated Math III Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 4: Measurement	
Big Idea 1. Understand measurable attributes of objects and the units, systems and processes of measurement	
A. Determine unit of measurement: No CLE	**Basic Operations & Applications:** Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour)
B. Identify equivalent measures: compare and contrast between angle and radian measure*	**Properties of Plane Figures:** Use several angle properties to find an unknown angle measure Draw conclusions based on a set of conditions Solve multistep geometry problems that involve integrating concepts, planning, visualization, and/or making connections with other content areas **Functions:** Exhibit knowledge of unit circle trigonometry
C. Tell and use units of time: No CLE	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average
D. Count and compute money: No CLE	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average

*Locally assessed.

= Measured by ACT Mathematics Test

TABLE 2M

MISSOURI Integrated Math III Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 4: Measurement	
Big Idea 2. Apply appropriate techniques, tools and formulas to determine measurements	
A. Use standard or non-standard measurement: No CLE	**Measurement:** Estimate or calculate the length of a line segment based on other lengths given on a geometric figure Compute the perimeter of polygons when all side lengths are given Compute the area and perimeter of triangles and rectangles in simple problems Use geometric formulas when all necessary information is given Compute the area of triangles and rectangles when one or more additional simple steps are required Compute the area and circumference of circles after identifying necessary information Compute the perimeter of simple composite geometric figures with unknown side lengths Use relationships involving area, perimeter, and volume of geometric figures to compute another measure Compute the area of composite geometric figures when planning or visualization is required
B. Use angle measurement: solve problems of angle measure of parallel lines cut by a transversal	**Properties of Plane Figures:** Exhibit some knowledge of the angles associated with parallel lines Find the measure of an angle using properties of parallel lines Exhibit knowledge of basic angle properties and special sums of angle measures (e.g., 90°, 180°, and 360°) Use several angle properties to find an unknown angle measure Apply properties of 30°-60°-90°, 45°-45°-90°, similar, and congruent triangles Draw conclusions based on a set of conditions Solve multistep geometry problems that involve integrating concepts, planning, visualization, and/or making connections with other content areas

*Locally assessed.

TABLE 2M

MISSOURI Integrated Math III Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 4: Measurement	
Big Idea 2. Apply appropriate techniques, tools and formulas to determine measurements	
C. Apply geometric measurements: No CLE	**Measurement:** Estimate or calculate the length of a line segment based on other lengths given on a geometric figure Compute the perimeter of polygons when all side lengths are given Compute the area of rectangles when whole number dimensions are given Compute the area and perimeter of triangles and rectangles in simple problems Use geometric formulas when all necessary information is given Compute the area of triangles and rectangles when one or more additional simple steps are required Compute the area and circumference of circles after identifying necessary information Compute the perimeter of simple composite geometric figures with unknown side lengths Use relationships involving area, perimeter, and volume of geometric figures to compute another measure Compute the area of composite geometric figures when planning or visualization is required
D. Analyze precision: analyze concepts of successive approximation*	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages Solve complex arithmetic problems involving percent of increase or decrease and problems requiring integration of several concepts from pre-algebra and/or pre-geometry (e.g., comparing percentages or averages, using several ratios, and finding ratios in geometry settings)

*Locally assessed.

= Measured by ACT Mathematics Test

TABLE 2M

MISSOURI Integrated Math III Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 4: Measurement	
Big Idea 2. Apply appropriate techniques, tools and formulas to determine measurements	
E. Use relationships within a measurement system: use unit analysis to solve problems involving rates, such as speed, density or population density*	**Basic Operations & Applications:** Perform common conversions (e.g., inches to feet or hours to minutes) Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages Solve complex arithmetic problems involving percent of increase or decrease and problems requiring integration of several concepts from pre-algebra and/or pre-geometry (e.g., comparing percentages or averages, using several ratios, and finding ratios in geometry settings)

*Locally assessed.

= Measured by ACT Mathematics Test

TABLE 2M

MISSOURI Integrated Math III Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 5: Data and Probability	
Big Idea 1. Formulate questions that can be addressed with data and collect, organize and display relevant data to answer them	
A. Formulate questions: describe the characteristics of well designed studies, including the role of randomization in survey and experimental research	
B. Classify and organize data: No CLE	**Probability, Statistics, & Data Analysis:** Perform a single computation using information from a table or chart Calculate the average, given the number of data values and the sum of the data values Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs Analyze and draw conclusions based on information from figures, tables, and graphs
C. Represent and interpret data: display and analyze bivariate data where one variable is categorical and the other is numerical	
Big Idea 2. Select and use appropriate statistical methods to analyze data	
A. Describe and analyze data: No CLE	**Probability, Statistics, & Data Analysis:** Calculate the average of a list of positive whole numbers Calculate the average of a list of numbers Calculate the average, given the number of data values and the sum of the data values Calculate the missing data value, given the average and all data values but one Calculate the average, given the frequency counts of all the data values Calculate or use a weighted average Distinguish between mean, median, and mode for a list of numbers

*Locally assessed.

= Measured by ACT Mathematics Test

TABLE 2M

MISSOURI Integrated Math III Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 5: Data and Probability	
B. Compare data representations: recognize how linear transformations of single-variable data affect shape, center, and spread	**Probability, Statistics, & Data Analysis:** Calculate the average of a list of positive whole numbers Perform a single computation using information from a table or chart Calculate the average of a list of numbers Calculate the average, given the number of data values and the sum of the data values Read tables and graphs Perform computations on data from tables and graphs Calculate the missing data value, given the average and all data values but one Translate from one representation of data to another (e.g., a bar graph to a circle graph) Calculate the average, given the frequency counts of all the data values Manipulate data from tables and graphs Calculate or use a weighted average Interpret and use information from figures, tables, and graphs Distinguish between mean, median, and mode for a list of numbers Analyze and draw conclusions based on information from figures, tables, and graphs
C. Represent data algebraically: create a scatter plot, describe its shape, determine and analyze regression equations	**Probability, Statistics, & Data Analysis:** Read tables and graphs Perform computations on data from tables and graphs Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs Analyze and draw conclusions based on information from figures, tables, and graphs **Expressions, Equations, & Inequalities:** Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions) Write expressions, equations, and inequalities for common algebra settings Write equations and inequalities that require planning, manipulating, and/or solving

*Locally assessed.

= Measured by ACT Mathematics Test

TABLE 2M

MISSOURI Integrated Math III Course Level Expectations	ACT Mathematics College Readiness Standards
Strand 5: Data and Probability	
Big Idea 3. Develop and evaluate inferences and predictions that are based on data	
A. Develop and evaluate inferences: describe how sample statistics reflect the values of population parameters and use sampling distributions as the basis for informal reference	**Probability, Statistics, & Data Analysis:** Perform a single computation using information from a table or chart Calculate the average, given the number of data values and the sum of the data values Read tables and graphs Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs Analyze and draw conclusions based on information from figures, tables, and graphs
B. Analyze basic statistical techniques: No CLE	
Big Idea 4. Understand and apply basic concepts of probability	
A. Apply basic concepts of probability: No CLE	**Probability, Statistics, & Data Analysis:** Use the relationship between the probability of an event and the probability of its complement Determine the probability of a simple event Exhibit knowledge of simple counting techniques Compute straightforward probabilities for common situations Use Venn diagrams in counting Apply counting techniques Compute a probability when the event and/or sample space are not given or obvious Analyze and draw conclusions based on information from figures, tables, and graphs
B. Use and describe compound events: use and describe how to compute the probability of a compound event	**Probability, Statistics, & Data Analysis:** Apply counting techniques Compute a probability when the event and/or sample space are not given or obvious Analyze and draw conclusions based on information from figures, tables, and graphs

*Locally assessed.

= Measured by ACT Mathematics Test

SUPPLEMENT
TABLES 3A–3M:

SCIENCE

TABLE 3A

MISSOURI Physical Science Course Level Expectations	EXPLORE Science College Readiness Standards
Strand 1: Properties and Principles of Matter and Energy	
Big Idea 1. Changes in properties and states of matter provide evidence of the atomic theory of matter	
A. Objects, and the materials they are made of, have properties that can be used to describe and classify them a. Compare the densities of regular and irregular objects using their respective measures of volume and mass♦ b. Identify pure substances by their physical and chemical properties (i.e., color, luster/reflectivity, hardness, conductivity, density, pH, melting point, boiling point, specific heat, solubility, phase at room temperature, chemical reactivity)♦ c. Classify a substance as being made up of one kind of atom (element) or a compound when given the molecular formula or structural formula (introduce electron dot diagram) for the substance d. Compare and contrast the common properties of metals, nonmetals, metalloids (semi-conductors) and noble gases	
B. Properties of mixtures depend upon the concentrations, properties, and interactions of particles a. Compare and contrast the properties of acidic, basic, and neutral solutions	
C.	[No CLEs in Physical Science course]
D. Physical changes in states of matter due to thermal changes in materials can be explained by the Kinetic Theory of Matter a. Using the Kinetic Theory model, explain the changes that occur in the distance between atoms/molecules and temperature of a substance as energy is absorbed or released during a phase change♦ b. Predict the effect of a temperature change on the properties (i.e., pressure, density, volume) of a material (solids, liquids, gases) c. Predict the effect of pressure changes on the properties (i.e., temperature, volume, density) of a material (solids, liquids, gases)	
E. The atomic model describes the electrically neutral atom a. Describe the atom as having a dense, positive nucleus surrounded by a cloud of negative electrons♦ b. Calculate the number of protons, neutrons, and electrons of an element/isotopes given its mass number and atomic number♦ c. Describe the information provided by the atomic number and the mass number (i.e., electrical charge, chemical stability)♦	

♦ Assessed in MAP End-of-Course Exam

= Measured by EXPLORE Science Test

_____ = Content sampled by EXPLORE Science Test

TABLE 3A

MISSOURI Physical Science Course Level Expectations	EXPLORE Science College Readiness Standards
Strand 1: Properties and Principles of Matter and Energy	
Big Idea 1. Changes in properties and states of matter provide evidence of the atomic theory of matter	
F. The periodic table organizes the elements according to their atomic structure and chemical reactivity a. Explain the structure of the periodic table in terms of the elements with common properties (groups/ families) and repeating properties (periods)♦ b. Classify elements as metals, nonmetals, metalloids (semi-conductors), and noble gases according to their location on the Periodic Table♦ c. Predict the chemical reactivity of elements, and the type of bonds that may result between them, using the Periodic Table	
G. Properties of objects and states of matter can change chemically and/or physically a. Distinguish between physical and chemical changes in matter♦	
H. Chemical bonding is the combining of different pure substances (elements, compounds) to form new substances with different properties [NOTE: No a. or b. in source document] c. Describe how the valence electron configuration determines how atoms interact and may bond d. Compare and contrast the types of chemical bonds (i.e., ionic, covalent)	
I. Mass is conserved during any physical or chemical change a. Compare the mass of the reactants to the mass of the products in a chemical reaction or physical change as support for the Law of Conservation of Mass♦	

TABLE 3A

MISSOURI Physical Science Course Level Expectations	EXPLORE Science College Readiness Standards
Strand 1: Properties and Principles of Matter and Energy	
Big Idea 2. Energy has a source, can be stored, and can be transferred but is conserved within a system	
A. Forms of energy have a source, a means of transfer (work and heat), and a receiver a. Differentiate between thermal energy (the total internal energy of a substance which is dependent upon mass), heat (thermal energy that transfers from one object or system to another due to a difference in temperature), and temperature (the measure of average kinetic energy of molecules or atoms in a substance) b. Differentiate between the properties and examples of conductors and insulators c. Describe sources and common uses of different forms of energy: chemical, nuclear, thermal, mechanical, electromagnetic♦ d. Identify and evaluate advantages/disadvantages of using various sources of energy (e.g., wind, solar, geothermal, hydroelectric, biomass, fossil fuel) for human activity e. Describe the effect of different frequencies of electromagnetic waves on the Earth and living organisms (e.g., radio, infrared, visible, ultraviolet, gamma, cosmic rays) f. Interpret examples of heat transfer (e.g., home heating, solar panels) as convection, conduction, or radiation	
B. Mechanical energy comes from the motion (kinetic energy) and/or relative position (potential energy) of an object a. Relate kinetic energy to an object's mass and its velocity♦ b. Relate an object's gravitational potential energy to its weight and height relative to the surface of the Earth♦ c. Distinguish between examples of kinetic and potential energy (i.e., gravitational) within a system♦ d. Describe the effect of work on an object's kinetic and potential energy	
C. Electromagnetic energy from the Sun (solar radiation) is a major source of energy on Earth • Identify stars as producers of electromagnetic energy • Describe how electromagnetic energy is transferred through space as electromagnetic waves of varying wavelength and frequency♦	
D.	[No CLEs in Physical Science course]

♦ Assessed in MAP End-of-Course Exam

= Measured by EXPLORE Science Test

_____ = Content sampled by EXPLORE Science Test

TABLE 3A

MISSOURI Physical Science Course Level Expectations	EXPLORE Science College Readiness Standards
Strand 1: Properties and Principles of Matter and Energy	
Big Idea 2. Energy has a source, can be stored, and can be transferred but is conserved within a system	
E. Nuclear energy is a major source of energy throughout the universe • Describe how changes in the nucleus of an atom during a nuclear reaction (i.e., nuclear decay, fusion, fission) result in emission of radiation • Identify the role of nuclear energy as it serves as a source of energy for the Earth, stars, and human activity (e.g., source of electromagnetic radiation, nuclear power plants, fuel for stars)	
F. Energy can be transferred within a system as the total amount of energy remains constant (i.e., Law of Conservation of Energy) • Describe the transfer of energy that occurs as energy changes from kinetic to potential within a system (e.g., car moving on rollercoaster track, child swinging, diver jumping off a board)(Do NOT assess calculations)♦ • Compare the efficiency of systems (recognizing that, as work is done, the amount of usable energy decreases)♦ • Classify the different ways to store energy (i.e., chemical, nuclear, thermal, mechanical, electro-magnetic) and describe the transfer of energy as it changes from kinetic to potential, while the total amount of energy remains constant, within a system (e.g., using gasoline to move a car, photocell generating electricity, electromagnetic motor doing work, energy generated by nuclear reactor)♦	

TABLE 3A

MISSOURI Physical Science Course Level Expectations	EXPLORE Science College Readiness Standards
Strand 2: Properties and Principles of Force and Motion	
Big Idea 1. The motion of an object is described by its change in position relative to another object or point	
A. The motion of an object is described as a change in position, direction, and speed relative to another object (frame of reference) • Represent and analyze the motion of an object graphically♦ • Analyze the velocity of two objects in terms of distance and time (i.e., verbally, diagrammatically, graphically, mathematically)♦	
B. An object that is accelerating is speeding up, slowing down, or changing direction • Measure and analyze an object's motion in terms of speed, velocity, and acceleration (i.e., verbally, diagrammatically, graphically)♦	
C. Momentum depends on the mass of the object and the velocity with which it is traveling • Compare the momentum of two objects in terms of mass and velocity (Do NOT assess calculations) • Explain that the total momentum remains constant within a system	
Big Idea 2. Forces affect motion	
A. Forces are classified as either contact forces (pushes, pulls, friction, buoyancy) or non-contact forces (gravity, magnetism), that can be described in terms of direction and magnitude • Identify and describe the forces acting on an object (i.e., type of force, direction, magnitude in Newtons) using a force diagram (do not assess calculations)♦	
B. Every object exerts a gravitational force on every other object • Describe gravity as an attractive force among all objects • Compare and describe the gravitational forces between two objects in terms of their masses and the distances between them • Describe weight in terms of the force of a planet's or moon's gravity acting on a given mass♦ • Recognize all free falling bodies accelerate at the same rate due to gravity regardless of their mass	
C.	[No CLEs in Physical Science course]

♦ Assessed in MAP End-of-Course Exam

(yellow box) = Measured by EXPLORE Science Test

_____ = Content sampled by EXPLORE Science Test

TABLE 3A

MISSOURI Physical Science Course Level Expectations	EXPLORE Science College Readiness Standards
Strand 2: Properties and Principles of Force and Motion	
Big Idea 1. The motion of an object is described by its change in position relative to another object or point	
D. Newton's Laws of Motion explain the interaction of mass and forces, and are used to predict changes in motion • Recognize that inertia is a property of matter that can be described as an object's tendency to resist a change in motion, and is dependent upon the object's mass (Newton's First Law of Motion)♦ • Determine the effect (i.e., direction and magnitude) of the sum of the forces acting on an object (i.e., net force)♦ • Using information about net force and mass determine the effect on acceleration (Newton's Second Law of Motion)♦ • Identify forces acting on a falling object (i.e., weight, air resistance) and how those forces affect the rate of acceleration • Analyze force pairs (i.e., action/reaction forces) when given a scenario (e.g., handball hits concrete wall, shotgun firing) and describe their magnitudes and directions. (Newton's Third Law of Motion)♦	
E. Perpendicular forces act independently of each other • Predict the path of an object when the net force changes♦	
F. Work transfers energy into and out of a mechanical system • Describe the relationships among work, applied net force, and the distance an object moves♦ • Explain how the efficiency of a mechanical system can be expressed as a ratio of work output to work input • Describe power in terms of work and time • Describe and analyze the relationships among force, distance, work, efficiency, and power	
Strand 3: Characteristic and Interactions of Living Organisms	[No CLEs in Physical Science course]
Strand 4: Changes in Ecosystems and Interactions of Organisms with their Environments	[No CLEs in Physical Science course]
Strand 5: Processes and Interactions of the Earth's Systems (Geosphere, Atmosphere, and Hydrosphere)	[No CLEs in Physical Science course]

TABLE 3A

MISSOURI Physical Science Course Level Expectations	EXPLORE Science College Readiness Standards
Strand 6: Composition and Structure of the Universe and the Motion of the Objects Within It	
Big Idea 1. The universe has observable properties and structure	
A.	[No CLEs in Physical Science course]
B. The Earth has a composition and location suitable to sustain life • Explain how Earth's environmental characteristics and location in the universe (e.g., atmosphere, temperature, orbital path, magnetic field, mass-gravity, location in solar system) provide a life-supporting environment	
C. Most of the information we know about the universe comes from the electromagnetic spectrum • Identify information that the electromagnetic spectrum provides about the stars and the universe (e.g., chemical composition, temperature, age of stars, location of black holes, motion of celestial bodies)♦	
Big Idea 2. Regular and predictable motions of objects in the universe can be described and explained as the result of gravitational forces	
A.–B.	[No CLEs in Physical Science course]
C. The regular and predictable motions of a planet and moon relative to the Sun explain natural phenomena, such as day, month, year, shadows, moon phases, eclipses, tides, and seasons • Predict the moon rise/set times, phases of the moon, and/or eclipses when given the relative positions of the moon, planet, and Sun • Explain how the gravitational forces, due to the relative positions of a planet, moon, and Sun, determine the height and frequency of tides	
D. Gravity is a force of attraction between objects in the solar system that governs their motion • Explain orbital motions of moons around planets, and planets around the Sun, as the result of gravitational forces between those objects	

♦ Assessed in MAP End-of-Course Exam

= Measured by EXPLORE Science Test

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TABLE 3A

MISSOURI Physical Science Course Level Expectations	EXPLORE Science College Readiness Standards
Strand 7: Scientific Inquiry	
Big Idea 1. Science understanding is developed through the use of science process skills, scientific knowledge, scientific investigation, reasoning, and critical thinking	
A. Scientific inquiry includes the ability of students to formulate a testable question and explanation, and to select appropriate investigative methods in order to obtain evidence relevant to the explanation • Formulate testable questions and hypotheses • Analyzing an experiment, identify the components (i.e., independent variable, dependent variables, control of constants, multiple trials) and explain their importance to the design of a valid experiment♦ • Design and conduct a valid experiment • Recognize it is not always possible, for practical or ethical reasons, to control some conditions (e.g., when sampling or testing humans, when observing animal behaviors in nature) • Acknowledge some scientific explanations (e.g., explanations of astronomical or meteorological phenomena) cannot be tested using a controlled laboratory experiment, but instead by using a model, due to the limits of the laboratory environment, resources, and/or technologies • Acknowledge there is no fixed procedure called "the scientific method", but that some investigations involve systematic observations, carefully collected and relevant evidence, logical reasoning, and some imagination in developing hypotheses and other explanations • Evaluate the design of an experiment and make suggestions for reasonable improvements♦	**Interpretation of Data:** Select a single piece of data (numerical or nonnumerical) from a simple data presentation (e.g., a table or graph with two or three variables; a food web diagram) Identify basic features of a table, graph, or diagram (e.g., headings, units of measurement, axis labels) Select two or more pieces of data from a simple data presentation Understand basic scientific terminology Find basic information in a brief body of text Determine how the value of one variable changes as the value of another variable changes in a simple data presentation Compare or combine data from a simple data presentation (e.g., order or sum data from a table) Translate information into a table, graph, or diagram **Scientific Investigation:** Understand the methods and tools used in a simple experiment Understand a simple experimental design Identify a control in an experiment Determine the experimental conditions that would produce specified results **Evaluation of Models, Inferences, and Experimental Results:** Select a simple hypothesis, prediction, or conclusion that is supported by a data presentation or a model Identify key issues or assumptions in a model Determine whether given information supports or contradicts a simple hypothesis or conclusion, and why Identify strengths and weaknesses in one or more models Select a data presentation or a model that supports or contradicts a hypothesis, prediction, or conclusion

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MISSOURI Physical Science Course Level Expectations	EXPLORE Science College Readiness Standards
Strand 7: Scientific Inquiry	
Big Idea 1. Science understanding is developed through the use of science process skills, scientific knowledge, scientific investigation, reasoning, and critical thinking	
B. Scientific inquiry relies upon gathering evidence from qualitative and quantitative observations • Make qualitative and quantitative observations using the appropriate senses, tools and equipment to gather data (e.g., microscopes, thermometers, analog and digital meters, computers, spring scales, balances, metric rulers, graduated cylinders) • Measure length to the nearest millimeter, mass to the nearest gram, volume to the nearest milliliter, force (weight) to the nearest Newton, temperature to the nearest degree Celsius, time to the nearest second • Determine the appropriate tools and techniques to collect, analyze, and interpret data • Judge whether measurements and computation of quantities are reasonable • Calculate the range, average/mean, percent, and ratios for sets of data • Recognize observation is biased by the experiences and knowledge of the observer (e.g., strong beliefs about what should happen in particular circumstances can prevent the detection of other results)	**Interpretation of Data:** Select a single piece of data (numerical or nonnumerical) from a simple data presentation (e.g., a table or graph with two or three variables; a food web diagram) Identify basic features of a table, graph, or diagram (e.g., headings, units of measurement, axis labels) Select two or more pieces of data from a simple data presentation Understand basic scientific terminology Find basic information in a brief body of text Determine how the value of one variable changes as the value of another variable changes in a simple data presentation Compare or combine data from a simple data presentation (e.g., order or sum data from a table) Translate information into a table, graph, or diagram Interpolate between data points in a table or graph Identify and/or use a simple (e.g., linear) mathematical relationship between data **Scientific Investigation:** Understand the methods and tools used in a simple experiment Understand a simple experimental design **Evaluation of Models, Inferences, and Experimental Results:** Select a simple hypothesis, prediction, or conclusion that is supported by a data presentation or a model

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MISSOURI Physical Science Course Level Expectations	EXPLORE Science College Readiness Standards
Strand 7: Scientific Inquiry	
Big Idea 1. Science understanding is developed through the use of science process skills, scientific knowledge, scientific investigation, reasoning, and critical thinking	
C. Scientific inquiry includes evaluation of explanations (laws/principles, theories/models) in light of evidence (data) and scientific principles (understandings) • Use quantitative and qualitative data as support for reasonable explanations (conclusions)♦ • Analyze experimental data to determine patterns, relationships, perspectives, and credibility of explanations (e.g., predict/extrapolate data, explain the relationship between the independent and dependent variable)♦ • Identify the possible effects of errors in observations, measurements, and calculations, on the validity and reliability of data and resultant explanations (conclusions) • Analyze whether evidence (data) and scientific principles support proposed explanations (laws/principles, theories/models)♦	**Interpretation of Data:** Select a single piece of data (numerical or nonnumerical) from a simple data presentation (e.g., a table or graph with two or three variables; a food web diagram) Identify basic features of a table, graph, or diagram (e.g., headings, units of measurement, axis labels) Select two or more pieces of data from a simple data presentation Understand basic scientific terminology Find basic information in a brief body of text Determine how the value of one variable changes as the value of another variable changes in a simple data presentation Compare or combine data from a simple data presentation (e.g., order or sum data from a table) Translate information into a table, graph, or diagram Interpolate between data points in a table or graph Identify and/or use a simple (e.g., linear) mathematical relationship between data **Scientific Investigation:** Understand the methods and tools used in a simple experiment Understand a simple experimental design Identify a control in an experiment **Evaluation of Models, Inferences, and Experimental Results:** Select a simple hypothesis, prediction, or conclusion that is supported by a data presentation or a model Identify key issues or assumptions in a model Determine whether given information supports or contradicts a simple hypothesis or conclusion, and why Identify strengths and weaknesses in one or more models Determine which model(s) is(are) supported or weakened by new information Select a data presentation or a model that supports or contradicts a hypothesis, prediction, or conclusion

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MISSOURI Physical Science Course Level Expectations	EXPLORE Science College Readiness Standards
Strand 7: Scientific Inquiry	
Big Idea 1. Science understanding is developed through the use of science process skills, scientific knowledge, scientific investigation, reasoning, and critical thinking	

D. The nature of science relies upon communication of results and justification of explanations
• Communicate the procedures and results of investigations and explanations through:
  • oral presentations
  • drawings and maps
  • data tables (allowing for the recording and analysis of data relevant to the experiment such as independent and dependent variables, multiple trials, beginning and ending times or temperatures, derived quantities)
  • graphs (bar, single, and multiple line)
  • equations and writings
• Communicate and defend a scientific argument
• Explain the importance of the public presentation of scientific work and supporting evidence to the scientific community (e.g., work and evidence must be critiqued, reviewed, and validated by peers; needed for subsequent investigations by peers; results can influence the decisions regarding future scientific work)
	Interpretation of Data:
	Select a single piece of data (numerical or nonnumerical) from a simple data presentation (e.g., a table or graph with two or three variables; a food web diagram)
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	Find basic information in a brief body of text
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	Understand the methods and tools used in a simple experiment
	Understand a simple experimental design
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TABLE 3A

MISSOURI Physical Science Course Level Expectations	EXPLORE Science College Readiness Standards
Strand 8: Impact of Science, Technology and Human Activity	
Big Idea 1. The nature of technology can advance, and is advanced by, science as it seeks to apply scientific knowledge in ways that meet human needs	
A.	[No CLEs in Physical Science course]
B. Advances in technology often result in improved data collection and an increase in scientific information • Recognize the relationships linking technology and science (e.g., how technological problems may create a demand for new science knowledge, how new technologies make it possible for scientists to extend research and advance science)	
Big Idea 2. Historical and cultural perspectives of scientific explanations help to improve understanding of the nature of science and how science knowledge and technology evolve over time	
A. People of different gender and ethnicity have contributed to scientific discoveries and the invention of technological innovations • Recognize contributions to science are not limited to the work of one particular group, but are made by a diverse group of scientists representing various ethnic and gender groups • Recognize gender and ethnicity of scientists often influence the questions asked and/or the methods used in scientific research and may limit or advance science knowledge and/or technology	
B. Scientific theories are developed based on the body of knowledge that exists at any particular time and must be rigorously questioned and tested for validity • Identify and describe how explanations (laws/ principles, theories/models) of scientific phenomena have changed over time as a result of new evidence (e.g., model of the solar system, basic structure of matter, structure of an atom, Big Bang and nebular theory of the Universe) • Identify and analyze current theories that are being questioned, and compare them to new theories that have emerged to challenge older ones (e.g., theories of evolution, extinction, global warming)	**Evaluation of Models, Inferences, and Experimental Results:** Select a simple hypothesis, prediction, or conclusion that is supported by a data presentation or a model Identify key issues or assumptions in a model Determine whether given information supports or contradicts a simple hypothesis or conclusion, and why Identify strengths and weaknesses in one or more models Identify similarities and differences between models Determine which model(s) is(are) supported or weakened by new information Select a data presentation or a model that supports or contradicts a hypothesis, prediction, or conclusion

TABLE 3A

MISSOURI Physical Science Course Level Expectations	EXPLORE Science College Readiness Standards
Strand 8: Impact of Science, Technology and Human Activity	
Big Idea 3. Science and technology affect, and are affected by, society	
A.	[No CLEs in Physical Science course]
B. Social, political, economic, ethical and environmental factors strongly influence, and are influenced by, the direction of progress of science and technology • Identify and describe major scientific and technological challenges to society and their ramifications for public policy (e.g., global warming, limitations to fossil fuels, genetic engineering of plants, space and/or medical research) • Identify and evaluate the drawbacks (e.g., design constraints, unintended consequences, risks) and benefits of technological solutions to a given problem (e.g., use of alternative energies to reduce the use of carbon fuels, use of satellite communications to gather information)	
C.	[No CLEs in Physical Science course]
D. Scientific information is presented through a number of credible sources, but is at times influenced in such a way to become non-credible • Evaluate a given source for its scientific credibility (e.g., articles in a new periodical quoting an "eye witness," a scientist speaking within or outside his/her area of expertise) • Explain why accurate record-keeping, openness, and replication are essential for maintaining an investigator's credibility with other scientists and society	

TABLE 3B

MISSOURI Physical Science Course Level Expectations	PLAN Science College Readiness Standards
Strand 1: Properties and Principles of Matter and Energy	
Big Idea 1. Changes in properties and states of matter provide evidence of the atomic theory of matter	
A. Objects, and the materials they are made of, have properties that can be used to describe and classify them a. Compare the densities of regular and irregular objects using their respective measures of volume and mass♦ b. Identify pure substances by their physical and chemical properties (i.e., color, luster/reflectivity, hardness, conductivity, density, pH, melting point, boiling point, specific heat, solubility, phase at room temperature, chemical reactivity)♦ c. Classify a substance as being made up of one kind of atom (element) or a compound when given the molecular formula or structural formula (introduce electron dot diagram) for the substance d. Compare and contrast the common properties of metals, nonmetals, metalloids (semi-conductors) and noble gases	
B. Properties of mixtures depend upon the concentrations, properties, and interactions of particles a. Compare and contrast the properties of acidic, basic, and neutral solutions	
C.	[No CLEs in Physical Science course]
D. Physical changes in states of matter due to thermal changes in materials can be explained by the Kinetic Theory of Matter a. Using the Kinetic Theory model, explain the changes that occur in the distance between atoms/molecules and temperature of a substance as energy is absorbed or released during a phase change♦ b. Predict the effect of a temperature change on the properties (i.e., pressure, density, volume) of a material (solids, liquids, gases) c. Predict the effect of pressure changes on the properties (i.e., temperature, volume, density) of a material (solids, liquids, gases)	
E. The atomic model describes the electrically neutral atom a. Describe the atom as having a dense, positive nucleus surrounded by a cloud of negative electrons♦ b. Calculate the number of protons, neutrons, and electrons of an element/isotopes given its mass number and atomic number♦ c. Describe the information provided by the atomic number and the mass number (i.e., electrical charge, chemical stability)♦	

TABLE 3B

MISSOURI Physical Science Course Level Expectations	PLAN Science College Readiness Standards
Strand 1: Properties and Principles of Matter and Energy	
Big Idea 1. Changes in properties and states of matter provide evidence of the atomic theory of matter	
F. The periodic table organizes the elements according to their atomic structure and chemical reactivity a. Explain the structure of the periodic table in terms of the elements with common properties (groups/ families) and repeating properties (periods)♦ b. Classify elements as metals, nonmetals, metalloids (semi-conductors), and noble gases according to their location on the Periodic Table♦ c. Predict the chemical reactivity of elements, and the type of bonds that may result between them, using the Periodic Table	
G. Properties of objects and states of matter can change chemically and/or physically a. Distinguish between physical and chemical changes in matter♦	
H. Chemical bonding is the combining of different pure substances (elements, compounds) to form new substances with different properties [NOTE: No a. or b. in source document] c. Describe how the valence electron configuration determines how atoms interact and may bond d. Compare and contrast the types of chemical bonds (i.e., ionic, covalent)	
I. Mass is conserved during any physical or chemical change a. Compare the mass of the reactants to the mass of the products in a chemical reaction or physical change as support for the Law of Conservation of Mass♦	

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TABLE 3B

MISSOURI Physical Science Course Level Expectations	PLAN Science College Readiness Standards
Strand 1: Properties and Principles of Matter and Energy	
Big Idea 2. Energy has a source, can be stored, and can be transferred but is conserved within a system	
A. Forms of energy have a source, a means of transfer (work and heat), and a receiver a. Differentiate between thermal energy (the total internal energy of a substance which is dependent upon mass), heat (thermal energy that transfers from one object or system to another due to a difference in temperature), and temperature (the measure of average kinetic energy of molecules or atoms in a substance) b. Differentiate between the properties and examples of conductors and insulators c. Describe sources and common uses of different forms of energy: chemical, nuclear, thermal, mechanical, electromagnetic♦ d. Identify and evaluate advantages/disadvantages of using various sources of energy (e.g., wind, solar, geothermal, hydroelectric, biomass, fossil fuel) for human activity e. Describe the effect of different frequencies of electromagnetic waves on the Earth and living organisms (e.g., radio, infrared, visible, ultraviolet, gamma, cosmic rays) f. Interpret examples of heat transfer (e.g., home heating, solar panels) as convection, conduction, or radiation	
B. Mechanical energy comes from the motion (kinetic energy) and/or relative position (potential energy) of an object a. Relate kinetic energy to an object's mass and its velocity♦ b. Relate an object's gravitational potential energy to its weight and height relative to the surface of the Earth♦ c. Distinguish between examples of kinetic and potential energy (i.e., gravitational) within a system♦ d. Describe the effect of work on an object's kinetic and potential energy	
C. Electromagnetic energy from the Sun (solar radiation) is a major source of energy on Earth • Identify stars as producers of electromagnetic energy • Describe how electromagnetic energy is transferred through space as electromagnetic waves of varying wavelength and frequency♦	
D.	[No CLEs in Physical Science course]

TABLE 3B

MISSOURI Physical Science Course Level Expectations	PLAN Science College Readiness Standards
Strand 1: Properties and Principles of Matter and Energy	
Big Idea 2. Energy has a source, can be stored, and can be transferred but is conserved within a system	
E. Nuclear energy is a major source of energy throughout the universe • Describe how changes in the nucleus of an atom during a nuclear reaction (i.e., nuclear decay, fusion, fission) result in emission of radiation • Identify the role of nuclear energy as it serves as a source of energy for the Earth, stars, and human activity (e.g., source of electromagnetic radiation, nuclear power plants, fuel for stars)	
F. Energy can be transferred within a system as the total amount of energy remains constant (i.e., Law of Conservation of Energy) • Describe the transfer of energy that occurs as energy changes from kinetic to potential within a system (e.g., car moving on rollercoaster track, child swinging, diver jumping off a board)(Do NOT assess calculations)♦ • Compare the efficiency of systems (recognizing that, as work is done, the amount of usable energy decreases)♦ • Classify the different ways to store energy (i.e., chemical, nuclear, thermal, mechanical, electro-magnetic) and describe the transfer of energy as it changes from kinetic to potential, while the total amount of energy remains constant, within a system (e.g., using gasoline to move a car, photocell generating electricity, electromagnetic motor doing work, energy generated by nuclear reactor)♦	

TABLE 3B

MISSOURI Physical Science Course Level Expectations	PLAN Science College Readiness Standards
Strand 2: Properties and Principles of Force and Motion	
Big Idea 1. The motion of an object is described by its change in position relative to another object or point	
A. The motion of an object is described as a change in position, direction, and speed relative to another object (frame of reference) • Represent and analyze the motion of an object graphically♦ • Analyze the velocity of two objects in terms of distance and time (i.e., verbally, diagrammatically, graphically, mathematically)♦	
B. An object that is accelerating is speeding up, slowing down, or changing direction • Measure and analyze an object's motion in terms of speed, velocity, and acceleration (i.e., verbally, diagrammatically, graphically)♦	
C. Momentum depends on the mass of the object and the velocity with which it is traveling • Compare the momentum of two objects in terms of mass and velocity (Do NOT assess calculations) • Explain that the total momentum remains constant within a system	

TABLE 3B

MISSOURI Physical Science Course Level Expectations	PLAN Science College Readiness Standards
Strand 2: Properties and Principles of Force and Motion	
Big Idea 2. Forces affect motion	
A. Forces are classified as either contact forces (pushes, pulls, friction, buoyancy) or non-contact forces (gravity, magnetism), that can be described in terms of direction and magnitude • Identify and describe the forces acting on an object (i.e., type of force, direction, magnitude in Newtons) using a force diagram (do not assess calculations)♦	
B. Every object exerts a gravitational force on every other object • Describe gravity as an attractive force among all objects • Compare and describe the gravitational forces between two objects in terms of their masses and the distances between them • Describe weight in terms of the force of a planet's or moon's gravity acting on a given mass♦ • Recognize all free falling bodies accelerate at the same rate due to gravity regardless of their mass	
C.	[No CLEs in Physical Science course]
D. Newton's Laws of Motion explain the interaction of mass and forces, and are used to predict changes in motion • Recognize that inertia is a property of matter that can be described as an object's tendency to resist a change in motion, and is dependent upon the object's mass (Newton's First Law of Motion)♦ • Determine the effect (i.e., direction and magnitude) of the sum of the forces acting on an object (i.e., net force)♦ • Using information about net force and mass determine the effect on acceleration (Newton's Second Law of Motion)♦ • Identify forces acting on a falling object (i.e., weight, air resistance) and how those forces affect the rate of acceleration • Analyze force pairs (i.e., action/reaction forces) when given a scenario (e.g., handball hits concrete wall, shotgun firing) and describe their magnitudes and directions. (Newton's Third Law of Motion)♦	
E. Perpendicular forces act independently of each other • Predict the path of an object when the net force changes♦	

TABLE 3B

MISSOURI Physical Science Course Level Expectations	PLAN Science College Readiness Standards
Strand 2: Properties and Principles of Force and Motion	
Big Idea 2. Forces affect motion	
F. Work transfers energy into and out of a mechanical system • Describe the relationships among work, applied net force, and the distance an object moves♦ • Explain how the efficiency of a mechanical system can be expressed as a ratio of work output to work input • Describe power in terms of work and time • Describe and analyze the relationships among force, distance, work, efficiency, and power	
Strand 3: Characteristic and Interactions of Living Organisms	[No CLEs in Physical Science course]
Strand 4: Changes in Ecosystems and Interactions of Organisms with their Environments	[No CLEs in Physical Science course]
Strand 5: Processes and Interactions of the Earth's Systems (Geosphere, Atmosphere, and Hydrosphere)	[No CLEs in Physical Science course]

TABLE 3B

MISSOURI Physical Science Course Level Expectations	PLAN Science College Readiness Standards
Strand 6: Composition and Structure of the Universe and the Motion of the Objects Within It	
Big Idea 1. The universe has observable properties and structure	
A.	[No CLEs in Physical Science course]
B. The Earth has a composition and location suitable to sustain life • Explain how Earth's environmental characteristics and location in the universe (e.g., atmosphere, temperature, orbital path, magnetic field, mass-gravity, location in solar system) provide a life-supporting environment	
C. Most of the information we know about the universe comes from the electromagnetic spectrum • Identify information that the electromagnetic spectrum provides about the stars and the universe (e.g., chemical composition, temperature, age of stars, location of black holes, motion of celestial bodies)♦	
Big Idea 2. Regular and predictable motions of objects in the universe can be described and explained as the result of gravitational forces	
A.–B.	[No CLEs in Physical Science course]
C. The regular and predictable motions of a planet and moon relative to the Sun explain natural phenomena, such as day, month, year, shadows, moon phases, eclipses, tides, and seasons • Predict the moon rise/set times, phases of the moon, and/or eclipses when given the relative positions of the moon, planet, and Sun • Explain how the gravitational forces, due to the relative positions of a planet, moon, and Sun, determine the height and frequency of tides	
D. Gravity is a force of attraction between objects in the solar system that governs their motion • Explain orbital motions of moons around planets, and planets around the Sun, as the result of gravitational forces between those objects	

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	Select two or more pieces of data from a simple data presentation
	Understand basic scientific terminology
	Find basic information in a brief body of text
	Determine how the value of one variable changes as the value of another variable changes in a simple data presentation
	Compare or combine data from a simple data presentation (e.g., order or sum data from a table)
	Translate information into a table, graph, or diagram
	Scientific Investigation:
	Understand the methods and tools used in a simple experiment
	Understand a simple experimental design
	Evaluation of Models, Inferences, and Experimental Results:
	Select a simple hypothesis, prediction, or conclusion that is supported by a data presentation or a model
	Identify key issues or assumptions in a model
	Determine whether given information supports or contradicts a simple hypothesis or conclusion, and why
	Identify strengths and weaknesses in one or more models
	Determine which model(s) is(are) supported or weakened by new information
	Select a data presentation or a model that supports or contradicts a hypothesis, prediction, or conclusion

TABLE 3B

MISSOURI Physical Science Course Level Expectations	PLAN Science College Readiness Standards
Strand 8: Impact of Science, Technology and Human Activity	
Big Idea 1. The nature of technology can advance, and is advanced by, science as it seeks to apply scientific knowledge in ways that meet human needs	
A.	[No CLEs in Physical Science course]
B. Advances in technology often result in improved data collection and an increase in scientific information • Recognize the relationships linking technology and science (e.g., how technological problems may create a demand for new science knowledge, how new technologies make it possible for scientists to extend research and advance science)	
Big Idea 2. Historical and cultural perspectives of scientific explanations help to improve understanding of the nature of science and how science knowledge and technology evolve over time	
A. People of different gender and ethnicity have contributed to scientific discoveries and the invention of technological innovations • Recognize contributions to science are not limited to the work of one particular group, but are made by a diverse group of scientists representing various ethnic and gender groups • Recognize gender and ethnicity of scientists often influence the questions asked and/or the methods used in scientific research and may limit or advance science knowledge and/or technology	
B. Scientific theories are developed based on the body of knowledge that exists at any particular time and must be rigorously questioned and tested for validity • Identify and describe how explanations (laws/ principles, theories/models) of scientific phenomena have changed over time as a result of new evidence (e.g., model of the solar system, basic structure of matter, structure of an atom, Big Bang and nebular theory of the Universe) • Identify and analyze current theories that are being questioned, and compare them to new theories that have emerged to challenge older ones (e.g., theories of evolution, extinction, global warming)	**Evaluation of Models, Inferences, and Experimental Results:** Select a simple hypothesis, prediction, or conclusion that is supported by a data presentation or a model Identify key issues or assumptions in a model Determine whether given information supports or contradicts a simple hypothesis or conclusion, and why Identify strengths and weaknesses in one or more models Identify similarities and differences between models Determine which model(s) is(are) supported or weakened by new information Select a data presentation or a model that supports or contradicts a hypothesis, prediction, or conclusion

TABLE 3B

MISSOURI Physical Science Course Level Expectations	PLAN Science College Readiness Standards
Strand 8: Impact of Science, Technology and Human Activity	
Big Idea 3. Science and technology affect, and are affected by, society	
A.	[No CLEs in Physical Science course]
B. Social, political, economic, ethical and environmental factors strongly influence, and are influenced by, the direction of progress of science and technology • Identify and describe major scientific and technological challenges to society and their ramifications for public policy (e.g., global warming, limitations to fossil fuels, genetic engineering of plants, space and/or medical research) • Identify and evaluate the drawbacks (e.g., design constraints, unintended consequences, risks) and benefits of technological solutions to a given problem (e.g., use of alternative energies to reduce the use of carbon fuels, use of satellite communications to gather information)	
C.	[No CLEs in Physical Science course]
D. Scientific information is presented through a number of credible sources, but is at times influenced in such a way to become non-credible • Evaluate a given source for its scientific credibility (e.g., articles in a new periodical quoting an "eye witness," a scientist speaking within or outside his/her area of expertise) • Explain why accurate record-keeping, openness, and replication are essential for maintaining an investigator's credibility with other scientists and society	

TABLE 3C

MISSOURI Physical Science Course Level Expectations	ACT Science College Readiness Standards
Strand 1: Properties and Principles of Matter and Energy	
Big Idea 1. Changes in properties and states of matter provide evidence of the atomic theory of matter	
A. Objects, and the materials they are made of, have properties that can be used to describe and classify them a. Compare the densities of regular and irregular objects using their respective measures of volume and mass♦ b. Identify pure substances by their physical and chemical properties (i.e., color, luster/reflectivity, hardness, conductivity, density, pH, melting point, boiling point, specific heat, solubility, phase at room temperature, chemical reactivity)♦ c. Classify a substance as being made up of one kind of atom (element) or a compound when given the molecular formula or structural formula (introduce electron dot diagram) for the substance d. Compare and contrast the common properties of metals, nonmetals, metalloids (semi-conductors) and noble gases	
B. Properties of mixtures depend upon the concentrations, properties, and interactions of particles a. Compare and contrast the properties of acidic, basic, and neutral solutions	
C.	[No CLEs in Physical Science course]
D. Physical changes in states of matter due to thermal changes in materials can be explained by the Kinetic Theory of Matter a. Using the Kinetic Theory model, explain the changes that occur in the distance between atoms/molecules and temperature of a substance as energy is absorbed or released during a phase change♦ b. Predict the effect of a temperature change on the properties (i.e., pressure, density, volume) of a material (solids, liquids, gases) c. Predict the effect of pressure changes on the properties (i.e., temperature, volume, density) of a material (solids, liquids, gases)	
E. The atomic model describes the electrically neutral atom a. Describe the atom as having a dense, positive nucleus surrounded by a cloud of negative electrons♦ b. Calculate the number of protons, neutrons, and electrons of an element/isotopes given its mass number and atomic number♦ c. Describe the information provided by the atomic number and the mass number (i.e., electrical charge, chemical stability)♦	

♦ Assessed in MAP End-of-Course Exam

= Measured by ACT Science Test

_____ = Content sampled by ACT Science Test

TABLE 3C

MISSOURI Physical Science Course Level Expectations	ACT Science College Readiness Standards
Strand 1: Properties and Principles of Matter and Energy	
Big Idea 1. Changes in properties and states of matter provide evidence of the atomic theory of matter	
F. The periodic table organizes the elements according to their atomic structure and chemical reactivity a. Explain the structure of the periodic table in terms of the elements with common properties (groups/ families) and repeating properties (periods)♦ b. Classify elements as metals, nonmetals, metalloids (semi-conductors), and noble gases according to their location on the Periodic Table♦ c. Predict the chemical reactivity of elements, and the type of bonds that may result between them, using the Periodic Table	
G. Properties of objects and states of matter can change chemically and/or physically a. Distinguish between physical and chemical changes in matter♦	
H. Chemical bonding is the combining of different pure substances (elements, compounds) to form new substances with different properties [NOTE: No a. or b. in source document] c. Describe how the valence electron configuration determines how atoms interact and may bond d. Compare and contrast the types of chemical bonds (i.e., ionic, covalent)	
I. Mass is conserved during any physical or chemical change a. Compare the mass of the reactants to the mass of the products in a chemical reaction or physical change as support for the Law of Conservation of Mass♦	

TABLE 3C

MISSOURI Physical Science Course Level Expectations	ACT Science College Readiness Standards
Strand 1: Properties and Principles of Matter and Energy	
Big Idea 2. Energy has a source, can be stored, and can be transferred but is conserved within a system	
A. Forms of energy have a source, a means of transfer (work and heat), and a receiver a. Differentiate between thermal energy (the total internal energy of a substance which is dependent upon mass), heat (thermal energy that transfers from one object or system to another due to a difference in temperature), and temperature (the measure of average kinetic energy of molecules or atoms in a substance) b. Differentiate between the properties and examples of conductors and insulators c. Describe sources and common uses of different forms of energy: chemical, nuclear, thermal, mechanical, electromagnetic♦ d. Identify and evaluate advantages/disadvantages of using various sources of energy (e.g., wind, solar, geothermal, hydroelectric, biomass, fossil fuel) for human activity e. Describe the effect of different frequencies of electromagnetic waves on the Earth and living organisms (e.g., radio, infrared, visible, ultraviolet, gamma, cosmic rays) f. Interpret examples of heat transfer (e.g., home heating, solar panels) as convection, conduction, or radiation	
B. Mechanical energy comes from the motion (kinetic energy) and/or relative position (potential energy) of an object a. Relate kinetic energy to an object's mass and its velocity♦ b. Relate an object's gravitational potential energy to its weight and height relative to the surface of the Earth♦ c. Distinguish between examples of kinetic and potential energy (i.e., gravitational) within a system♦ d. Describe the effect of work on an object's kinetic and potential energy	
C. Electromagnetic energy from the Sun (solar radiation) is a major source of energy on Earth • Identify stars as producers of electromagnetic energy • Describe how electromagnetic energy is transferred through space as electromagnetic waves of varying wavelength and frequency♦	
D.	[No CLEs in Physical Science course]

TABLE 3C

MISSOURI Physical Science Course Level Expectations	ACT Science College Readiness Standards
Strand 1: Properties and Principles of Matter and Energy	
Big Idea 2. Energy has a source, can be stored, and can be transferred but is conserved within a system	
E. Nuclear energy is a major source of energy throughout the universe • Describe how changes in the nucleus of an atom during a nuclear reaction (i.e., nuclear decay, fusion, fission) result in emission of radiation • Identify the role of nuclear energy as it serves as a source of energy for the Earth, stars, and human activity (e.g., source of electromagnetic radiation, nuclear power plants, fuel for stars)	
F. Energy can be transferred within a system as the total amount of energy remains constant (i.e., Law of Conservation of Energy) • Describe the transfer of energy that occurs as energy changes from kinetic to potential within a system (e.g., car moving on rollercoaster track, child swinging, diver jumping off a board)(Do NOT assess calculations)♦ • Compare the efficiency of systems (recognizing that, as work is done, the amount of usable energy decreases)♦ • Classify the different ways to store energy (i.e., chemical, nuclear, thermal, mechanical, electro-magnetic) and describe the transfer of energy as it changes from kinetic to potential, while the total amount of energy remains constant, within a system (e.g., using gasoline to move a car, photocell generating electricity, electromagnetic motor doing work, energy generated by nuclear reactor)♦	

TABLE 3C

MISSOURI Physical Science Course Level Expectations	ACT Science College Readiness Standards
Strand 2: Properties and Principles of Force and Motion	
Big Idea 1. The motion of an object is described by its change in position relative to another object or point	
A. The motion of an object is described as a change in position, direction, and speed relative to another object (frame of reference) • Represent and analyze the motion of an object graphically♦ • Analyze the velocity of two objects in terms of distance and time (i.e., verbally, diagrammatically, graphically, mathematically)♦	
B. An object that is accelerating is speeding up, slowing down, or changing direction • Measure and analyze an object's motion in terms of speed, velocity, and acceleration (i.e., verbally, diagrammatically, graphically)♦	
C. Momentum depends on the mass of the object and the velocity with which it is traveling • Compare the momentum of two objects in terms of mass and velocity (Do NOT assess calculations) • Explain that the total momentum remains constant within a system	

TABLE 3C

MISSOURI Physical Science Course Level Expectations	ACT Science College Readiness Standards
Strand 2: Properties and Principles of Force and Motion	
Big Idea 2. Forces affect motion	
A. Forces are classified as either contact forces (pushes, pulls, friction, buoyancy) or non-contact forces (gravity, magnetism), that can be described in terms of direction and magnitude • Identify and describe the forces acting on an object (i.e., type of force, direction, magnitude in Newtons) using a force diagram (do not assess calculations)♦	
B. Every object exerts a gravitational force on every other object • Describe gravity as an attractive force among all objects • Compare and describe the gravitational forces between two objects in terms of their masses and the distances between them • Describe weight in terms of the force of a planet's or moon's gravity acting on a given mass♦ • Recognize all free falling bodies accelerate at the same rate due to gravity regardless of their mass	
C.	[No CLEs in Physical Science course]
D. Newton's Laws of Motion explain the interaction of mass and forces, and are used to predict changes in motion • Recognize that inertia is a property of matter that can be described as an object's tendency to resist a change in motion, and is dependent upon the object's mass (Newton's First Law of Motion)♦ • Determine the effect (i.e., direction and magnitude) of the sum of the forces acting on an object (i.e., net force)♦ • Using information about net force and mass determine the effect on acceleration (Newton's Second Law of Motion)♦ • Identify forces acting on a falling object (i.e., weight, air resistance) and how those forces affect the rate of acceleration • Analyze force pairs (i.e., action/reaction forces) when given a scenario (e.g., handball hits concrete wall, shotgun firing) and describe their magnitudes and directions. (Newton's Third Law of Motion)♦	
E. Perpendicular forces act independently of each other • Predict the path of an object when the net force changes♦	

TABLE 3C

MISSOURI Physical Science Course Level Expectations	ACT Science College Readiness Standards
Strand 2: Properties and Principles of Force and Motion	
Big Idea 2. Forces affect motion	
F. Work transfers energy into and out of a mechanical system • Describe the relationships among work, applied net force, and the distance an object moves♦ • Explain how the efficiency of a mechanical system can be expressed as a ratio of work output to work input • Describe power in terms of work and time • Describe and analyze the relationships among force, distance, work, efficiency, and power	
Strand 3: Characteristic and Interactions of Living Organisms	[No CLEs in Physical Science course]
Strand 4: Changes in Ecosystems and Interactions of Organisms with their Environments	[No CLEs in Physical Science course]
Strand 5: Processes and Interactions of the Earth's Systems (Geosphere, Atmosphere, and Hydrosphere)	[No CLEs in Physical Science course]

TABLE 3C

MISSOURI Physical Science Course Level Expectations	ACT Science College Readiness Standards
Strand 6: Composition and Structure of the Universe and the Motion of the Objects Within It	
Big Idea 1. The universe has observable properties and structure	
A.	[No CLEs in Physical Science course]
B. The Earth has a composition and location suitable to sustain life • Explain how Earth's environmental characteristics and location in the universe (e.g., atmosphere, temperature, orbital path, magnetic field, mass-gravity, location in solar system) provide a life-supporting environment	
C. Most of the information we know about the universe comes from the electromagnetic spectrum • Identify information that the electromagnetic spectrum provides about the stars and the universe (e.g., chemical composition, temperature, age of stars, location of black holes, motion of celestial bodies)♦	
Big Idea 2. Regular and predictable motions of objects in the universe can be described and explained as the result of gravitational forces	
A.–B.	[No CLEs in Physical Science course]
C. The regular and predictable motions of a planet and moon relative to the Sun explain natural phenomena, such as day, month, year, shadows, moon phases, eclipses, tides, and seasons • Predict the moon rise/set times, phases of the moon, and/or eclipses when given the relative positions of the moon, planet, and Sun • Explain how the gravitational forces, due to the relative positions of a planet, moon, and Sun, determine the height and frequency of tides	
D. Gravity is a force of attraction between objects in the solar system that governs their motion • Explain orbital motions of moons around planets, and planets around the Sun, as the result of gravitational forces between those objects	

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TABLE 3C

MISSOURI Physical Science Course Level Expectations	ACT Science College Readiness Standards
Strand 7: Scientific Inquiry	
Big Idea 1. Science understanding is developed through the use of science process skills, scientific knowledge, scientific investigation, reasoning, and critical thinking	
A. Scientific inquiry includes the ability of students to formulate a testable question and explanation, and to select appropriate investigative methods in order to obtain evidence relevant to the explanation • Formulate testable questions and hypotheses • Analyzing an experiment, identify the components (i.e., independent variable, dependent variables, control of constants, multiple trials) and explain their importance to the design of a valid experiment♦ • Design and conduct a valid experiment • Recognize it is not always possible, for practical or ethical reasons, to control some conditions (e.g., when sampling or testing humans, when observing animal behaviors in nature) • Acknowledge some scientific explanations (e.g., explanations of astronomical or meteorological phenomena) cannot be tested using a controlled laboratory experiment, but instead by using a model, due to the limits of the laboratory environment, resources, and/or technologies • Acknowledge there is no fixed procedure called "the scientific method", but that some investigations involve systematic observations, carefully collected and relevant evidence, logical reasoning, and some imagination in developing hypotheses and other explanations • Evaluate the design of an experiment and make suggestions for reasonable improvements♦	**Interpretation of Data:** Select a single piece of data (numerical or nonnumerical) from a simple data presentation (e.g., a table or graph with two or three variables; a food web diagram) Identify basic features of a table, graph, or diagram (e.g., headings, units of measurement, axis labels) Select two or more pieces of data from a simple data presentation Understand basic scientific terminology Find basic information in a brief body of text Determine how the value of one variable changes as the value of another variable changes in a simple data presentation Compare or combine data from a simple data presentation (e.g., order or sum data from a table) Translate information into a table, graph, or diagram **Scientific Investigation:** Understand the methods and tools used in a simple experiment Understand a simple experimental design Identify a control in an experiment Determine the experimental conditions that would produce specified results Determine the hypothesis for an experiment Identify an alternate method for testing a hypothesis **Evaluation of Models, Inferences, and Experimental Results:** Select a simple hypothesis, prediction, or conclusion that is supported by a data presentation or a model Identify key issues or assumptions in a model Determine whether given information supports or contradicts a simple hypothesis or conclusion, and why Identify strengths and weaknesses in one or more models Select a data presentation or a model that supports or contradicts a hypothesis, prediction, or conclusion

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TABLE 3C

MISSOURI Physical Science Course Level Expectations	ACT Science College Readiness Standards
Strand 7: Scientific Inquiry	
Big Idea 1. Science understanding is developed through the use of science process skills, scientific knowledge, scientific investigation, reasoning, and critical thinking	
B. Scientific inquiry relies upon gathering evidence from qualitative and quantitative observations • Make qualitative and quantitative observations using the appropriate senses, tools and equipment to gather data (e.g., microscopes, thermometers, analog and digital meters, computers, spring scales, balances, metric rulers, graduated cylinders) • Measure length to the nearest millimeter, mass to the nearest gram, volume to the nearest milliliter, force (weight) to the nearest Newton, temperature to the nearest degree Celsius, time to the nearest second • Determine the appropriate tools and techniques to collect, analyze, and interpret data • Judge whether measurements and computation of quantities are reasonable • Calculate the range, average/mean, percent, and ratios for sets of data • Recognize observation is biased by the experiences and knowledge of the observer (e.g., strong beliefs about what should happen in particular circumstances can prevent the detection of other results)	**Interpretation of Data:** Select a single piece of data (numerical or nonnumerical) from a simple data presentation (e.g., a table or graph with two or three variables; a food web diagram) Identify basic features of a table, graph, or diagram (e.g., headings, units of measurement, axis labels) Select two or more pieces of data from a simple data presentation Understand basic scientific terminology Find basic information in a brief body of text Determine how the value of one variable changes as the value of another variable changes in a simple data presentation Compare or combine data from a simple data presentation (e.g., order or sum data from a table) Translate information into a table, graph, or diagram Interpolate between data points in a table or graph Identify and/or use a simple (e.g., linear) mathematical relationship between data **Scientific Investigation:** Understand the methods and tools used in a simple experiment Understand a simple experimental design Understand precision and accuracy issues **Evaluation of Models, Inferences, and Experimental Results:** Select a simple hypothesis, prediction, or conclusion that is supported by a data presentation or a model

TABLE 3C

MISSOURI Physical Science Course Level Expectations	ACT Science College Readiness Standards
Strand 7: Scientific Inquiry	
Big Idea 1. Science understanding is developed through the use of science process skills, scientific knowledge, scientific investigation, reasoning, and critical thinking	
C. Scientific inquiry includes evaluation of explanations (laws/principles, theories/models) in light of evidence (data) and scientific principles (understandings) • Use quantitative and qualitative data as support for reasonable explanations (conclusions)♦ • Analyze experimental data to determine patterns, relationships, perspectives, and credibility of explanations (e.g., predict/extrapolate data, explain the relationship between the independent and dependent variable)♦ • Identify the possible effects of errors in observations, measurements, and calculations, on the validity and reliability of data and resultant explanations (conclusions) • Analyze whether evidence (data) and scientific principles support proposed explanations (laws/principles, theories/models)♦	**Interpretation of Data:** Select a single piece of data (numerical or nonnumerical) from a simple data presentation (e.g., a table or graph with two or three variables; a food web diagram) Identify basic features of a table, graph, or diagram (e.g., headings, units of measurement, axis labels) Select two or more pieces of data from a simple data presentation Understand basic scientific terminology Find basic information in a brief body of text Determine how the value of one variable changes as the value of another variable changes in a simple data presentation Compare or combine data from a simple data presentation (e.g., order or sum data from a table) Translate information into a table, graph, or diagram Interpolate between data points in a table or graph Identify and/or use a simple (e.g., linear) mathematical relationship between data Extrapolate from data points in a table or graph **Scientific Investigation:** Understand the methods and tools used in a simple experiment Understand a simple experimental design Identify a control in an experiment Understand precision and accuracy issues **Evaluation of Models, Inferences, and Experimental Results:** Select a simple hypothesis, prediction, or conclusion that is supported by a data presentation or a model Identify key issues or assumptions in a model Determine whether given information supports or contradicts a simple hypothesis or conclusion, and why Identify strengths and weaknesses in one or more models Determine which model(s) is(are) supported or weakened by new information Select a data presentation or a model that supports or contradicts a hypothesis, prediction, or conclusion

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TABLE 3C

MISSOURI Physical Science Course Level Expectations	ACT Science College Readiness Standards
Strand 7: Scientific Inquiry	
Big Idea 1. Science understanding is developed through the use of science process skills, scientific knowledge, scientific investigation, reasoning, and critical thinking	

D. The nature of science relies upon communication of results and justification of explanations
• Communicate the procedures and results of investigations and explanations through:
  • oral presentations
  • drawings and maps
  • data tables (allowing for the recording and analysis of data relevant to the experiment such as independent and dependent variables, multiple trials, beginning and ending times or temperatures, derived quantities)
  • graphs (bar, single, and multiple line)
  • equations and writings
• Communicate and defend a scientific argument
• Explain the importance of the public presentation of scientific work and supporting evidence to the scientific community (e.g., work and evidence must be critiqued, reviewed, and validated by peers; needed for subsequent investigations by peers; results can influence the decisions regarding future scientific work)
	Interpretation of Data:
	Select a single piece of data (numerical or nonnumerical) from a simple data presentation (e.g., a table or graph with two or three variables; a food web diagram)
	Identify basic features of a table, graph, or diagram (e.g., headings, units of measurement, axis labels)
	Select two or more pieces of data from a simple data presentation
	Understand basic scientific terminology
	Find basic information in a brief body of text
	Determine how the value of one variable changes as the value of another variable changes in a simple data presentation
	Compare or combine data from a simple data presentation (e.g., order or sum data from a table)
	Translate information into a table, graph, or diagram
	Scientific Investigation:
	Understand the methods and tools used in a simple experiment
	Understand a simple experimental design
	Evaluation of Models, Inferences, and Experimental Results:
	Select a simple hypothesis, prediction, or conclusion that is supported by a data presentation or a model
	Identify key issues or assumptions in a model
	Determine whether given information supports or contradicts a simple hypothesis or conclusion, and why
	Identify strengths and weaknesses in one or more models
	Determine which model(s) is(are) supported or weakened by new information
	Select a data presentation or a model that supports or contradicts a hypothesis, prediction, or conclusion

TABLE 3C

MISSOURI Physical Science Course Level Expectations	ACT Science College Readiness Standards
Strand 8: Impact of Science, Technology and Human Activity	
Big Idea 1. The nature of technology can advance, and is advanced by, science as it seeks to apply scientific knowledge in ways that meet human needs	
A.	[No CLEs in Physical Science course]
B. Advances in technology often result in improved data collection and an increase in scientific information • Recognize the relationships linking technology and science (e.g., how technological problems may create a demand for new science knowledge, how new technologies make it possible for scientists to extend research and advance science)	
Big Idea 2. Historical and cultural perspectives of scientific explanations help to improve understanding of the nature of science and how science knowledge and technology evolve over time	
A. People of different gender and ethnicity have contributed to scientific discoveries and the invention of technological innovations • Recognize contributions to science are not limited to the work of one particular group, but are made by a diverse group of scientists representing various ethnic and gender groups • Recognize gender and ethnicity of scientists often influence the questions asked and/or the methods used in scientific research and may limit or advance science knowledge and/or technology	
B. Scientific theories are developed based on the body of knowledge that exists at any particular time and must be rigorously questioned and tested for validity • Identify and describe how explanations (laws/ principles, theories/models) of scientific phenomena have changed over time as a result of new evidence (e.g., model of the solar system, basic structure of matter, structure of an atom, Big Bang and nebular theory of the Universe) • Identify and analyze current theories that are being questioned, and compare them to new theories that have emerged to challenge older ones (e.g., theories of evolution, extinction, global warming)	**Evaluation of Models, Inferences, and Experimental Results:** Select a simple hypothesis, prediction, or conclusion that is supported by a data presentation or a model Identify key issues or assumptions in a model Determine whether given information supports or contradicts a simple hypothesis or conclusion, and why Identify strengths and weaknesses in one or more models Identify similarities and differences between models Determine which model(s) is(are) supported or weakened by new information Select a data presentation or a model that supports or contradicts a hypothesis, prediction, or conclusion

TABLE 3C

MISSOURI Physical Science Course Level Expectations	ACT Science College Readiness Standards
Strand 8: Impact of Science, Technology and Human Activity	
Big Idea 3. Science and technology affect, and are affected by, society	
A.	[No CLEs in Physical Science course]
B. Social, political, economic, ethical and environmental factors strongly influence, and are influenced by, the direction of progress of science and technology • Identify and describe major scientific and technological challenges to society and their ramifications for public policy (e.g., global warming, limitations to fossil fuels, genetic engineering of plants, space and/or medical research) • Identify and evaluate the drawbacks (e.g., design constraints, unintended consequences, risks) and benefits of technological solutions to a given problem (e.g., use of alternative energies to reduce the use of carbon fuels, use of satellite communications to gather information)	
C.	[No CLEs in Physical Science course]
D. Scientific information is presented through a number of credible sources, but is at times influenced in such a way to become non-credible • Evaluate a given source for its scientific credibility (e.g., articles in a new periodical quoting an "eye witness," a scientist speaking within or outside his/her area of expertise) • Explain why accurate record-keeping, openness, and replication are essential for maintaining an investigator's credibility with other scientists and society	

TABLE 3D

MISSOURI Earth & Space Science Course Level Expectations	EXPLORE Science College Readiness Standards
Strand 1: Properties and Principles of Matter and Energy	
Big Idea 1. Changes in properties and states of matter provide evidence of the atomic theory of matter	
A. Objects, and the materials they are made of, have properties that can be used to describe and classify them a. Compare the densities of regular and irregular objects using their respective measures of volume and mass b. Identify pure substances(e.g., minerals, water, atmospheric gases) by their physical and chemical properties (i.e., color, luster/reflectivity, hardness, cleavage, fracture, conductivity, density, pH, melting point, boiling point, specific heat, solubility, phase at room temperature, chemical reactivity)	
B. Properties of mixtures depend upon the concentrations, properties, and interactions of particles a. Compare and contrast the properties of acidic, basic, and neutral solutions b. Predict the effects of solvent and solute polarity on solubility ("like dissolves like"); and predict the effects of temperature, surface area, particle size, and agitation on rates of solubility	
C.	[No CLEs in Earth & Space Science course]
D. Physical changes in states of matter due to thermal changes in materials can be explained by the Kinetic Theory of Matter a. Using the Kinetic Theory model, explain the changes that occur in the distance between atoms/molecules and temperature of a substance as energy is absorbed or released during a phase change b. Predict the effect of a temperature change on the properties (e.g., pressure, density) of earth materials (i.e., rock, water, air) c. Predict the effect of pressure changes on the properties (e.g., temperature, density) of earth materials (i.e., rock, water, air)	
E.–G.	[No CLEs in Earth & Space Science course]
H. Chemical bonding is the combining of different pure substances (elements, compounds) to form new substances with different properties a. Compare and contrast the types of chemical bonds (i.e., ionic, covalent) as they relate to mineralization, changes in rock type within the rock cycle, formation of pollutant molecules (e.g., acid rain, ozone) b. Predict the products of an acid/base (neutralization), oxidation (rusting), and combustion (burning) reaction as it may occur in the geosphere, hydrosphere, or atmosphere	

TABLE 3D

MISSOURI Earth & Space Science Course Level Expectations	EXPLORE Science College Readiness Standards
Strand 1: Properties and Principles of Matter and Energy	
Big Idea 1. Changes in properties and states of matter provide evidence of the atomic theory of matter	
I. Mass is conserved during any physical or chemical change a. Compare the mass of the reactants to the mass of the products in a chemical reaction or physical change (e.g., cycling of minerals within rock cycle, process of erosion/weathering, carbon dioxide-oxygen cycle, nitrogen cycle, water cycle, nuclear reaction) as support for the Law of Conservation of Mass♦	

TABLE 3D

MISSOURI Earth & Space Science Course Level Expectations	EXPLORE Science College Readiness Standards
Strand 1: Properties and Principles of Matter and Energy	
Big Idea 2. Energy has a source, can be stored, and can be transferred but is conserved within a system	
A. Forms of energy have a source, a means of transfer (work and heat), and a receiver a. Describe the relationship among wavelength, energy, and frequency as illustrated by the electromagnetic spectrum b. Describe sources and common uses of different forms of energy: chemical, nuclear, thermal, electromagnetic , mechanical (as transferred by moving objects, including rock, water, wind, waves) c. Identify and evaluate advantages/disadvantages of using various sources of energy (e.g., wind, solar, geothermal, hydroelectric, biomass, fossil fuel, electromagnetic radiation) for human activity♦ d. Describe the effect of different frequencies of electromagnetic waves on the Earth and living organisms (e.g., radio, infrared, visible, ultraviolet, gamma, cosmic rays) e. Interpret examples (e.g., land and sea breezes, plate tectonics) of heat transfer as convection, conduction, or radiation	
B.	[No CLEs in Earth & Space Science course]
C. Electromagnetic energy from the Sun (solar radiation) is a major source of energy on Earth • Identify stars as producers of electromagnetic energy • Describe how electromagnetic energy is transferred through space as electromagnetic waves of varying wavelength and frequency	
D.	[No CLEs in Earth & Space Science course]
E. Nuclear energy is a major source of energy throughout the universe • Describe how changes in the nucleus of an atom during a nuclear reaction (i.e., nuclear decay, fusion, fission) result in emission of radiation • Identify the role of nuclear energy as it serves as a source of energy for the Earth, stars, and human activity (e.g., source of electromagnetic radiation, thermal energy within mantle, nuclear power plants, fuel for stars)	

TABLE 3D

MISSOURI Earth & Space Science Course Level Expectations	EXPLORE Science College Readiness Standards
Strand 1: Properties and Principles of Matter and Energy	
Big Idea 2. Energy has a source, can be stored, and can be transferred but is conserved within a system	
F. Energy can be transferred within a system as the total amount of energy remains constant (i.e., Law of Conservation of Energy) • Classify the different ways to store energy (i.e., chemical, nuclear, thermal, mechanical, electro-agetic) and describe the transfer of energy as it changes from kinetic to potential, while the total amount of energy remains constant, within a system (e.g., process of erosion/weathering, cycling of minerals within rock cycle, carbon dioxide-oxygen cycle, nitrogen cycle, water cycle, nuclear reaction)♦	

TABLE 3D

MISSOURI Earth & Space Science Course Level Expectations	EXPLORE Science College Readiness Standards
Strand 2: Properties and Principles of Force and Motion	
Big Idea 1.	[No CLEs in Earth & Space Science course]
Big Idea 2. Forces affect motion	
A.	[No CLEs in Earth & Space Science course]
B. Every object exerts a gravitational force on every other object • Compare and describe the gravitational forces between two objects in terms of their masses and the distances between them	
C.–F.	[No CLEs in Earth & Space Science course]
Strand 3: Characteristic and Interactions of Living Organisms	[No CLEs in Earth & Space Science course]
Strand 4: Changes in Ecosystems and Interactions of Organisms with their Environments	
Big Idea 1. Organisms are interdependent with one another and with their environment	
A.–B.	[No CLEs in Earth & Space Science course]
C. All organisms, including humans, and their activities cause changes in their environment that affect the ecosystem • Predict and explain how natural or human caused changes (biological, chemical and/or physical) in one ecosystem may affect other ecosystems due to natural mechanisms (e.g., global wind patterns, water cycle, ocean currents)	
D.	[No CLEs in Earth & Space Science course]
Big Idea 2. Matter and energy flow through the ecosystem	
A.	[No CLEs in Earth & Space Science course]
B. Matter is recycled through an ecosystem • Explain the processes involved in the recycling of nitrogen, oxygen, and carbon through an ecosystem • Explain the importance of the recycling of nitrogen, oxygen, and carbon within an ecosystem	
Big Idea 3.	[No CLEs in Earth & Space Science course]

TABLE 3D

MISSOURI Earth & Space Science Course Level Expectations	EXPLORE Science College Readiness Standards
Strand 5: Processes and Interactions of the Earth's Systems (Geosphere, Atmosphere, and Hydrosphere)	
Big Idea 1. Earth's Systems (geosphere, atmosphere, and hydrosphere) have common components and unique structures	
A. The Earth's crust is composed of various materials, including soil, minerals, and rocks, with characteristic properties • Classify minerals (rock-forming and ore) based on physical and chemical properties (e.g., color, streak, luster/reflectivity, hardness, cleavage, fracture, conductivity, density, melting point, boiling point, solubility, pH, chemical reactivity) • Classify common igneous, metamorphic, and/or sedimentary rocks based on physical and chemical properties (e.g., mineral composition, texture, density, and other unique properties) • Classify earth materials as minerals, rocks, and soils by comparing and contrasting their components, unique properties, and the processes which formed them♦	
B. The hydrosphere is composed of water (a material with unique properties) and other materials • Recognize the importance of water as a solvent in the environment as it relates to karst geology (dissolution and mineralization), acid rain, water pollution, erosion and deposition of rock and soil materials♦	
C. The atmosphere (air) is composed of a mixture of gases, including water vapor, and minute particles • Relate the composition of gases and temperature of the layers of the atmosphere (i.e., troposphere, stratosphere, ionosphere) to cloud formation and transmission of radiation (e.g., ultraviolet, infrared)♦ • Describe the causes and consequences of observed and predicted changes in the ozone layer♦	

TABLE 3D

MISSOURI Earth & Space Science Course Level Expectations	EXPLORE Science College Readiness Standards
Strand 5: Processes and Interactions of the Earth's Systems (Geosphere, Atmosphere, and Hydrosphere)	
Big Idea 2. Earth's Systems (geosphere, atmosphere, and hydrosphere) interact with one another as they undergo change by common processes	
A. The Earth's materials and surface features are changed through a variety of external processes • Explain the external processes (i.e., weathering, erosion, deposition of sediment) that result in the formation and modification of landforms♦ • Describe the factors that affect rates of weathering and erosion of landforms (e.g., soil/rock type, amount and force of run-off, slope)♦	
B. There are internal processes and sources of energy within the geosphere that cause changes in Earth's crustal plates • Describe the internal source of energy on Earth that results in uneven heating of the mantle (i.e., decay of radioactive isotopes) • Illustrate and explain the convection currents that result from the uneven heating inside the mantle and cause movement of crustal plates • Describe how the energy of an earthquake travels as seismic waves and provides evidence for the layers of the geosphere • Relate the densities of the materials found in continental and oceanic plates to the processes that result in each type of plate boundary (i.e., diverging, converging, transform) • Describe the effects of the movement of crustal plates (i.e., earthquakes, sea floor spreading, mountain building, volcanic eruptions) at a given location on the planet♦ • Articulate the processes involved in the Theory of Plate Tectonics (i.e., uneven heating of the mantle due to the decay of radioactive isotopes, movement of materials via convection currents, movement of continental and oceanic plates along diverging, converging, or transform plate boundaries) and describe evidence that supports that theory (e.g., correlation of rock sequences, landforms, and fossils; presence of intrusions and faults; evidence of sea-floor spreading)♦	
C. Continual changes in Earth's materials and surface that result from internal and external processes is described by the rock cycle • Describe the rock cycle as it relates to the origin and transformation of rock types (i.e., igneous, metamorphic, and sedimentary)♦	

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TABLE 3D

MISSOURI Earth & Space Science Course Level Expectations	EXPLORE Science College Readiness Standards
Strand 5: Processes and Interactions of the Earth's Systems (Geosphere, Atmosphere, and Hydrosphere)	
Big Idea 2. Earth's Systems (geosphere, atmosphere, and hydrosphere) interact with one another as they undergo change by common processes	
D. Changes in the Earth over time can be inferred through rock and fossil evidence • Use evidence from relative and real dating techniques (e.g., correlation of trace fossils, landforms, and rock sequences; evidence of climate changes; presence of intrusions and faults; magnetic orientation; relative age of drill samples) to infer geologic history♦	
E.	[No CLEs in Earth & Space Science course]
F. Climate is a description of average weather conditions in a given area due to the transfer of energy and matter through Earth's systems • Predict the weather (patterns of change in the atmosphere) at a designated location using weather maps (including map legends) and/or weather data (e.g., temperature, barometric pressure, cloud cover and type, wind speed and direction, precipitation)♦ • Explain how global wind and ocean currents are produced on the Earth's surface (e.g., effects of unequal heating of the Earth's land masses, oceans, and air by the Sun due to latitude and surface material type; effects of gravitational forces acting on layers of air of different densities due to temperature differences; effects of the rotation of the Earth; effects of surface topography)♦ • Describe the effects of natural phenomena (e.g., burning organic material, volcanic eruptions, lightning, changes in global wind and ocean currents) on the properties of the atmosphere • Explain how climate and weather patterns in a particular region are affected by factors such as proximity to large bodies of water or ice/ocean currents, latitude, altitude, wind and ocean currents, amount of solar radiation, changes in the atmosphere due to natural phenomena (e.g., burning organic material, volcanic eruptions)♦ • Provide evidence (e.g., fossils, desertification, variation in sea level, glaciations, and permafrost layers) that supports theories of climate change due to natural phenomena and/or human interactions with the environment♦	

TABLE 3D

MISSOURI Earth & Space Science Course Level Expectations	EXPLORE Science College Readiness Standards
Strand 5: Processes and Interactions of the Earth's Systems (Geosphere, Atmosphere, and Hydrosphere)	
Big Idea 3. Human activity is dependent upon and affects Earth's resources and systems	
A. Earth's materials are limited natural resources affected by human activity • Recognize the limited availability of some energy resources (i.e., solar radiation, wind, fossil fuels) and major mineral deposits in the United States (e.g., lead, petroleum, coal, copper, zinc, iron, gravel, aluminum) and the factors that affect their availability♦ • Identify human activities that may adversely affect the composition of the atmosphere, hydrosphere, or geosphere • Predict local and/or global effects of environmental changes when given a scenario describing how the composition of the geosphere, hydrosphere, or atmosphere is altered by natural phenomena or human activities♦ • Recognize how the geomorphology of Missouri (i.e., different types of Missouri soil and rock materials such as limestone, granite, clay, loam; land formations such as karst (cave) formations, glaciated plains, river channels) affects the survival of organisms and the development of land use by humans (e.g., agriculture, recreation, planning and zoning, waste management)♦ • Recognize the economic, political, social, and ethical constraints associated with obtaining and using natural resources (e.g., mining and use of different types of Missouri mineral resources such as lead mining, gravel dredging, strip mining, coal burning, production of fertilizers and explosives; use of fossil fuels versus renewable resources)	

TABLE 3D

MISSOURI Earth & Space Science Course Level Expectations	EXPLORE Science College Readiness Standards
Strand 6: Composition and Structure of the Universe and the Motion of the Objects Within It	
Big Idea 1. The universe has observable properties and structure	
A. The Earth, Sun, and moon are part of a larger system that includes other planets and smaller celestial bodies • Describe and relate the positions and motions of the Sun-Earth solar system, the Milky-Way galaxy, and other galaxies within the universe (i.e., it is just one of several solar systems orbiting the center of a rotating spiral galaxy; that spiral galaxy is just one of many galaxies which orbit a common center of gravity; the expanding universe causes the distance between galaxies to increase)♦	
B. The Earth has a composition and location suitable to sustain life • Explain how Earth's environmental characteristics and location in the universe (e.g., atmosphere, temperature, orbital path, magnetic field, mass-gravity, location in solar system) provide a life-supporting environment • Compare the environmental characteristics and location in the universe of Earth and other celestial bodies (e.g., planets, moons) to determine ability to support life♦	
C. Most of the information we know about the universe comes from the electromagnetic spectrum • Identify information that the electromagnetic spectrum provides about the stars and the universe (e.g., chemical composition, temperature, age of stars, location of black holes, motion of celestial bodies) • Evaluate the advantages/ disadvantages of using different tools (e.g., spectroscope, different types of telescopes, probes) to gather information about the universe (e.g., background radiation, magnetic fields, discovery of previously unknown celestial bodies)	

TABLE 3D

MISSOURI Earth & Space Science Course Level Expectations	EXPLORE Science College Readiness Standards
Strand 6: Composition and Structure of the Universe and the Motion of the Objects Within It	
Big Idea 2. Regular and predictable motions of objects in the universe can be described and explained as the result of gravitational forces	
A.–B.	[No CLEs in Earth & Space Science course]
C. The regular and predictable motions of a planet and moon relative to the Sun explain natural phenomena, such as day, month, year, shadows, moon phases, eclipses, tides, and seasons • Relate units of time (i.e., day, month, year) to the regular and predictable motion of the planets and moons and their positions in the Solar system • Explain seasonal phenomena (i.e., weather, length of day, temperature, intensity of sunlight) as a consequence of a planet's axial tilt as it rotates and a planet's orbital position as it revolves around the Sun♦ • Provide evidence that can be observed from Earth that supports the fact Earth rotates on its axis and revolves around the Sun♦ • Predict the moon rise/set times, phases of the moon, and/or eclipses when given the relative positions of the moon, planet, and Sun • Explain how the gravitational forces, due to the relative positions of a planet, moon, and Sun, determine the height and frequency of tides	
D. Gravity is a force of attraction between objects in the solar system that governs their motion • Explain orbital motions of moons around planets, and planets around the Sun, as the result of gravitational forces between those objects	

TABLE 3D

MISSOURI Earth & Space Science Course Level Expectations	EXPLORE Science College Readiness Standards
Strand 7: Scientific Inquiry	
Big Idea 1. Science understanding is developed through the use of science process skills, scientific knowledge, scientific investigation, reasoning, and critical thinking	
A. Scientific inquiry includes the ability of students to formulate a testable question and explanation, and to select appropriate investigative methods in order to obtain evidence relevant to the explanation • Formulate testable questions and hypotheses • Analyzing an experiment, identify the components (i.e., independent variable, dependent variables, control of constants, multiple trials) and explain their importance to the design of a valid experiment♦ • Design and conduct a valid experiment • Recognize it is not always possible, for practical or ethical reasons, to control some conditions (e.g., when sampling or testing humans, when observing animal behaviors in nature) • Acknowledge some scientific explanations (e.g., explanations of astronomical or meteorological phenomena) cannot be tested using a controlled laboratory experiment, but instead by using a model, due to the limits of the laboratory environment, resources, and/or technologies • Acknowledge there is no fixed procedure called "the scientific method", but that some investigations involve systematic observations, carefully collected and relevant evidence, logical reasoning, and some imagination in developing hypotheses and other explanations • Evaluate the design of an experiment and make suggestions for reasonable improvements♦	**Interpretation of Data:** Select a single piece of data (numerical or nonnumerical) from a simple data presentation (e.g., a table or graph with two or three variables; a food web diagram) Identify basic features of a table, graph, or diagram (e.g., headings, units of measurement, axis labels) Select two or more pieces of data from a simple data presentation Understand basic scientific terminology Find basic information in a brief body of text Determine how the value of one variable changes as the value of another variable changes in a simple data presentation Compare or combine data from a simple data presentation (e.g., order or sum data from a table) Translate information into a table, graph, or diagram **Scientific Investigation:** Understand the methods and tools used in a simple experiment Understand a simple experimental design Identify a control in an experiment Determine the experimental conditions that would produce specified results **Evaluation of Models, Inferences, and Experimental Results:** Select a simple hypothesis, prediction, or conclusion that is supported by a data presentation or a model Identify key issues or assumptions in a model Determine whether given information supports or contradicts a simple hypothesis or conclusion, and why Identify strengths and weaknesses in one or more models Select a data presentation or a model that supports or contradicts a hypothesis, prediction, or conclusion

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TABLE 3D

MISSOURI Earth & Space Science Course Level Expectations	EXPLORE Science College Readiness Standards
Strand 7: Scientific Inquiry	
Big Idea 1. Science understanding is developed through the use of science process skills, scientific knowledge, scientific investigation, reasoning, and critical thinking	
B. Scientific inquiry relies upon gathering evidence from qualitative and quantitative observations • Make qualitative and quantitative observations using the appropriate senses, tools and equipment to gather data (e.g., microscopes, thermometers, analog and digital meters, computers, spring scales, balances, metric rulers, graduated cylinders) • Measure length to the nearest millimeter, mass to the nearest gram, volume to the nearest milliliter, force (weight) to the nearest Newton, temperature to the nearest degree Celsius, time to the nearest second • Determine the appropriate tools and techniques to collect, analyze, and interpret data • Judge whether measurements and computation of quantities are reasonable • Calculate the range, average/mean, percent, and ratios for sets of data • Recognize observation is biased by the experiences and knowledge of the observer (e.g., strong beliefs about what should happen in particular circumstances can prevent the detection of other results)	**Interpretation of Data:** Select a single piece of data (numerical or nonnumerical) from a simple data presentation (e.g., a table or graph with two or three variables; a food web diagram) Identify basic features of a table, graph, or diagram (e.g., headings, units of measurement, axis labels) Select two or more pieces of data from a simple data presentation Understand basic scientific terminology Find basic information in a brief body of text Determine how the value of one variable changes as the value of another variable changes in a simple data presentation Compare or combine data from a simple data presentation (e.g., order or sum data from a table) Translate information into a table, graph, or diagram Interpolate between data points in a table or graph Identify and/or use a simple (e.g., linear) mathematical relationship between data **Scientific Investigation:** Understand the methods and tools used in a simple experiment Understand a simple experimental design **Evaluation of Models, Inferences, and Experimental Results:** Select a simple hypothesis, prediction, or conclusion that is supported by a data presentation or a model

TABLE 3D

MISSOURI Earth & Space Science Course Level Expectations	EXPLORE Science College Readiness Standards
Strand 7: Scientific Inquiry	
Big Idea 1. Science understanding is developed through the use of science process skills, scientific knowledge, scientific investigation, reasoning, and critical thinking	
C. Scientific inquiry includes evaluation of explanations (laws/principles, theories/models) in light of evidence (data) and scientific principles (understandings) • Use quantitative and qualitative data as support for reasonable explanations (conclusions)♦ • Analyze experimental data to determine patterns, relationships, perspectives, and credibility of explanations (e.g., predict/extrapolate data, explain the relationship between the independent and dependent variable)♦ • Identify the possible effects of errors in observations, measurements, and calculations, on the validity and reliability of data and resultant explanations (conclusions) • Analyze whether evidence (data) and scientific principles support proposed explanations (laws/principles, theories/models)♦	**Interpretation of Data:** Select a single piece of data (numerical or nonnumerical) from a simple data presentation (e.g., a table or graph with two or three variables; a food web diagram) Identify basic features of a table, graph, or diagram (e.g., headings, units of measurement, axis labels) Select two or more pieces of data from a simple data presentation Understand basic scientific terminology Find basic information in a brief body of text Determine how the value of one variable changes as the value of another variable changes in a simple data presentation Compare or combine data from a simple data presentation (e.g., order or sum data from a table) Translate information into a table, graph, or diagram Interpolate between data points in a table or graph Identify and/or use a simple (e.g., linear) mathematical relationship between data **Scientific Investigation:** Understand the methods and tools used in a simple experiment Understand a simple experimental design Identify a control in an experiment **Evaluation of Models, Inferences, and Experimental Results:** Select a simple hypothesis, prediction, or conclusion that is supported by a data presentation or a model Identify key issues or assumptions in a model Determine whether given information supports or contradicts a simple hypothesis or conclusion, and why Identify strengths and weaknesses in one or more models Determine which model(s) is(are) supported or weakened by new information Select a data presentation or a model that supports or contradicts a hypothesis, prediction, or conclusion

TABLE 3D

MISSOURI Earth & Space Science Course Level Expectations	EXPLORE Science College Readiness Standards
Strand 7: Scientific Inquiry	
Big Idea 1. Science understanding is developed through the use of science process skills, scientific knowledge, scientific investigation, reasoning, and critical thinking	

D. The nature of science relies upon communication of results and justification of explanations
• Communicate the procedures and results of investigations and explanations through:
  • oral presentations
  • drawings and maps
  • data tables (allowing for the recording and analysis of data relevant to the experiment such as independent and dependent variables, multiple trials, beginning and ending times or temperatures, derived quantities)
  • graphs (bar, single, and multiple line)
  • equations and writings
• Communicate and defend a scientific argument
• Explain the importance of the public presentation of scientific work and supporting evidence to the scientific community (e.g., work and evidence must be critiqued, reviewed, and validated by peers; needed for subsequent investigations by peers; results can influence the decisions regarding future scientific work)
	Interpretation of Data:
	Select a single piece of data (numerical or nonnumerical) from a simple data presentation (e.g., a table or graph with two or three variables; a food web diagram)
	Identify basic features of a table, graph, or diagram (e.g., headings, units of measurement, axis labels)
	Select two or more pieces of data from a simple data presentation
	Understand basic scientific terminology
	Find basic information in a brief body of text
	Determine how the value of one variable changes as the value of another variable changes in a simple data presentation
	Compare or combine data from a simple data presentation (e.g., order or sum data from a table)
	Translate information into a table, graph, or diagram
	Scientific Investigation:
	Understand the methods and tools used in a simple experiment
	Understand a simple experimental design
	Evaluation of Models, Inferences, and Experimental Results:
	Select a simple hypothesis, prediction, or conclusion that is supported by a data presentation or a model
	Identify key issues or assumptions in a model
	Determine whether given information supports or contradicts a simple hypothesis or conclusion, and why
	Identify strengths and weaknesses in one or more models
	Determine which model(s) is(are) supported or weakened by new information
	Select a data presentation or a model that supports or contradicts a hypothesis, prediction, or conclusion

TABLE 3D

MISSOURI Earth & Space Science Course Level Expectations	EXPLORE Science College Readiness Standards
Strand 8: Impact of Science, Technology and Human Activity	
Big Idea 1. The nature of technology can advance, and is advanced by, science as it seeks to apply scientific knowledge in ways that meet human needs	
A.	[No CLEs in Earth & Space Science course]
B. Advances in technology often result in improved data collection and an increase in scientific information • Recognize the relationships linking technology and science (e.g., how technological problems may create a demand for new science knowledge, how new technologies make it possible for scientists to extend research and advance science)	
Big Idea 2. Historical and cultural perspectives of scientific explanations help to improve understanding of the nature of science and how science knowledge and technology evolve over time	
A. People of different gender and ethnicity have contributed to scientific discoveries and the invention of technological innovations • Recognize contributions to science are not limited to the work of one particular group, but are made by a diverse group of scientists representing various ethnic and gender groups • Recognize gender and ethnicity of scientists often influence the questions asked and/or the methods used in scientific research and may limit or advance science knowledge and/or technology	
B. Scientific theories are developed based on the body of knowledge that exists at any particular time and must be rigorously questioned and tested for validity • Identify and describe how explanations (laws/ principles, theories/models) of scientific phenomena have changed over time as a result of new evidence (e.g., model of the solar system, basic structure of matter, structure of an atom, Big Bang and nebular theory of the Universe)♦ • Identify and analyze current theories that are being questioned, and compare them to new theories that have emerged to challenge older ones (e.g., theories of evolution, extinction, global warming)	**Evaluation of Models, Inferences, and Experimental Results:** Select a simple hypothesis, prediction, or conclusion that is supported by a data presentation or a model Identify key issues or assumptions in a model Determine whether given information supports or contradicts a simple hypothesis or conclusion, and why Identify strengths and weaknesses in one or more models Identify similarities and differences between models Determine which model(s) is(are) supported or weakened by new information Select a data presentation or a model that supports or contradicts a hypothesis, prediction, or conclusion

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TABLE 3D

MISSOURI Earth & Space Science Course Level Expectations	EXPLORE Science College Readiness Standards
Strand 8: Impact of Science, Technology and Human Activity	
Big Idea 3. Science and technology affect, and are affected by, society	
A.	[No CLEs in Earth & Space Science course]
B. Social, political, economic, ethical and environmental factors strongly influence, and are influenced by, the direction of progress of science and technology • Analyze the roles of science and society as they interact to determine the direction of scientific and technological progress (e.g., prioritization of and funding for new scientific research and technological development is determined on the basis of individual, political and social values and needs; understanding basic concepts and principles of science and technology influences debate about the economics, policies, politics, and ethics of various scientific and technological challenges) • Identify and describe major scientific and technological challenges to society and their ramifications for public policy (e.g., global warming, limitations to fossil fuels, genetic engineering of plants, space and/or medical research) • Analyze and evaluate the drawbacks (e.g., design constraints, unintended consequences, risks), benefits, and factors (i.e., social, political, economic, ethical, and environmental) affecting progress toward meeting major scientific and technological challenges (e.g., use of alternative energies to reduce the use of carbon fuels, damming a river for flood control, use of satellite communications to gather information, deforestation, nuclear energy, space technology)	
C. Scientific ethics require that scientists must not knowingly subject people or the community to health or property risks without their knowledge and consent • Identify and evaluate the need for informed consent in experimentation • Identify the ethical issues involved in experimentation (i.e., risks to organisms or environment) • Identify and evaluate the role of models as an ethical alternative to direct experimentation (e.g., using a model for a stream rather than pouring oil in an existing stream when studying the effects of oil pollution)	

TABLE 3D

MISSOURI Earth & Space Science Course Level Expectations	EXPLORE Science College Readiness Standards
Strand 8: Impact of Science, Technology and Human Activity	
Big Idea 3. Science and technology affect, and are affected by, society	
D. Scientific information is presented through a number of credible sources, but is at times influenced in such a way to become non-credible • Evaluate a given source for its scientific credibility (e.g., articles in a new periodical quoting an "eye witness," a scientist speaking within or outside his/her area of expertise)♦ • Explain why accurate record-keeping, openness, and replication are essential for maintaining an investigator's credibility with other scientists and society	

TABLE 3E

MISSOURI Earth & Space Science Course Level Expectations	PLAN Science College Readiness Standards
Strand 1: Properties and Principles of Matter and Energy	
Big Idea 1. Changes in properties and states of matter provide evidence of the atomic theory of matter	
A. Objects, and the materials they are made of, have properties that can be used to describe and classify them a. Compare the densities of regular and irregular objects using their respective measures of volume and mass b. Identify pure substances(e.g., minerals, water, atmospheric gases) by their physical and chemical properties (i.e., color, luster/reflectivity, hardness, cleavage, fracture, conductivity, density, pH, melting point, boiling point, specific heat, solubility, phase at room temperature, chemical reactivity)	
B. Properties of mixtures depend upon the concentrations, properties, and interactions of particles a. Compare and contrast the properties of acidic, basic, and neutral solutions b. Predict the effects of solvent and solute polarity on solubility ("like dissolves like"); and predict the effects of temperature, surface area, particle size, and agitation on rates of solubility	
C.	[No CLEs in Earth & Space Science course]
D. Physical changes in states of matter due to thermal changes in materials can be explained by the Kinetic Theory of Matter a. Using the Kinetic Theory model, explain the changes that occur in the distance between atoms/molecules and temperature of a substance as energy is absorbed or released during a phase change b. Predict the effect of a temperature change on the properties (e.g., pressure, density) of earth materials (i.e., rock, water, air) c. Predict the effect of pressure changes on the properties (e.g., temperature, density) of earth materials (i.e., rock, water, air)	
E.–G.	[No CLEs in Earth & Space Science course]
H. Chemical bonding is the combining of different pure substances (elements, compounds) to form new substances with different properties a. Compare and contrast the types of chemical bonds (i.e., ionic, covalent) as they relate to mineralization, changes in rock type within the rock cycle, formation of pollutant molecules (e.g., acid rain, ozone) b. Predict the products of an acid/base (neutralization), oxidation (rusting), and combustion (burning) reaction as it may occur in the geosphere, hydrosphere, or atmosphere	

TABLE 3E

MISSOURI Earth & Space Science Course Level Expectations	PLAN Science College Readiness Standards
Strand 1: Properties and Principles of Matter and Energy	
Big Idea 1. Changes in properties and states of matter provide evidence of the atomic theory of matter	
I. Mass is conserved during any physical or chemical change a. Compare the mass of the reactants to the mass of the products in a chemical reaction or physical change (e.g., cycling of minerals within rock cycle, process of erosion/weathering, carbon dioxide-oxygen cycle, nitrogen cycle, water cycle, nuclear reaction) as support for the Law of Conservation of Mass♦	

TABLE 3E

MISSOURI Earth & Space Science Course Level Expectations	PLAN Science College Readiness Standards
Strand 1: Properties and Principles of Matter and Energy	
Big Idea 2. Energy has a source, can be stored, and can be transferred but is conserved within a system	
A. Forms of energy have a source, a means of transfer (work and heat), and a receiver a. Describe the relationship among wavelength, energy, and frequency as illustrated by the electromagnetic spectrum b. Describe sources and common uses of different forms of energy: chemical, nuclear, thermal, electromagnetic , mechanical (as transferred by moving objects, including rock, water, wind, waves) c. Identify and evaluate advantages/disadvantages of using various sources of energy (e.g., wind, solar, geothermal, hydroelectric, biomass, fossil fuel, electromagnetic radiation) for human activity♦ d. Describe the effect of different frequencies of electromagnetic waves on the Earth and living organisms (e.g., radio, infrared, visible, ultraviolet, gamma, cosmic rays) e. Interpret examples (e.g., land and sea breezes, plate tectonics) of heat transfer as convection, conduction, or radiation	
B.	[No CLEs in Earth & Space Science course]
C. Electromagnetic energy from the Sun (solar radiation) is a major source of energy on Earth • Identify stars as producers of electromagnetic energy • Describe how electromagnetic energy is transferred through space as electromagnetic waves of varying wavelength and frequency	
D.	[No CLEs in Earth & Space Science course]
E. Nuclear energy is a major source of energy throughout the universe • Describe how changes in the nucleus of an atom during a nuclear reaction (i.e., nuclear decay, fusion, fission) result in emission of radiation • Identify the role of nuclear energy as it serves as a source of energy for the Earth, stars, and human activity (e.g., source of electromagnetic radiation, thermal energy within mantle, nuclear power plants, fuel for stars)	

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MISSOURI Earth & Space Science Course Level Expectations	PLAN Science College Readiness Standards
Strand 1: Properties and Principles of Matter and Energy	
Big Idea 2. Energy has a source, can be stored, and can be transferred but is conserved within a system	
F. Energy can be transferred within a system as the total amount of energy remains constant (i.e., Law of Conservation of Energy) • Classify the different ways to store energy (i.e., chemical, nuclear, thermal, mechanical, electro-agetic) and describe the transfer of energy as it changes from kinetic to potential, while the total amount of energy remains constant, within a system (e.g., process of erosion/weathering, cycling of minerals within rock cycle, carbon dioxide-oxygen cycle, nitrogen cycle, water cycle, nuclear reaction)♦	

TABLE 3E

MISSOURI Earth & Space Science Course Level Expectations	PLAN Science College Readiness Standards
Strand 2: Properties and Principles of Force and Motion	
Big Idea 1.	[No CLEs in Earth & Space Science course]
Big Idea 2. Forces affect motion	
A.	[No CLEs in Earth & Space Science course]
B. Every object exerts a gravitational force on every other object • Compare and describe the gravitational forces between two objects in terms of their masses and the distances between them	
C.–F.	[No CLEs in Earth & Space Science course]
Strand 3: Characteristic and Interactions of Living Organisms	[No CLEs in Earth & Space Science course]
Strand 4: Changes in Ecosystems and Interactions of Organisms with their Environments	
Big Idea 1. Organisms are interdependent with one another and with their environment	
A.–B.	[No CLEs in Earth & Space Science course]
C. All organisms, including humans, and their activities cause changes in their environment that affect the ecosystem • Predict and explain how natural or human caused changes (biological, chemical and/or physical) in one ecosystem may affect other ecosystems due to natural mechanisms (e.g., global wind patterns, water cycle, ocean currents)	
D.	[No CLEs in Earth & Space Science course]
Big Idea 2. Matter and energy flow through the ecosystem	
A.	[No CLEs in Earth & Space Science course]
B. Matter is recycled through an ecosystem • Explain the processes involved in the recycling of nitrogen, oxygen, and carbon through an ecosystem • Explain the importance of the recycling of nitrogen, oxygen, and carbon within an ecosystem	
Big Idea 3.	[No CLEs in Earth & Space Science course]

TABLE 3E

MISSOURI Earth & Space Science Course Level Expectations	PLAN Science College Readiness Standards
Strand 5: Processes and Interactions of the Earth's Systems (Geosphere, Atmosphere, and Hydrosphere)	
Big Idea 1. Earth's Systems (geosphere, atmosphere, and hydrosphere) have common components and unique structures	
A. The Earth's crust is composed of various materials, including soil, minerals, and rocks, with characteristic properties • Classify minerals (rock-forming and ore) based on physical and chemical properties (e.g., color, streak, luster/reflectivity, hardness, cleavage, fracture, conductivity, density, melting point, boiling point, solubility, pH, chemical reactivity) • Classify common igneous, metamorphic, and/or sedimentary rocks based on physical and chemical properties (e.g., mineral composition, texture, density, and other unique properties) • Classify earth materials as minerals, rocks, and soils by comparing and contrasting their components, unique properties, and the processes which formed them♦	
B. The hydrosphere is composed of water (a material with unique properties) and other materials • Recognize the importance of water as a solvent in the environment as it relates to karst geology (dissolution and mineralization), acid rain, water pollution, erosion and deposition of rock and soil materials♦	
C. The atmosphere (air) is composed of a mixture of gases, including water vapor, and minute particles • Relate the composition of gases and temperature of the layers of the atmosphere (i.e., troposphere, stratosphere, ionosphere) to cloud formation and transmission of radiation (e.g., ultraviolet, infrared)♦ • Describe the causes and consequences of observed and predicted changes in the ozone layer♦	

TABLE 3E

MISSOURI Earth & Space Science Course Level Expectations	PLAN Science College Readiness Standards
Strand 5: Processes and Interactions of the Earth's Systems (Geosphere, Atmosphere, and Hydrosphere)	
Big Idea 2. Earth's Systems (geosphere, atmosphere, and hydrosphere) interact with one another as they undergo change by common processes	
A. The Earth's materials and surface features are changed through a variety of external processes • Explain the external processes (i.e., weathering, erosion, deposition of sediment) that result in the formation and modification of landforms♦ • Describe the factors that affect rates of weathering and erosion of landforms (e.g., soil/rock type, amount and force of run-off, slope)♦	
B. There are internal processes and sources of energy within the geosphere that cause changes in Earth's crustal plates • Describe the internal source of energy on Earth that results in uneven heating of the mantle (i.e., decay of radioactive isotopes) • Illustrate and explain the convection currents that result from the uneven heating inside the mantle and cause movement of crustal plates • Describe how the energy of an earthquake travels as seismic waves and provides evidence for the layers of the geosphere • Relate the densities of the materials found in continental and oceanic plates to the processes that result in each type of plate boundary (i.e., diverging, converging, transform) • Describe the effects of the movement of crustal plates (i.e., earthquakes, sea floor spreading, mountain building, volcanic eruptions) at a given location on the planet♦ • Articulate the processes involved in the Theory of Plate Tectonics (i.e., uneven heating of the mantle due to the decay of radioactive isotopes, movement of materials via convection currents, movement of continental and oceanic plates along diverging, converging, or transform plate boundaries) and describe evidence that supports that theory (e.g., correlation of rock sequences, landforms, and fossils; presence of intrusions and faults; evidence of sea-floor spreading)♦	
C. Continual changes in Earth's materials and surface that result from internal and external processes is described by the rock cycle • Describe the rock cycle as it relates to the origin and transformation of rock types (i.e., igneous, metamorphic, and sedimentary)♦	

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TABLE 3E

MISSOURI Earth & Space Science Course Level Expectations	PLAN Science College Readiness Standards
Strand 5: Processes and Interactions of the Earth's Systems (Geosphere, Atmosphere, and Hydrosphere)	
Big Idea 2. Earth's Systems (geosphere, atmosphere, and hydrosphere) interact with one another as they undergo change by common processes	
D. Changes in the Earth over time can be inferred through rock and fossil evidence • Use evidence from relative and real dating techniques (e.g., correlation of trace fossils, landforms, and rock sequences; evidence of climate changes; presence of intrusions and faults; magnetic orientation; relative age of drill samples) to infer geologic history♦	
E.	[No CLEs in Earth & Space Science course]
F. Climate is a description of average weather conditions in a given area due to the transfer of energy and matter through Earth's systems • Predict the weather (patterns of change in the atmosphere) at a designated location using weather maps (including map legends) and/or weather data (e.g., temperature, barometric pressure, cloud cover and type, wind speed and direction, precipitation)♦ • Explain how global wind and ocean currents are produced on the Earth's surface (e.g., effects of unequal heating of the Earth's land masses, oceans, and air by the Sun due to latitude and surface material type; effects of gravitational forces acting on layers of air of different densities due to temperature differences; effects of the rotation of the Earth; effects of surface topography)♦ • Describe the effects of natural phenomena (e.g., burning organic material, volcanic eruptions, lightning, changes in global wind and ocean currents) on the properties of the atmosphere • Explain how climate and weather patterns in a particular region are affected by factors such as proximity to large bodies of water or ice/ocean currents, latitude, altitude, wind and ocean currents, amount of solar radiation, changes in the atmosphere due to natural phenomena (e.g., burning organic material, volcanic eruptions)♦ • Provide evidence (e.g., fossils, desertification, variation in sea level, glaciations, and permafrost layers) that supports theories of climate change due to natural phenomena and/or human interactions with the environment♦	

TABLE 3E

MISSOURI Earth & Space Science Course Level Expectations	PLAN Science College Readiness Standards
Strand 5: Processes and Interactions of the Earth's Systems (Geosphere, Atmosphere, and Hydrosphere)	
Big Idea 3. Human activity is dependent upon and affects Earth's resources and systems	
A. Earth's materials are limited natural resources affected by human activity • Recognize the limited availability of some energy resources (i.e., solar radiation, wind, fossil fuels) and major mineral deposits in the United States (e.g., lead, petroleum, coal, copper, zinc, iron, gravel, aluminum) and the factors that affect their availability♦ • Identify human activities that may adversely affect the composition of the atmosphere, hydrosphere, or geosphere • Predict local and/or global effects of environmental changes when given a scenario describing how the composition of the geosphere, hydrosphere, or atmosphere is altered by natural phenomena or human activities♦ • Recognize how the geomorphology of Missouri (i.e., different types of Missouri soil and rock materials such as limestone, granite, clay, loam; land formations such as karst (cave) formations, glaciated plains, river channels) affects the survival of organisms and the development of land use by humans (e.g., agriculture, recreation, planning and zoning, waste management)♦ • Recognize the economic, political, social, and ethical constraints associated with obtaining and using natural resources (e.g., mining and use of different types of Missouri mineral resources such as lead mining, gravel dredging, strip mining, coal burning, production of fertilizers and explosives; use of fossil fuels versus renewable resources)	

TABLE 3E

MISSOURI Earth & Space Science Course Level Expectations	PLAN Science College Readiness Standards
Strand 6: Composition and Structure of the Universe and the Motion of the Objects Within It	
Big Idea 1. The universe has observable properties and structure	
A. The Earth, Sun, and moon are part of a larger system that includes other planets and smaller celestial bodies • Describe and relate the positions and motions of the Sun-Earth solar system, the Milky-Way galaxy, and other galaxies within the universe (i.e., it is just one of several solar systems orbiting the center of a rotating spiral galaxy; that spiral galaxy is just one of many galaxies which orbit a common center of gravity; the expanding universe causes the distance between galaxies to increase)♦	
B. The Earth has a composition and location suitable to sustain life • Explain how Earth's environmental characteristics and location in the universe (e.g., atmosphere, temperature, orbital path, magnetic field, mass-gravity, location in solar system) provide a life-supporting environment • Compare the environmental characteristics and location in the universe of Earth and other celestial bodies (e.g., planets, moons) to determine ability to support life♦	
C. Most of the information we know about the universe comes from the electromagnetic spectrum • Identify information that the electromagnetic spectrum provides about the stars and the universe (e.g., chemical composition, temperature, age of stars, location of black holes, motion of celestial bodies) • Evaluate the advantages/ disadvantages of using different tools (e.g., spectroscope, different types of telescopes, probes) to gather information about the universe (e.g., background radiation, magnetic fields, discovery of previously unknown celestial bodies)	

TABLE 3E

MISSOURI Earth & Space Science Course Level Expectations	PLAN Science College Readiness Standards
Strand 6: Composition and Structure of the Universe and the Motion of the Objects Within It	
Big Idea 2. Regular and predictable motions of objects in the universe can be described and explained as the result of gravitational forces	
A.–B.	[No CLEs in Earth & Space Science course]
C. The regular and predictable motions of a planet and moon relative to the Sun explain natural phenomena, such as day, month, year, shadows, moon phases, eclipses, tides, and seasons • Relate units of time (i.e., day, month, year) to the regular and predictable motion of the planets and moons and their positions in the Solar system • Explain seasonal phenomena (i.e., weather, length of day, temperature, intensity of sunlight) as a consequence of a planet's axial tilt as it rotates and a planet's orbital position as it revolves around the Sun♦ • Provide evidence that can be observed from Earth that supports the fact Earth rotates on its axis and revolves around the Sun♦ • Predict the moon rise/set times, phases of the moon, and/or eclipses when given the relative positions of the moon, planet, and Sun • Explain how the gravitational forces, due to the relative positions of a planet, moon, and Sun, determine the height and frequency of tides	
D. Gravity is a force of attraction between objects in the solar system that governs their motion • Explain orbital motions of moons around planets, and planets around the Sun, as the result of gravitational forces between those objects	

TABLE 3E

MISSOURI Earth & Space Science Course Level Expectations	PLAN Science College Readiness Standards
Strand 7: Scientific Inquiry	
Big Idea 1. Science understanding is developed through the use of science process skills, scientific knowledge, scientific investigation, reasoning, and critical thinking	
A. Scientific inquiry includes the ability of students to formulate a testable question and explanation, and to select appropriate investigative methods in order to obtain evidence relevant to the explanation • Formulate testable questions and hypotheses • Analyzing an experiment, identify the components (i.e., independent variable, dependent variables, control of constants, multiple trials) and explain their importance to the design of a valid experiment♦ • Design and conduct a valid experiment • Recognize it is not always possible, for practical or ethical reasons, to control some conditions (e.g., when sampling or testing humans, when observing animal behaviors in nature) • Acknowledge some scientific explanations (e.g., explanations of astronomical or meteorological phenomena) cannot be tested using a controlled laboratory experiment, but instead by using a model, due to the limits of the laboratory environment, resources, and/or technologies • Acknowledge there is no fixed procedure called "the scientific method", but that some investigations involve systematic observations, carefully collected and relevant evidence, logical reasoning, and some imagination in developing hypotheses and other explanations • Evaluate the design of an experiment and make suggestions for reasonable improvements♦	**Interpretation of Data:** Select a single piece of data (numerical or nonnumerical) from a simple data presentation (e.g., a table or graph with two or three variables; a food web diagram) Identify basic features of a table, graph, or diagram (e.g., headings, units of measurement, axis labels) Select two or more pieces of data from a simple data presentation Understand basic scientific terminology Find basic information in a brief body of text Determine how the value of one variable changes as the value of another variable changes in a simple data presentation Compare or combine data from a simple data presentation (e.g., order or sum data from a table) Translate information into a table, graph, or diagram **Scientific Investigation:** Understand the methods and tools used in a simple experiment Understand a simple experimental design Identify a control in an experiment Determine the experimental conditions that would produce specified results Determine the hypothesis for an experiment Identify an alternate method for testing a hypothesis **Evaluation of Models, Inferences, and Experimental Results:** Select a simple hypothesis, prediction, or conclusion that is supported by a data presentation or a model Identify key issues or assumptions in a model Determine whether given information supports or contradicts a simple hypothesis or conclusion, and why Identify strengths and weaknesses in one or more models Select a data presentation or a model that supports or contradicts a hypothesis, prediction, or conclusion

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TABLE 3E

MISSOURI Earth & Space Science Course Level Expectations	PLAN Science College Readiness Standards
Strand 7: Scientific Inquiry	
Big Idea 1. Science understanding is developed through the use of science process skills, scientific knowledge, scientific investigation, reasoning, and critical thinking	
B. Scientific inquiry relies upon gathering evidence from qualitative and quantitative observations • Make qualitative and quantitative observations using the appropriate senses, tools and equipment to gather data (e.g., microscopes, thermometers, analog and digital meters, computers, spring scales, balances, metric rulers, graduated cylinders) • Measure length to the nearest millimeter, mass to the nearest gram, volume to the nearest milliliter, force (weight) to the nearest Newton, temperature to the nearest degree Celsius, time to the nearest second • Determine the appropriate tools and techniques to collect, analyze, and interpret data • Judge whether measurements and computation of quantities are reasonable • Calculate the range, average/mean, percent, and ratios for sets of data • Recognize observation is biased by the experiences and knowledge of the observer (e.g., strong beliefs about what should happen in particular circumstances can prevent the detection of other results)	**Interpretation of Data:** Select a single piece of data (numerical or nonnumerical) from a simple data presentation (e.g., a table or graph with two or three variables; a food web diagram) Identify basic features of a table, graph, or diagram (e.g., headings, units of measurement, axis labels) Select two or more pieces of data from a simple data presentation Understand basic scientific terminology Find basic information in a brief body of text Determine how the value of one variable changes as the value of another variable changes in a simple data presentation Compare or combine data from a simple data presentation (e.g., order or sum data from a table) Translate information into a table, graph, or diagram Interpolate between data points in a table or graph Identify and/or use a simple (e.g., linear) mathematical relationship between data **Scientific Investigation:** Understand the methods and tools used in a simple experiment Understand a simple experimental design **Evaluation of Models, Inferences, and Experimental Results:** Select a simple hypothesis, prediction, or conclusion that is supported by a data presentation or a model

TABLE 3E

MISSOURI Earth & Space Science Course Level Expectations	PLAN Science College Readiness Standards
Strand 7: Scientific Inquiry	
Big Idea 1. Science understanding is developed through the use of science process skills, scientific knowledge, scientific investigation, reasoning, and critical thinking	
C. Scientific inquiry includes evaluation of explanations (laws/principles, theories/models) in light of evidence (data) and scientific principles (understandings) • Use quantitative and qualitative data as support for reasonable explanations (conclusions)♦ • Analyze experimental data to determine patterns, relationships, perspectives, and credibility of explanations (e.g., predict/extrapolate data, explain the relationship between the independent and dependent variable)♦ • Identify the possible effects of errors in observations, measurements, and calculations, on the validity and reliability of data and resultant explanations (conclusions) • Analyze whether evidence (data) and scientific principles support proposed explanations (laws/principles, theories/models)♦	**Interpretation of Data:** Select a single piece of data (numerical or nonnumerical) from a simple data presentation (e.g., a table or graph with two or three variables; a food web diagram) Identify basic features of a table, graph, or diagram (e.g., headings, units of measurement, axis labels) Select two or more pieces of data from a simple data presentation Understand basic scientific terminology Find basic information in a brief body of text Determine how the value of one variable changes as the value of another variable changes in a simple data presentation Compare or combine data from a simple data presentation (e.g., order or sum data from a table) Translate information into a table, graph, or diagram Interpolate between data points in a table or graph Identify and/or use a simple (e.g., linear) mathematical relationship between data Extrapolate from data points in a table or graph **Scientific Investigation:** Understand the methods and tools used in a simple experiment Understand a simple experimental design Identify a control in an experiment **Evaluation of Models, Inferences, and Experimental Results:** Select a simple hypothesis, prediction, or conclusion that is supported by a data presentation or a model Identify key issues or assumptions in a model Determine whether given information supports or contradicts a simple hypothesis or conclusion, and why Identify strengths and weaknesses in one or more models Determine which model(s) is(are) supported or weakened by new information Select a data presentation or a model that supports or contradicts a hypothesis, prediction, or conclusion

TABLE 3E

MISSOURI Earth & Space Science Course Level Expectations	PLAN Science College Readiness Standards
Strand 7: Scientific Inquiry	
Big Idea 1. Science understanding is developed through the use of science process skills, scientific knowledge, scientific investigation, reasoning, and critical thinking	

D. The nature of science relies upon communication of results and justification of explanations
• Communicate the procedures and results of investigations and explanations through:
  • oral presentations
  • drawings and maps
  • data tables (allowing for the recording and analysis of data relevant to the experiment such as independent and dependent variables, multiple trials, beginning and ending times or temperatures, derived quantities)
  • graphs (bar, single, and multiple line)
  • equations and writings
• Communicate and defend a scientific argument
• Explain the importance of the public presentation of scientific work and supporting evidence to the scientific community (e.g., work and evidence must be critiqued, reviewed, and validated by peers; needed for subsequent investigations by peers; results can influence the decisions regarding future scientific work)
	Interpretation of Data:
	Select a single piece of data (numerical or nonnumerical) from a simple data presentation (e.g., a table or graph with two or three variables; a food web diagram)
	Identify basic features of a table, graph, or diagram (e.g., headings, units of measurement, axis labels)
	Select two or more pieces of data from a simple data presentation
	Understand basic scientific terminology
	Find basic information in a brief body of text
	Determine how the value of one variable changes as the value of another variable changes in a simple data presentation
	Compare or combine data from a simple data presentation (e.g., order or sum data from a table)
	Translate information into a table, graph, or diagram
	Scientific Investigation:
	Understand the methods and tools used in a simple experiment
	Understand a simple experimental design
	Evaluation of Models, Inferences, and Experimental Results:
	Select a simple hypothesis, prediction, or conclusion that is supported by a data presentation or a model
	Identify key issues or assumptions in a model
	Determine whether given information supports or contradicts a simple hypothesis or conclusion, and why
	Identify strengths and weaknesses in one or more models
	Determine which model(s) is(are) supported or weakened by new information
	Select a data presentation or a model that supports or contradicts a hypothesis, prediction, or conclusion

TABLE 3E

MISSOURI Earth & Space Science Course Level Expectations	PLAN Science College Readiness Standards
Strand 8: Impact of Science, Technology and Human Activity	
Big Idea 1. The nature of technology can advance, and is advanced by, science as it seeks to apply scientific knowledge in ways that meet human needs	
A.	[No CLEs in Earth & Space Science course]
B. Advances in technology often result in improved data collection and an increase in scientific information • Recognize the relationships linking technology and science (e.g., how technological problems may create a demand for new science knowledge, how new technologies make it possible for scientists to extend research and advance science)	
Big Idea 2. Historical and cultural perspectives of scientific explanations help to improve understanding of the nature of science and how science knowledge and technology evolve over time	
A. People of different gender and ethnicity have contributed to scientific discoveries and the invention of technological innovations • Recognize contributions to science are not limited to the work of one particular group, but are made by a diverse group of scientists representing various ethnic and gender groups • Recognize gender and ethnicity of scientists often influence the questions asked and/or the methods used in scientific research and may limit or advance science knowledge and/or technology	
B. Scientific theories are developed based on the body of knowledge that exists at any particular time and must be rigorously questioned and tested for validity • Identify and describe how explanations (laws/ principles, theories/models) of scientific phenomena have changed over time as a result of new evidence (e.g., model of the solar system, basic structure of matter, structure of an atom, Big Bang and nebular theory of the Universe)♦ • Identify and analyze current theories that are being questioned, and compare them to new theories that have emerged to challenge older ones (e.g., theories of evolution, extinction, global warming)	**Evaluation of Models, Inferences, and Experimental Results:** Select a simple hypothesis, prediction, or conclusion that is supported by a data presentation or a model Identify key issues or assumptions in a model Determine whether given information supports or contradicts a simple hypothesis or conclusion, and why Identify strengths and weaknesses in one or more models Identify similarities and differences between models Determine which model(s) is(are) supported or weakened by new information Select a data presentation or a model that supports or contradicts a hypothesis, prediction, or conclusion

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TABLE 3E

MISSOURI Earth & Space Science Course Level Expectations	PLAN Science College Readiness Standards
Strand 8: Impact of Science, Technology and Human Activity	
Big Idea 3. Science and technology affect, and are affected by, society	
A.	[No CLEs in Earth & Space Science course]
B. Social, political, economic, ethical and environmental factors strongly influence, and are influenced by, the direction of progress of science and technology • Analyze the roles of science and society as they interact to determine the direction of scientific and technological progress (e.g., prioritization of and funding for new scientific research and technological development is determined on the basis of individual, political and social values and needs; understanding basic concepts and principles of science and technology influences debate about the economics, policies, politics, and ethics of various scientific and technological challenges) • Identify and describe major scientific and technological challenges to society and their ramifications for public policy (e.g., global warming, limitations to fossil fuels, genetic engineering of plants, space and/or medical research) • Analyze and evaluate the drawbacks (e.g., design constraints, unintended consequences, risks), benefits, and factors (i.e., social, political, economic, ethical, and environmental) affecting progress toward meeting major scientific and technological challenges (e.g., use of alternative energies to reduce the use of carbon fuels, damming a river for flood control, use of satellite communications to gather information, deforestation, nuclear energy, space technology)	
C. Scientific ethics require that scientists must not knowingly subject people or the community to health or property risks without their knowledge and consent • Identify and evaluate the need for informed consent in experimentation • Identify the ethical issues involved in experimentation (i.e., risks to organisms or environment) • Identify and evaluate the role of models as an ethical alternative to direct experimentation (e.g., using a model for a stream rather than pouring oil in an existing stream when studying the effects of oil pollution)	

TABLE 3E

MISSOURI Earth & Space Science Course Level Expectations	PLAN Science College Readiness Standards
Strand 8: Impact of Science, Technology and Human Activity	
Big Idea 3. Science and technology affect, and are affected by, society	
D. Scientific information is presented through a number of credible sources, but is at times influenced in such a way to become non-credible • Evaluate a given source for its scientific credibility (e.g., articles in a new periodical quoting an "eye witness," a scientist speaking within or outside his/her area of expertise)♦ • Explain why accurate record-keeping, openness, and replication are essential for maintaining an investigator's credibility with other scientists and society	

TABLE 3F

MISSOURI Earth & Space Science Course Level Expectations	ACT Science College Readiness Standards
Strand 1: Properties and Principles of Matter and Energy	
Big Idea 1. Changes in properties and states of matter provide evidence of the atomic theory of matter	
A. Objects, and the materials they are made of, have properties that can be used to describe and classify them a. Compare the densities of regular and irregular objects using their respective measures of volume and mass b. Identify pure substances(e.g., minerals, water, atmospheric gases) by their physical and chemical properties (i.e., color, luster/reflectivity, hardness, cleavage, fracture, conductivity, density, pH, melting point, boiling point, specific heat, solubility, phase at room temperature, chemical reactivity)	
B. Properties of mixtures depend upon the concentrations, properties, and interactions of particles a. Compare and contrast the properties of acidic, basic, and neutral solutions b. Predict the effects of solvent and solute polarity on solubility ("like dissolves like"); and predict the effects of temperature, surface area, particle size, and agitation on rates of solubility	
C.	[No CLEs in Earth & Space Science course]
D. Physical changes in states of matter due to thermal changes in materials can be explained by the Kinetic Theory of Matter a. Using the Kinetic Theory model, explain the changes that occur in the distance between atoms/molecules and temperature of a substance as energy is absorbed or released during a phase change b. Predict the effect of a temperature change on the properties (e.g., pressure, density) of earth materials (i.e., rock, water, air) c. Predict the effect of pressure changes on the properties (e.g., temperature, density) of earth materials (i.e., rock, water, air)	
E.–G.	[No CLEs in Earth & Space Science course]
H. Chemical bonding is the combining of different pure substances (elements, compounds) to form new substances with different properties a. Compare and contrast the types of chemical bonds (i.e., ionic, covalent) as they relate to mineralization, changes in rock type within the rock cycle, formation of pollutant molecules (e.g., acid rain, ozone) b. Predict the products of an acid/base (neutralization), oxidation (rusting), and combustion (burning) reaction as it may occur in the geosphere, hydrosphere, or atmosphere	

TABLE 3F

MISSOURI Earth & Space Science Course Level Expectations	ACT Science College Readiness Standards
Strand 1: Properties and Principles of Matter and Energy	
Big Idea 1. Changes in properties and states of matter provide evidence of the atomic theory of matter	
I. Mass is conserved during any physical or chemical change a. Compare the mass of the reactants to the mass of the products in a chemical reaction or physical change (e.g., cycling of minerals within rock cycle, process of erosion/weathering, carbon dioxide-oxygen cycle, nitrogen cycle, water cycle, nuclear reaction) as support for the Law of Conservation of Mass♦	

TABLE 3F

MISSOURI Earth & Space Science Course Level Expectations	ACT Science College Readiness Standards
Strand 1: Properties and Principles of Matter and Energy	
Big Idea 2. Energy has a source, can be stored, and can be transferred but is conserved within a system	
A. Forms of energy have a source, a means of transfer (work and heat), and a receiver a. Describe the relationship among wavelength, energy, and frequency as illustrated by the electromagnetic spectrum b. Describe sources and common uses of different forms of energy: chemical, nuclear, thermal, electromagnetic , mechanical (as transferred by moving objects, including rock, water, wind, waves) c. Identify and evaluate advantages/disadvantages of using various sources of energy (e.g., wind, solar, geothermal, hydroelectric, biomass, fossil fuel, electromagnetic radiation) for human activity♦ d. Describe the effect of different frequencies of electromagnetic waves on the Earth and living organisms (e.g., radio, infrared, visible, ultraviolet, gamma, cosmic rays) e. Interpret examples (e.g., land and sea breezes, plate tectonics) of heat transfer as convection, conduction, or radiation	
B.	[No CLEs in Earth & Space Science course]
C. Electromagnetic energy from the Sun (solar radiation) is a major source of energy on Earth • Identify stars as producers of electromagnetic energy • Describe how electromagnetic energy is transferred through space as electromagnetic waves of varying wavelength and frequency	
D.	[No CLEs in Earth & Space Science course]
E. Nuclear energy is a major source of energy throughout the universe • Describe how changes in the nucleus of an atom during a nuclear reaction (i.e., nuclear decay, fusion, fission) result in emission of radiation • Identify the role of nuclear energy as it serves as a source of energy for the Earth, stars, and human activity (e.g., source of electromagnetic radiation, thermal energy within mantle, nuclear power plants, fuel for stars)	

TABLE 3F

MISSOURI Earth & Space Science Course Level Expectations	ACT Science College Readiness Standards
Strand 1: Properties and Principles of Matter and Energy	
Big Idea 2. Energy has a source, can be stored, and can be transferred but is conserved within a system	
F. Energy can be transferred within a system as the total amount of energy remains constant (i.e., Law of Conservation of Energy) • Classify the different ways to store energy (i.e., chemical, nuclear, thermal, mechanical, electro-agetic) and describe the transfer of energy as it changes from kinetic to potential, while the total amount of energy remains constant, within a system (e.g., process of erosion/weathering, cycling of minerals within rock cycle, carbon dioxide-oxygen cycle, nitrogen cycle, water cycle, nuclear reaction)♦	

TABLE 3F

MISSOURI Earth & Space Science Course Level Expectations	ACT Science College Readiness Standards
Strand 2: Properties and Principles of Force and Motion	
Big Idea 1.	[No CLEs in Earth & Space Science course]
Big Idea 2. Forces affect motion	
A.	[No CLEs in Earth & Space Science course]
B. Every object exerts a gravitational force on every other object • Compare and describe the gravitational forces between two objects in terms of their masses and the distances between them	
C.–F.	[No CLEs in Earth & Space Science course]
Strand 3: Characteristic and Interactions of Living Organisms	[No CLEs in Earth & Space Science course]
Strand 4: Changes in Ecosystems and Interactions of Organisms with their Environments	
Big Idea 1. Organisms are interdependent with one another and with their environment	
A.–B.	[No CLEs in Earth & Space Science course]
C. All organisms, including humans, and their activities cause changes in their environment that affect the ecosystem • Predict and explain how natural or human caused changes (biological, chemical and/or physical) in one ecosystem may affect other ecosystems due to natural mechanisms (e.g., global wind patterns, water cycle, ocean currents)	
D.	[No CLEs in Earth & Space Science course]
Big Idea 2. Matter and energy flow through the ecosystem	
A.	[No CLEs in Earth & Space Science course]
B. Matter is recycled through an ecosystem • Explain the processes involved in the recycling of nitrogen, oxygen, and carbon through an ecosystem • Explain the importance of the recycling of nitrogen, oxygen, and carbon within an ecosystem	
Big Idea 3.	[No CLEs in Earth & Space Science course]

TABLE 3F

MISSOURI Earth & Space Science Course Level Expectations	ACT Science College Readiness Standards
Strand 5: Processes and Interactions of the Earth's Systems (Geosphere, Atmosphere, and Hydrosphere)	
Big Idea 1. Earth's Systems (geosphere, atmosphere, and hydrosphere) have common components and unique structures	
A. The Earth's crust is composed of various materials, including soil, minerals, and rocks, with characteristic properties • Classify minerals (rock-forming and ore) based on physical and chemical properties (e.g., color, streak, luster/reflectivity, hardness, cleavage, fracture, conductivity, density, melting point, boiling point, solubility, pH, chemical reactivity) • Classify common igneous, metamorphic, and/or sedimentary rocks based on physical and chemical properties (e.g., mineral composition, texture, density, and other unique properties) • Classify earth materials as minerals, rocks, and soils by comparing and contrasting their components, unique properties, and the processes which formed them♦	
B. The hydrosphere is composed of water (a material with unique properties) and other materials • Recognize the importance of water as a solvent in the environment as it relates to karst geology (dissolution and mineralization), acid rain, water pollution, erosion and deposition of rock and soil materials♦	
C. The atmosphere (air) is composed of a mixture of gases, including water vapor, and minute particles • Relate the composition of gases and temperature of the layers of the atmosphere (i.e., troposphere, stratosphere, ionosphere) to cloud formation and transmission of radiation (e.g., ultraviolet, infrared)♦ • Describe the causes and consequences of observed and predicted changes in the ozone layer♦	

TABLE 3F

MISSOURI Earth & Space Science Course Level Expectations	ACT Science College Readiness Standards
Strand 5: Processes and Interactions of the Earth's Systems (Geosphere, Atmosphere, and Hydrosphere)	
Big Idea 2. Earth's Systems (geosphere, atmosphere, and hydrosphere) interact with one another as they undergo change by common processes	
A. The Earth's materials and surface features are changed through a variety of external processes • Explain the external processes (i.e., weathering, erosion, deposition of sediment) that result in the formation and modification of landforms♦ • Describe the factors that affect rates of weathering and erosion of landforms (e.g., soil/rock type, amount and force of run-off, slope)♦	
B. There are internal processes and sources of energy within the geosphere that cause changes in Earth's crustal plates • Describe the internal source of energy on Earth that results in uneven heating of the mantle (i.e., decay of radioactive isotopes) • Illustrate and explain the convection currents that result from the uneven heating inside the mantle and cause movement of crustal plates • Describe how the energy of an earthquake travels as seismic waves and provides evidence for the layers of the geosphere • Relate the densities of the materials found in continental and oceanic plates to the processes that result in each type of plate boundary (i.e., diverging, converging, transform) • Describe the effects of the movement of crustal plates (i.e., earthquakes, sea floor spreading, mountain building, volcanic eruptions) at a given location on the planet♦ • Articulate the processes involved in the Theory of Plate Tectonics (i.e., uneven heating of the mantle due to the decay of radioactive isotopes, movement of materials via convection currents, movement of continental and oceanic plates along diverging, converging, or transform plate boundaries) and describe evidence that supports that theory (e.g., correlation of rock sequences, landforms, and fossils; presence of intrusions and faults; evidence of sea-floor spreading)♦	
C. Continual changes in Earth's materials and surface that result from internal and external processes is described by the rock cycle • Describe the rock cycle as it relates to the origin and transformation of rock types (i.e., igneous, metamorphic, and sedimentary)♦	

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TABLE 3F

MISSOURI Earth & Space Science Course Level Expectations	ACT Science College Readiness Standards
Strand 5: Processes and Interactions of the Earth's Systems (Geosphere, Atmosphere, and Hydrosphere)	
Big Idea 2. Earth's Systems (geosphere, atmosphere, and hydrosphere) interact with one another as they undergo change by common processes	
D. Changes in the Earth over time can be inferred through rock and fossil evidence • Use evidence from relative and real dating techniques (e.g., correlation of trace fossils, landforms, and rock sequences; evidence of climate changes; presence of intrusions and faults; magnetic orientation; relative age of drill samples) to infer geologic history♦	
E.	[No CLEs in Earth & Space Science course]
F. Climate is a description of average weather conditions in a given area due to the transfer of energy and matter through Earth's systems • Predict the weather (patterns of change in the atmosphere) at a designated location using weather maps (including map legends) and/or weather data (e.g., temperature, barometric pressure, cloud cover and type, wind speed and direction, precipitation)♦ • Explain how global wind and ocean currents are produced on the Earth's surface (e.g., effects of unequal heating of the Earth's land masses, oceans, and air by the Sun due to latitude and surface material type; effects of gravitational forces acting on layers of air of different densities due to temperature differences; effects of the rotation of the Earth; effects of surface topography)♦ • Describe the effects of natural phenomena (e.g., burning organic material, volcanic eruptions, lightning, changes in global wind and ocean currents) on the properties of the atmosphere • Explain how climate and weather patterns in a particular region are affected by factors such as proximity to large bodies of water or ice/ocean currents, latitude, altitude, wind and ocean currents, amount of solar radiation, changes in the atmosphere due to natural phenomena (e.g., burning organic material, volcanic eruptions)♦ • Provide evidence (e.g., fossils, desertification, variation in sea level, glaciations, and permafrost layers) that supports theories of climate change due to natural phenomena and/or human interactions with the environment♦	

TABLE 3F

MISSOURI Earth & Space Science Course Level Expectations	ACT Science College Readiness Standards
Strand 5: Processes and Interactions of the Earth's Systems (Geosphere, Atmosphere, and Hydrosphere)	
Big Idea 3. Human activity is dependent upon and affects Earth's resources and systems	
A. Earth's materials are limited natural resources affected by human activity • Recognize the limited availability of some energy resources (i.e., solar radiation, wind, fossil fuels) and major mineral deposits in the United States (e.g., lead, petroleum, coal, copper, zinc, iron, gravel, aluminum) and the factors that affect their availability♦ • Identify human activities that may adversely affect the composition of the atmosphere, hydrosphere, or geosphere • Predict local and/or global effects of environmental changes when given a scenario describing how the composition of the geosphere, hydrosphere, or atmosphere is altered by natural phenomena or human activities♦ • Recognize how the geomorphology of Missouri (i.e., different types of Missouri soil and rock materials such as limestone, granite, clay, loam; land formations such as karst (cave) formations, glaciated plains, river channels) affects the survival of organisms and the development of land use by humans (e.g., agriculture, recreation, planning and zoning, waste management)♦ • Recognize the economic, political, social, and ethical constraints associated with obtaining and using natural resources (e.g., mining and use of different types of Missouri mineral resources such as lead mining, gravel dredging, strip mining, coal burning, production of fertilizers and explosives; use of fossil fuels versus renewable resources)	

TABLE 3F

MISSOURI Earth & Space Science Course Level Expectations	ACT Science College Readiness Standards
Strand 6: Composition and Structure of the Universe and the Motion of the Objects Within It	
Big Idea 1. The universe has observable properties and structure	
A. The Earth, Sun, and moon are part of a larger system that includes other planets and smaller celestial bodies • Describe and relate the positions and motions of the Sun-Earth solar system, the Milky-Way galaxy, and other galaxies within the universe (i.e., it is just one of several solar systems orbiting the center of a rotating spiral galaxy; that spiral galaxy is just one of many galaxies which orbit a common center of gravity; the expanding universe causes the distance between galaxies to increase)♦	
B. The Earth has a composition and location suitable to sustain life • Explain how Earth's environmental characteristics and location in the universe (e.g., atmosphere, temperature, orbital path, magnetic field, mass-gravity, location in solar system) provide a life-supporting environment • Compare the environmental characteristics and location in the universe of Earth and other celestial bodies (e.g., planets, moons) to determine ability to support life♦	
C. Most of the information we know about the universe comes from the electromagnetic spectrum • Identify information that the electromagnetic spectrum provides about the stars and the universe (e.g., chemical composition, temperature, age of stars, location of black holes, motion of celestial bodies) • Evaluate the advantages/ disadvantages of using different tools (e.g., spectroscope, different types of telescopes, probes) to gather information about the universe (e.g., background radiation, magnetic fields, discovery of previously unknown celestial bodies)	

TABLE 3F

MISSOURI Earth & Space Science Course Level Expectations	ACT Science College Readiness Standards
Strand 6: Composition and Structure of the Universe and the Motion of the Objects Within It	
Big Idea 2. Regular and predictable motions of objects in the universe can be described and explained as the result of gravitational forces	
A.–B.	[No CLEs in Earth & Space Science course]
C. The regular and predictable motions of a planet and moon relative to the Sun explain natural phenomena, such as day, month, year, shadows, moon phases, eclipses, tides, and seasons • Relate units of time (i.e., day, month, year) to the regular and predictable motion of the planets and moons and their positions in the Solar system • Explain seasonal phenomena (i.e., weather, length of day, temperature, intensity of sunlight) as a consequence of a planet's axial tilt as it rotates and a planet's orbital position as it revolves around the Sun♦ • Provide evidence that can be observed from Earth that supports the fact Earth rotates on its axis and revolves around the Sun♦ • Predict the moon rise/set times, phases of the moon, and/or eclipses when given the relative positions of the moon, planet, and Sun • Explain how the gravitational forces, due to the relative positions of a planet, moon, and Sun, determine the height and frequency of tides	
D. Gravity is a force of attraction between objects in the solar system that governs their motion • Explain orbital motions of moons around planets, and planets around the Sun, as the result of gravitational forces between those objects	

TABLE 3F

MISSOURI Earth & Space Science Course Level Expectations	ACT Science College Readiness Standards
Strand 7: Scientific Inquiry	
Big Idea 1. Science understanding is developed through the use of science process skills, scientific knowledge, scientific investigation, reasoning, and critical thinking	
A. Scientific inquiry includes the ability of students to formulate a testable question and explanation, and to select appropriate investigative methods in order to obtain evidence relevant to the explanation • Formulate testable questions and hypotheses • Analyzing an experiment, identify the components (i.e., independent variable, dependent variables, control of constants, multiple trials) and explain their importance to the design of a valid experiment♦ • Design and conduct a valid experiment • Recognize it is not always possible, for practical or ethical reasons, to control some conditions (e.g., when sampling or testing humans, when observing animal behaviors in nature) • Acknowledge some scientific explanations (e.g., explanations of astronomical or meteorological phenomena) cannot be tested using a controlled laboratory experiment, but instead by using a model, due to the limits of the laboratory environment, resources, and/or technologies • Acknowledge there is no fixed procedure called "the scientific method", but that some investigations involve systematic observations, carefully collected and relevant evidence, logical reasoning, and some imagination in developing hypotheses and other explanations • Evaluate the design of an experiment and make suggestions for reasonable improvements♦	**Interpretation of Data:** Select a single piece of data (numerical or nonnumerical) from a simple data presentation (e.g., a table or graph with two or three variables; a food web diagram) Identify basic features of a table, graph, or diagram (e.g., headings, units of measurement, axis labels) Select two or more pieces of data from a simple data presentation Understand basic scientific terminology Find basic information in a brief body of text Determine how the value of one variable changes as the value of another variable changes in a simple data presentation Compare or combine data from a simple data presentation (e.g., order or sum data from a table) Translate information into a table, graph, or diagram **Scientific Investigation:** Understand the methods and tools used in a simple experiment Understand a simple experimental design Identify a control in an experiment Determine the experimental conditions that would produce specified results Determine the hypothesis for an experiment Identify an alternate method for testing a hypothesis **Evaluation of Models, Inferences, and Experimental Results:** Select a simple hypothesis, prediction, or conclusion that is supported by a data presentation or a model Identify key issues or assumptions in a model Determine whether given information supports or contradicts a simple hypothesis or conclusion, and why Identify strengths and weaknesses in one or more models Select a data presentation or a model that supports or contradicts a hypothesis, prediction, or conclusion

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TABLE 3F

MISSOURI Earth & Space Science Course Level Expectations	ACT Science College Readiness Standards
Strand 7: Scientific Inquiry	
Big Idea 1. Science understanding is developed through the use of science process skills, scientific knowledge, scientific investigation, reasoning, and critical thinking	
B. Scientific inquiry relies upon gathering evidence from qualitative and quantitative observations • Make qualitative and quantitative observations using the appropriate senses, tools and equipment to gather data (e.g., microscopes, thermometers, analog and digital meters, computers, spring scales, balances, metric rulers, graduated cylinders) • Measure length to the nearest millimeter, mass to the nearest gram, volume to the nearest milliliter, force (weight) to the nearest Newton, temperature to the nearest degree Celsius, time to the nearest second • Determine the appropriate tools and techniques to collect, analyze, and interpret data • Judge whether measurements and computation of quantities are reasonable • Calculate the range, average/mean, percent, and ratios for sets of data • Recognize observation is biased by the experiences and knowledge of the observer (e.g., strong beliefs about what should happen in particular circumstances can prevent the detection of other results)	**Interpretation of Data:** Select a single piece of data (numerical or nonnumerical) from a simple data presentation (e.g., a table or graph with two or three variables; a food web diagram) Identify basic features of a table, graph, or diagram (e.g., headings, units of measurement, axis labels) Select two or more pieces of data from a simple data presentation Understand basic scientific terminology Find basic information in a brief body of text Determine how the value of one variable changes as the value of another variable changes in a simple data presentation Compare or combine data from a simple data presentation (e.g., order or sum data from a table) Translate information into a table, graph, or diagram Interpolate between data points in a table or graph Identify and/or use a simple (e.g., linear) mathematical relationship between data **Scientific Investigation:** Understand the methods and tools used in a simple experiment Understand a simple experimental design Understand precision and accuracy issues **Evaluation of Models, Inferences, and Experimental Results:** Select a simple hypothesis, prediction, or conclusion that is supported by a data presentation or a model

TABLE 3F

MISSOURI Earth & Space Science Course Level Expectations	ACT Science College Readiness Standards
Strand 7: Scientific Inquiry	
Big Idea 1. Science understanding is developed through the use of science process skills, scientific knowledge, scientific investigation, reasoning, and critical thinking	
C. Scientific inquiry includes evaluation of explanations (laws/principles, theories/models) in light of evidence (data) and scientific principles (understandings) • Use quantitative and qualitative data as support for reasonable explanations (conclusions)♦ • Analyze experimental data to determine patterns, relationships, perspectives, and credibility of explanations (e.g., predict/extrapolate data, explain the relationship between the independent and dependent variable)♦ • Identify the possible effects of errors in observations, measurements, and calculations, on the validity and reliability of data and resultant explanations (conclusions) • Analyze whether evidence (data) and scientific principles support proposed explanations (laws/principles, theories/models)♦	**Interpretation of Data:** Select a single piece of data (numerical or nonnumerical) from a simple data presentation (e.g., a table or graph with two or three variables; a food web diagram) Identify basic features of a table, graph, or diagram (e.g., headings, units of measurement, axis labels) Select two or more pieces of data from a simple data presentation Understand basic scientific terminology Find basic information in a brief body of text Determine how the value of one variable changes as the value of another variable changes in a simple data presentation Compare or combine data from a simple data presentation (e.g., order or sum data from a table) Translate information into a table, graph, or diagram Interpolate between data points in a table or graph Identify and/or use a simple (e.g., linear) mathematical relationship between data Extrapolate from data points in a table or graph **Scientific Investigation:** Understand the methods and tools used in a simple experiment Understand a simple experimental design Identify a control in an experiment Understand precision and accuracy issues **Evaluation of Models, Inferences, and Experimental Results:** Select a simple hypothesis, prediction, or conclusion that is supported by a data presentation or a model Identify key issues or assumptions in a model Determine whether given information supports or contradicts a simple hypothesis or conclusion, and why Identify strengths and weaknesses in one or more models Determine which model(s) is(are) supported or weakened by new information Select a data presentation or a model that supports or contradicts a hypothesis, prediction, or conclusion

TABLE 3F

MISSOURI Earth & Space Science Course Level Expectations	ACT Science College Readiness Standards
Strand 7: Scientific Inquiry	
Big Idea 1. Science understanding is developed through the use of science process skills, scientific knowledge, scientific investigation, reasoning, and critical thinking	

D. The nature of science relies upon communication of results and justification of explanations
• Communicate the procedures and results of investigations and explanations through:
  • oral presentations
  • drawings and maps
  • data tables (allowing for the recording and analysis of data relevant to the experiment such as independent and dependent variables, multiple trials, beginning and ending times or temperatures, derived quantities)
  • graphs (bar, single, and multiple line)
  • equations and writings
• Communicate and defend a scientific argument
• Explain the importance of the public presentation of scientific work and supporting evidence to the scientific community (e.g., work and evidence must be critiqued, reviewed, and validated by peers; needed for subsequent investigations by peers; results can influence the decisions regarding future scientific work)
	Interpretation of Data:
	Select a single piece of data (numerical or nonnumerical) from a simple data presentation (e.g., a table or graph with two or three variables; a food web diagram)
	Identify basic features of a table, graph, or diagram (e.g., headings, units of measurement, axis labels)
	Select two or more pieces of data from a simple data presentation
	Understand basic scientific terminology
	Find basic information in a brief body of text
	Determine how the value of one variable changes as the value of another variable changes in a simple data presentation
	Compare or combine data from a simple data presentation (e.g., order or sum data from a table)
	Translate information into a table, graph, or diagram
	Scientific Investigation:
	Understand the methods and tools used in a simple experiment
	Understand a simple experimental design
	Evaluation of Models, Inferences, and Experimental Results:
	Select a simple hypothesis, prediction, or conclusion that is supported by a data presentation or a model
	Identify key issues or assumptions in a model
	Determine whether given information supports or contradicts a simple hypothesis or conclusion, and why
	Identify strengths and weaknesses in one or more models
	Determine which model(s) is(are) supported or weakened by new information
	Select a data presentation or a model that supports or contradicts a hypothesis, prediction, or conclusion

TABLE 3F

MISSOURI Earth & Space Science Course Level Expectations	ACT Science College Readiness Standards
Strand 8: Impact of Science, Technology and Human Activity	
Big Idea 1. The nature of technology can advance, and is advanced by, science as it seeks to apply scientific knowledge in ways that meet human needs	
A.	[No CLEs in Earth & Space Science course]
B. Advances in technology often result in improved data collection and an increase in scientific information • Recognize the relationships linking technology and science (e.g., how technological problems may create a demand for new science knowledge, how new technologies make it possible for scientists to extend research and advance science)	
Big Idea 2. Historical and cultural perspectives of scientific explanations help to improve understanding of the nature of science and how science knowledge and technology evolve over time	
A. People of different gender and ethnicity have contributed to scientific discoveries and the invention of technological innovations • Recognize contributions to science are not limited to the work of one particular group, but are made by a diverse group of scientists representing various ethnic and gender groups • Recognize gender and ethnicity of scientists often influence the questions asked and/or the methods used in scientific research and may limit or advance science knowledge and/or technology	
B. Scientific theories are developed based on the body of knowledge that exists at any particular time and must be rigorously questioned and tested for validity • Identify and describe how explanations (laws/ principles, theories/models) of scientific phenomena have changed over time as a result of new evidence (e.g., model of the solar system, basic structure of matter, structure of an atom, Big Bang and nebular theory of the Universe)♦ • Identify and analyze current theories that are being questioned, and compare them to new theories that have emerged to challenge older ones (e.g., theories of evolution, extinction, global warming)	**Evaluation of Models, Inferences, and Experimental Results:** Select a simple hypothesis, prediction, or conclusion that is supported by a data presentation or a model Identify key issues or assumptions in a model Determine whether given information supports or contradicts a simple hypothesis or conclusion, and why Identify strengths and weaknesses in one or more models Identify similarities and differences between models Determine which model(s) is(are) supported or weakened by new information Select a data presentation or a model that supports or contradicts a hypothesis, prediction, or conclusion

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TABLE 3F

MISSOURI Earth & Space Science Course Level Expectations	ACT Science College Readiness Standards
Strand 8: Impact of Science, Technology and Human Activity	
Big Idea 3. Science and technology affect, and are affected by, society	
A.	[No CLEs in Earth & Space Science course]
B. Social, political, economic, ethical and environmental factors strongly influence, and are influenced by, the direction of progress of science and technology • Analyze the roles of science and society as they interact to determine the direction of scientific and technological progress (e.g., prioritization of and funding for new scientific research and technological development is determined on the basis of individual, political and social values and needs; understanding basic concepts and principles of science and technology influences debate about the economics, policies, politics, and ethics of various scientific and technological challenges) • Identify and describe major scientific and technological challenges to society and their ramifications for public policy (e.g., global warming, limitations to fossil fuels, genetic engineering of plants, space and/or medical research) • Analyze and evaluate the drawbacks (e.g., design constraints, unintended consequences, risks), benefits, and factors (i.e., social, political, economic, ethical, and environmental) affecting progress toward meeting major scientific and technological challenges (e.g., use of alternative energies to reduce the use of carbon fuels, damming a river for flood control, use of satellite communications to gather information, deforestation, nuclear energy, space technology)	
C. Scientific ethics require that scientists must not knowingly subject people or the community to health or property risks without their knowledge and consent • Identify and evaluate the need for informed consent in experimentation • Identify the ethical issues involved in experimentation (i.e., risks to organisms or environment) • Identify and evaluate the role of models as an ethical alternative to direct experimentation (e.g., using a model for a stream rather than pouring oil in an existing stream when studying the effects of oil pollution)	

TABLE 3F

MISSOURI Earth & Space Science Course Level Expectations	ACT Science College Readiness Standards
Strand 8: Impact of Science, Technology and Human Activity	
Big Idea 3. Science and technology affect, and are affected by, society	
D. Scientific information is presented through a number of credible sources, but is at times influenced in such a way to become non-credible • Evaluate a given source for its scientific credibility (e.g., articles in a new periodical quoting an "eye witness," a scientist speaking within or outside his/her area of expertise)♦ • Explain why accurate record-keeping, openness, and replication are essential for maintaining an investigator's credibility with other scientists and society	

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TABLE 3G

MISSOURI Biology I Course Level Expectations	EXPLORE Science College Readiness Standards
Strand 1: Properties and Principles of Matter and Energy	
Big Idea 1. Changes in properties and states of matter provide evidence of the atomic theory of matter	
A.–H.	[No CLEs in Biology I course]
I. Mass is conserved during any physical or chemical change a. Compare the mass of the reactants to the mass of the products in a chemical reaction or physical change (e.g., biochemical processes, carbon dioxide-oxygen cycle, nitrogen cycle, decomposition and synthesis reactions involved in a food web) as support for the Law of Conservation of Mass♦	
Big Idea 2. Energy has a source, can be stored, and can be transferred but is conserved within a system	
A.–E.	[No CLEs in Biology I course]
F. Energy can be transferred within a system as the total amount of energy remains constant (i.e., Law of Conservation of Energy) • Classify the different ways to store energy (i.e., chemical, nuclear, thermal, mechanical, electromagnetic) and describe the transfer of energy as it changes from kinetic to potential, while the total amount of energy remains constant, within a system (e.g., biochemical processes, carbon dioxide-oxygen cycle, nitrogen cycle, food web)♦	
Strand 2: Properties and Principles of Force and Motion	[No CLEs in Biology I course]

TABLE 3G

MISSOURI Biology I Course Level Expectations	EXPLORE Science College Readiness Standards
Strand 3: Characteristic and Interactions of Living Organisms	
Big Idea 1. There is a fundamental unity underlying the diversity of all living organisms	
A.	[No CLEs in Biology I course]
B. Organisms progress through life cycles unique to different types of organisms • Recognize cells both increase in number and differentiate, becoming specialized in structure and function, during and after embryonic development♦ • Identify factors (e.g., biochemical, temperature) that may affect the differentiation of cells and the development of an organism	
C. Cells are the fundamental units of structure and function of all living things • Recognize all organisms are composed of cells, the fundamental units of structure and function • Describe the structure of cell parts (e.g., cell wall, cell membrane, cytoplasm, nucleus, chloroplast, mitochondrion, ribosome, vacuole) found in different types of cells (e.g., bacterial, plant, skin, nerve, blood, muscle) and the functions they perform (e.g., structural support, transport of materials, storage of genetic information, photosynthesis and respiration, synthesis of new molecules, waste disposal) that are necessary to the survival of the cell and organism♦	
D.	[No CLEs in Biology I course]
E. Biological classifications are based on how organisms are related • Explain how similarities used to group taxa might reflect evolutionary relationships (e.g., similarities in DNA and protein structures, internal anatomical features, patterns of development) • Explain how and why the classification of any taxon might change as more is learned about the organisms assigned to that taxon	

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TABLE 3G

MISSOURI Biology I Course Level Expectations	EXPLORE Science College Readiness Standards
Strand 3: Characteristic and Interactions of Living Organisms	
Big Idea 2. Living organisms carry out life processes in order to survive	
A. The cell contains a set of structures called organelles that interact to carry out life processes through physical and chemical means • Compare and contrast the structure and function of mitochondria and chloroplasts • Compare and contrast the structure and function of cell wall and cell membranes • Explain physical and chemicalinteractions that occur between organelles (e.g. nucleus, cell membrane, chloroplast, mitochondrian, ribosome) as they carry out life processes♦	
B. Photosynthesis and cellular respiration are complementary processes necessary to the survival of most organisms on Earth • Explain the interrelationship between the processes of photosynthesis and cellular respiration (e.g., recycling of oxygen and carbon dioxide), comparing and contrasting photosynthesis and cellular respiration reactions (Do NOT assess intermediate reactions)♦ • Determine what factors affect the processes of photosynthesis and cellular respiration (i.e., light intensity, availability of reactants, temperature)♦	
C.	[No CLEs in Biology I course]
D. Cells carry out chemical transformations that use energy for the synthesis or breakdown of organic compounds • Summarize how energy transfer occurs during photosynthesis and cellular respiration as energy is stored in and released from the bonds of chemical compounds (i.e., ATP)♦ • Relate the structure of organic compounds (e.g., proteins, nucleic acids, lipids, carbohydrates) to their role in living systems♦ • Recognize energy is absorbed or released in the breakdown and/or synthesis of organic compounds • Explain how protein enzymes affect chemical reactions (e.g., the breakdown of food molecules, growth and repair, regulation)♦ • Interpret a data table showing the effects of an enzyme on a biochemical reaction	

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TABLE 3G

MISSOURI Biology I Course Level Expectations	EXPLORE Science College Readiness Standards
Strand 3: Characteristic and Interactions of Living Organisms	
Big Idea 2. Living organisms carry out life processes in order to survive	
E. Protein structure and function are coded by the DNA (Deoxyribonucleic acid) molecule • Explain how the DNA code determines the sequence of amino acids necessary for protein synthesis • Recognize the function of protein in cell structure and function (i.e., enzyme action, growth and repair of body parts, regulation of cell division and differentiation)	
F. Cellular activities and responses can maintain stability internally while external conditions are changing (homeostasis) • Explain the significance of the selectively permeable membrane to the transport of molecules♦ • Predict the movement of moleculesacross a selectively permeable membrane (i.e., diffusion, osmosis, active transport) needed for a cell to maintain homeostasis given concentration gradients and different sizes of molecules♦ • Explain how water is important to cells (e.g., is a buffer for body temperature, provides soluble environment for chemical reactions, serves as a reactant in chemical reactions, provides hydration that maintains cell turgidity, maintains protein shape)♦	
G.	[No CLEs in Biology I course]

TABLE 3G

MISSOURI Biology I Course Level Expectations	EXPLORE Science College Readiness Standards
Strand 3: Characteristic and Interactions of Living Organisms	
Big Idea 3. There is a genetic basis for the transfer of biological characteristics from one generation to the next through reproductive processes	
A. Reproduction can occur asexually or sexually • Distinguish between asexual (i.e., binary fission, budding, cloning) and sexual reproduction	
B. All living organisms have genetic material (DNA) that carries hereditary information • Describe the chemical and structural properties of DNA (e.g., DNA is a large polymer formed from linked subunits of four kinds of nitrogen bases; genetic information is encoded in genes based on the sequence of subunits; each DNA molecule in a cell forms a single chromosome) (Assess the concepts – NOT memorization of nitrogen base pairs)♦ • Recognize that DNA codes for proteins, which are expressed as the heritable characteristics of an organism♦ • Recognize that degree of relatedness can be determined by comparing DNA sequences • Explain how an error in the DNA molecule (mutation) can be transferred during replication • Identify possible external causes (e.g., heat, radiation, certain chemicals) and effects of DNA mutations (e.g., altered proteins which may affect chemical reactions and structural development)♦	
C. Chromosomes are components of cells that occur in pairs and carry hereditary information from one cell to daughter cells and from parent to offspring during reproduction • Recognize the chromosomes of daughter cells, formed through the processes of asexual reproduction and mitosis, the formation of somatic (body) cells in multicellular organisms, are identical to the chromosomes of the parent cell♦ • Recognize that during meiosis, the formation of sex cells, chromosomes are reduced to half the number present in the parent cell♦ • Explain how fertilization restores the diploid number of chromosomes♦ • Identify the implications of human sex chromosomes for sex determination	

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TABLE 3G

MISSOURI Biology I Course Level Expectations	EXPLORE Science College Readiness Standards
Strand 3: Characteristic and Interactions of Living Organisms	
Big Idea 3. There is a genetic basis for the transfer of biological characteristics from one generation to the next through reproductive processes	
D. There is heritable variation within every species of organism • Describe the advantages and disadvantages of asexual and sexual reproduction with regard to variation within a population♦ • Describe how genes can be altered and combined to create genetic variation within a species (e.g., mutation, recombination of genes) • Recognize that new heritable characteristics can only result from new combinations of existing genes or from mutations of genes in an organism's sex cells♦	
E. The pattern of inheritance for many traits can be predicted by using the principles of Mendelian genetics • Explain how genotypes (heterozygous and homozygous) contribute to phenotypic variation within a species♦ • Predict the probability of the occurrence of specific traits, including sex-linked traits, in an offspring by using a monohybrid cross • Explain how sex-linked traits may or may not result in the expression of a genetic disorder (e.g., hemophilia, muscular dystrophy, color blindness) depending on gender	

TABLE 3G

MISSOURI Biology I Course Level Expectations	EXPLORE Science College Readiness Standards
Strand 4: Changes in Ecosystems and Interactions of Organisms with their Environments	
Big Idea 1. Organisms are interdependent with one another and with their environment	
A. All populations living together within a community interact with one another and with their environment in order to survive and maintain a balanced ecosystem • Explain the nature of interactions between organisms in predator/prey relationships and different symbiotic relationships (i.e., mutualism, commensalism, parasitism)♦ • Explain howcooperative (e.g., symbiotic) and competitive (e.g., predator/prey) relationships help maintain balance within an ecosystem♦ • Explain why no two species can occupy the same niche in a community • Through the years, two concepts of niche have evolved in ecology. The first is the place niche, the physical space in which an organism lives. The second is the ecological niche, and it encompasses the particular location occupied by an organism and its functional role in the community. The functional role of a species is not limited to its placement along a food pyramid; it also includes the interactions of a species with other organisms while obtaining food. For example, the methods used to tolerate the physical factors of its environment, such as climate, water, nutrients, soils, and parasites, are all part of its functional role. In other words, the ecological niche of an organism is its natural history: all the interactions and interrelationships of the species with other organisms and the environment.	
B. Living organisms have the capacity to produce populations of infinite size, but environments and resources are finite • Identify and explain the limiting factors (biotic and abiotic) that may affect the carrying capacity of a population within an ecosystem♦ • Predict how populations within an ecosystem may change in number and/or structure in response to hypothesized changes in biotic and/or abiotic factors	

TABLE 3G

MISSOURI Biology I Course Level Expectations	EXPLORE Science College Readiness Standards
Strand 4: Changes in Ecosystems and Interactions of Organisms with their Environments	
Big Idea 1. Organisms are interdependent with one another and with their environment	
C. All organisms, including humans, and their activities cause changes in their environment that affect the ecosystem • Devise a multi-step plan to restore the stability and/or biodiversity of an ecosystem when given a scenario describing the possible adverse effects of human interactions with that ecosystem (e.g., destruction caused by direct harvesting, pollution, atmospheric changes) • Predict and explain how natural or human caused changes (biological, chemical and/or physical) in one ecosystem may affect other ecosystems due to natural mechanisms (e.g., global wind patterns, water cycle, ocean currents)	
D. The diversity of species within an ecosystem is affected by changes in the environment, which can be caused by other organisms or outside processes • Predict the impact (beneficial or harmful) a natural environmental event (e.g., forest fire, flood, volcanic eruption, avalanche) or human caused change (e.g., acid rain, global warming, pollution, deforestation, introduction of an exotic species) may have on the diversity of different species in an ecosystem♦ • Predict the impact (beneficial or harmful) a natural or human caused environmental event (e.g., forest fire, flood, volcanic eruption, avalanche, acid rain, global warming, pollution, deforestation, introduction of an exotic species) may have on the biodiversity of a community♦ • Describe possible causes of extinction of a population	
Big Idea 2. Matter and energy flow through the ecosystem	
A. As energy flows through the ecosystem, all organisms capture a portion of that energy and transform it to a form they can use • Illustrate and describe the flow of energy within a food web • Explain why there are generally more producers than consumers in an energy pyramid • Predict how the use and flow of energy will be altered due to changes in a food web♦	
B. Matter is recycled through an ecosystem • Explain the processes involved in the recycling of nitrogen, oxygen, and carbon through an ecosystem • Explain the importance of the recycling of nitrogen, oxygen, and carbon within an ecosystem	

♦ Assessed in MAP End-of-Course Exam

(yellow box) = Measured by EXPLORE Science Test

_____ = Content sampled by EXPLORE Science Test

TABLE 3G

MISSOURI Biology I Course Level Expectations	EXPLORE Science College Readiness Standards
Strand 4: Changes in Ecosystems and Interactions of Organisms with their Environments	
Big Idea 3. Genetic variation sorted by the natural selection process explains evidence of biological evolution	
A. Evidence for the nature and rates of evolution can be found in anatomical and molecular characteristics of organisms and in the fossil record • Interpret fossil evidence to explain the relatedness of organisms using the principles of superposition and fossil correlation • Evaluate the evidence that supports the theory of biological evolution (e.g., fossil records, similarities between DNA and protein structures, similarities between developmental stages of organisms, homologous and vestigial structures)♦	
B. Reproduction is essential to the continuation of every species • Define a species in terms of the ability to mate and produce fertile offspring♦ • Explain the importance of reproduction to the survival of a species (i.e., the failure of a species to reproduce will lead to extinction of that species)♦	
C. Natural selection is the process of sorting individuals based on their ability to survive and reproduce within their ecosystem • Identify examples of adaptations that may have resulted from variations favored by natural selection (e.g., long-necked giraffes, long-eared jack rabbits) and describe how that variation may have provided populations an advantage for survival♦ • Explain how genetic homogeneity may cause a population to be more susceptible to extinction (e.g., succumbing to a disease for which there is no natural resistance) • Explain how environmental factors (e.g., habitat loss, climate change, pollution, introduction of non-native species) can be agents of natural selection♦ • Given a scenario describing an environmental change, hypothesize why a given species was unable to survive	

TABLE 3G

MISSOURI Biology I Course Level Expectations	EXPLORE Science College Readiness Standards
Strand 5: Processes and Interactions of the Earth's Systems (Geosphere, Atmosphere, and Hydrosphere)	
Big Idea 1.	[No CLEs in Biology I course]
Big Idea 2.	[No CLEs in Biology I course]
Big Idea 3. Human activity is dependent upon and affects Earth's resources and systems	
A. Earth's materials are limited natural resources affected by human activity • Predict local and/or global effects of environmental changes when given a scenario describing how the composition of the geosphere, hydrosphere, or atmosphere is altered by natural phenomena or human activities • Recognize how the geomorphology of Missouri (i.e., different types of Missouri soil and rock materials such as limestone, granite, clay, loam; land formations such as karst (cave) formations, glaciated plains, river channels) affects the survival of organisms	
Strand 6: Composition and Structure of the Universe and the Motion of the Objects Within It	
Big Idea 1. The universe has observable properties and structure	
A.	[No CLEs in Biology I course]
B. The Earth has a composition and location suitable to sustain life • Explain how Earth's environmental characteristics and location in the universe (e.g., atmosphere, temperature, orbital path, magnetic field, mass-gravity, location in solar system) provide a life-supporting environment	
C.	[No CLEs in Biology I course]
Big Idea 2.	[No CLEs in Biology I course]

TABLE 3G

MISSOURI Biology I Course Level Expectations	EXPLORE Science College Readiness Standards
Strand 7: Scientific Inquiry	
Big Idea 1. Science understanding is developed through the use of science process skills, scientific knowledge, scientific investigation, reasoning, and critical thinking	
A. Scientific inquiry includes the ability of students to formulate a testable question and explanation, and to select appropriate investigative methods in order to obtain evidence relevant to the explanation • Formulate testable questions and hypotheses♦ • Analyzing an experiment, identify the components (i.e., independent variable, dependent variables, control of constants, multiple trials) and explain their importance to the design of a valid experiment♦ • Design and conduct a valid experiment♦ • Recognize it is not always possible, for practical or ethical reasons, to control some conditions (e.g., when sampling or testing humans, when observing animal behaviors in nature)♦ • Acknowledge some scientific explanations (e.g., explanations of astronomical or meteorological phenomena) cannot be tested using a controlled laboratory experiment, but instead by using a model, due to the limits of the laboratory environment, resources, and/or technologies • Acknowledge there is no fixed procedure called "the scientific method", but that some investigations involve systematic observations, carefully collected and relevant evidence, logical reasoning, and some imagination in developing hypotheses and other explanations • Evaluate the design of an experiment and make suggestions for reasonable improvements♦	**Interpretation of Data:** Select a single piece of data (numerical or nonnumerical) from a simple data presentation (e.g., a table or graph with two or three variables; a food web diagram) Identify basic features of a table, graph, or diagram (e.g., headings, units of measurement, axis labels) Select two or more pieces of data from a simple data presentation Understand basic scientific terminology Find basic information in a brief body of text Determine how the value of one variable changes as the value of another variable changes in a simple data presentation Compare or combine data from a simple data presentation (e.g., order or sum data from a table) Translate information into a table, graph, or diagram **Scientific Investigation:** Understand the methods and tools used in a simple experiment Understand a simple experimental design Identify a control in an experiment Determine the experimental conditions that would produce specified results **Evaluation of Models, Inferences, and Experimental Results:** Select a simple hypothesis, prediction, or conclusion that is supported by a data presentation or a model Identify key issues or assumptions in a model Determine whether given information supports or contradicts a simple hypothesis or conclusion, and why Identify strengths and weaknesses in one or more models Select a data presentation or a model that supports or contradicts a hypothesis, prediction, or conclusion

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TABLE 3G

MISSOURI Biology I Course Level Expectations	EXPLORE Science College Readiness Standards
Strand 7: Scientific Inquiry	
Big Idea 1. Science understanding is developed through the use of science process skills, scientific knowledge, scientific investigation, reasoning, and critical thinking	
B. Scientific inquiry relies upon gathering evidence from qualitative and quantitative observations • Make qualitative and quantitative observations using the appropriate senses, tools and equipment to gather data (e.g., microscopes, thermometers, analog and digital meters, computers, spring scales, balances, metric rulers, graduated cylinders) • Measure length to the nearest millimeter, mass to the nearest gram, volume to the nearest milliliter, force (weight) to the nearest Newton, temperature to the nearest degree Celsius, time to the nearest second♦ • Determine the appropriate tools and techniques to collect, analyze, and interpret data♦ • Judge whether measurements and computation of quantities are reasonable♦ • Calculate the range, average/mean, percent, and ratios for sets of data♦ • Recognize observation is biased by the experiences and knowledge of the observer (e.g., strong beliefs about what should happen in particular circumstances can prevent the detection of other results)	**Interpretation of Data:** Select a single piece of data (numerical or nonnumerical) from a simple data presentation (e.g., a table or graph with two or three variables; a food web diagram) Identify basic features of a table, graph, or diagram (e.g., headings, units of measurement, axis labels) Select two or more pieces of data from a simple data presentation Understand basic scientific terminology Find basic information in a brief body of text Determine how the value of one variable changes as the value of another variable changes in a simple data presentation Compare or combine data from a simple data presentation (e.g., order or sum data from a table) Translate information into a table, graph, or diagram Interpolate between data points in a table or graph Identify and/or use a simple (e.g., linear) mathematical relationship between data **Scientific Investigation:** Understand the methods and tools used in a simple experiment Understand a simple experimental design **Evaluation of Models, Inferences, and Experimental Results:** Select a simple hypothesis, prediction, or conclusion that is supported by a data presentation or a model

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TABLE 3G

MISSOURI Biology I Course Level Expectations	EXPLORE Science College Readiness Standards
Strand 7: Scientific Inquiry	
Big Idea 1. Science understanding is developed through the use of science process skills, scientific knowledge, scientific investigation, reasoning, and critical thinking	
C. Scientific inquiry includes evaluation of explanations (laws/principles, theories/models) in light of evidence (data) and scientific principles (understandings) • Use quantitative and qualitative data as support for reasonable explanations (conclusions)♦ • Analyze experimental data to determine patterns, relationships, perspectives, and credibility of explanations (e.g., predict/extrapolate data, explain the relationship between the independent and dependent variable)♦ • Identify the possible effects of errors in observations, measurements, and calculations, on the validity and reliability of data and resultant explanations (conclusions)♦ • Analyze whether evidence (data) and scientific principles support proposed explanations (laws/principles, theories/models)♦	**Interpretation of Data:** Select a single piece of data (numerical or nonnumerical) from a simple data presentation (e.g., a table or graph with two or three variables; a food web diagram) Identify basic features of a table, graph, or diagram (e.g., headings, units of measurement, axis labels) Select two or more pieces of data from a simple data presentation Understand basic scientific terminology Find basic information in a brief body of text Determine how the value of one variable changes as the value of another variable changes in a simple data presentation Compare or combine data from a simple data presentation (e.g., order or sum data from a table) Translate information into a table, graph, or diagram Interpolate between data points in a table or graph Identify and/or use a simple (e.g., linear) mathematical relationship between data **Scientific Investigation:** Understand the methods and tools used in a simple experiment Understand a simple experimental design Identify a control in an experiment **Evaluation of Models, Inferences, and Experimental Results:** Select a simple hypothesis, prediction, or conclusion that is supported by a data presentation or a model Identify key issues or assumptions in a model Determine whether given information supports or contradicts a simple hypothesis or conclusion, and why Identify strengths and weaknesses in one or more models Determine which model(s) is(are) supported or weakened by new information Select a data presentation or a model that supports or contradicts a hypothesis, prediction, or conclusion

TABLE 3G

MISSOURI Biology I Course Level Expectations	EXPLORE Science College Readiness Standards
Strand 7: Scientific Inquiry	
Big Idea 1. Science understanding is developed through the use of science process skills, scientific knowledge, scientific investigation, reasoning, and critical thinking	

D. The nature of science relies upon communication of results and justification of explanations
• Communicate the procedures and results of investigations and explanations through:♦
  • oral presentations
  • drawings and maps
  • data tables (allowing for the recording and analysis of data relevant to the experiment such as independent and dependent variables, multiple trials, beginning and ending times or temperatures, derived quantities)
  • graphs (bar, single, and multiple line)
  • equations and writings
• Communicate and defend a scientific argument
• Explain the importance of the public presentation of scientific work and supporting evidence to the scientific community (e.g., work and evidence must be critiqued, reviewed, and validated by peers; needed for subsequent investigations by peers; results can influence the decisions regarding future scientific work)♦
	Interpretation of Data:
	Select a single piece of data (numerical or nonnumerical) from a simple data presentation (e.g., a table or graph with two or three variables; a food web diagram)
	Identify basic features of a table, graph, or diagram (e.g., headings, units of measurement, axis labels)
	Select two or more pieces of data from a simple data presentation
	Understand basic scientific terminology
	Find basic information in a brief body of text
	Determine how the value of one variable changes as the value of another variable changes in a simple data presentation
	Compare or combine data from a simple data presentation (e.g., order or sum data from a table)
	Translate information into a table, graph, or diagram
	Scientific Investigation:
	Understand the methods and tools used in a simple experiment
	Understand a simple experimental design
	Evaluation of Models, Inferences, and Experimental Results:
	Select a simple hypothesis, prediction, or conclusion that is supported by a data presentation or a model
	Identify key issues or assumptions in a model
	Determine whether given information supports or contradicts a simple hypothesis or conclusion, and why
	Identify strengths and weaknesses in one or more models
	Select a data presentation or a model that supports or contradicts a hypothesis, prediction, or conclusion

TABLE 3G

MISSOURI Biology I Course Level Expectations	EXPLORE Science College Readiness Standards
Strand 8: Impact of Science, Technology and Human Activity	
Big Idea 1. The nature of technology can advance, and is advanced by, science as it seeks to apply scientific knowledge in ways that meet human needs	
A.	[No CLEs in Biology I course]
B. Advances in technology often result in improved data collection and an increase in scientific information • Recognize the relationships linking technology and science (e.g., how technological problems may create a demand for new science knowledge, how new technologies make it possible for scientists to extend research and advance science)	
Big Idea 2. Historical and cultural perspectives of scientific explanations help to improve understanding of the nature of science and how science knowledge and technology evolve over time	
A. People of different gender and ethnicity have contributed to scientific discoveries and the invention of technological innovations • Recognize contributions to science are not limited to the work of one particular group, but are made by a diverse group of scientists representing various ethnic and gender groups • Recognize gender and ethnicity of scientists often influence the questions asked and/or the methods used in scientific research and may limit or advance science knowledge and/or technology	
B. Scientific theories are developed based on the body of knowledge that exists at any particular time and must be rigorously questioned and tested for validity • Identify and describe how explanations (laws/ principles, theories/models) of scientific phenomena have changed over time as a result of new evidence (e.g., cell theory, theories of spontaneous generation and biogenesis, theories of extinction, evolution theory, structure of the cell membrane, genetic theory of inheritance)♦ • Identify and analyze current theories that are being questioned, and compare them to new theories that have emerged to challenge older ones (e.g., theories of evolution, extinction, global warming)	**Evaluation of Models, Inferences, and Experimental Results:** Select a simple hypothesis, prediction, or conclusion that is supported by a data presentation or a model Identify key issues or assumptions in a model Determine whether given information supports or contradicts a simple hypothesis or conclusion, and why Identify strengths and weaknesses in one or more models Identify similarities and differences between models Determine which model(s) is(are) supported or weakened by new information Select a data presentation or a model that supports or contradicts a hypothesis, prediction, or conclusion

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TABLE 3G

MISSOURI Biology I Course Level Expectations	EXPLORE Science College Readiness Standards
Strand 8: Impact of Science, Technology and Human Activity	
Big Idea 3. Science and technology affect, and are affected by, society	
A.	[No CLEs in Biology I course]
B. Social, political, economic, ethical and environmental factors strongly influence, and are influenced by, the direction of progress of science and technology • Analyze the roles of science and society as they interact to determine the direction of scientific and technological progress (e.g., prioritization of and funding for new scientific research and technological development is determined on the basis of individual, political and social values and needs; understanding basic concepts and principles of science and technology influences debate about the economics, policies, politics, and ethics of various scientific and technological challenges) • Identify and describe major scientific and technological challenges to society and their ramifications for public policy (e.g., global warming, limitations to fossil fuels, genetic engineering of plants, space and/or medical research) • Analyze and evaluate the drawbacks (e.g., design constraints, unintended consequences, risks), benefits, and factors (i.e., social, political, economic, ethical, and environmental) affecting progress toward meeting major scientific and technological challenges (e.g., limitations placed on stem-cell research or genetic engineering, introduction of alien species, deforestation, bioterrorism, nuclear energy, genetic counseling, use of alternative energies for carbon fuels, use of pesticides)♦	
C. Scientific ethics require that scientists must not knowingly subject people or the community to health or property risks without their knowledge and consent • Identify and evaluate the need for informed consent in experimentation • Identify the ethical issues involved in experimentation (i.e., risks to organisms or environment) • Identify and evaluate the role of models as an ethical alternative to direct experimentation (e.g., using a model for a stream rather than pouring oil in an existing stream when studying the effects of oil pollution on aquatic plants)	

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TABLE 3G

MISSOURI Biology I Course Level Expectations	EXPLORE Science College Readiness Standards
Strand 8: Impact of Science, Technology and Human Activity	
Big Idea 3. Science and technology affect, and are affected by, society	
D. Scientific information is presented through a number of credible sources, but is at times influenced in such a way to become non-credible • Evaluate a given source for its scientific credibility (e.g., articles in a new periodical quoting an "eye witness," a scientist speaking within or outside his/her area of expertise) • Explain why accurate record-keeping, openness, and replication are essential for maintaining an investigator's credibility with other scientists and society♦	

TABLE 3H

MISSOURI Biology I Course Level Expectations	PLAN Science College Readiness Standards
Strand 1: Properties and Principles of Matter and Energy	
Big Idea 1. Changes in properties and states of matter provide evidence of the atomic theory of matter	
A.–H.	[No CLEs in Biology I course]
I. Mass is conserved during any physical or chemical change a. Compare the mass of the reactants to the mass of the products in a chemical reaction or physical change (e.g., biochemical processes, carbon dioxide-oxygen cycle, nitrogen cycle, decomposition and synthesis reactions involved in a food web) as support for the Law of Conservation of Mass♦	
Big Idea 2. Energy has a source, can be stored, and can be transferred but is conserved within a system	
A.–E.	[No CLEs in Biology I course]
F. Energy can be transferred within a system as the total amount of energy remains constant (i.e., Law of Conservation of Energy) • Classify the different ways to store energy (i.e., chemical, nuclear, thermal, mechanical, electromagnetic) and describe the transfer of energy as it changes from kinetic to potential, while the total amount of energy remains constant, within a system (e.g., biochemical processes, carbon dioxide-oxygen cycle, nitrogen cycle, food web)♦	
Strand 2: Properties and Principles of Force and Motion	[No CLEs in Biology I course]

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TABLE 3H

MISSOURI Biology I Course Level Expectations	PLAN Science College Readiness Standards
Strand 3: Characteristic and Interactions of Living Organisms	
Big Idea 1. There is a fundamental unity underlying the diversity of all living organisms	
A.	[No CLEs in Biology I course]
B. Organisms progress through life cycles unique to different types of organisms • Recognize cells both increase in number and differentiate, becoming specialized in structure and function, during and after embryonic development♦ • Identify factors (e.g., biochemical, temperature) that may affect the differentiation of cells and the development of an organism	
C. Cells are the fundamental units of structure and function of all living things • Recognize all organisms are composed of cells, the fundamental units of structure and function • Describe the structure of cell parts (e.g., cell wall, cell membrane, cytoplasm, nucleus, chloroplast, mitochondrion, ribosome, vacuole) found in different types of cells (e.g., bacterial, plant, skin, nerve, blood, muscle) and the functions they perform (e.g., structural support, transport of materials, storage of genetic information, photosynthesis and respiration, synthesis of new molecules, waste disposal) that are necessary to the survival of the cell and organism♦	
D.	[No CLEs in Biology I course]
E. Biological classifications are based on how organisms are related • Explain how similarities used to group taxa might reflect evolutionary relationships (e.g., similarities in DNA and protein structures, internal anatomical features, patterns of development) • Explain how and why the classification of any taxon might change as more is learned about the organisms assigned to that taxon	

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TABLE 3H

MISSOURI Biology I Course Level Expectations	PLAN Science College Readiness Standards
Strand 3: Characteristic and Interactions of Living Organisms	
Big Idea 2. Living organisms carry out life processes in order to survive	
A. The cell contains a set of structures called organelles that interact to carry out life processes through physical and chemical means • Compare and contrast the structure and function of mitochondria and chloroplasts • Compare and contrast the structure and function of cell wall and cell membranes • Explain physical and chemicalinteractions that occur between organelles (e.g. nucleus, cell membrane, chloroplast, mitochondrian, ribosome) as they carry out life processes♦	
B. Photosynthesis and cellular respiration are complementary processes necessary to the survival of most organisms on Earth • Explain the interrelationship between the processes of photosynthesis and cellular respiration (e.g., recycling of oxygen and carbon dioxide), comparing and contrasting photosynthesis and cellular respiration reactions (Do NOT assess intermediate reactions)♦ • Determine what factors affect the processes of photosynthesis and cellular respiration (i.e., light intensity, availability of reactants, temperature)♦	
C.	[No CLEs in Biology I course]
D. Cells carry out chemical transformations that use energy for the synthesis or breakdown of organic compounds • Summarize how energy transfer occurs during photosynthesis and cellular respiration as energy is stored in and released from the bonds of chemical compounds (i.e., ATP)♦ • Relate the structure of organic compounds (e.g., proteins, nucleic acids, lipids, carbohydrates) to their role in living systems♦ • Recognize energy is absorbed or released in the breakdown and/or synthesis of organic compounds • Explain how protein enzymes affect chemical reactions (e.g., the breakdown of food molecules, growth and repair, regulation)♦ • Interpret a data table showing the effects of an enzyme on a biochemical reaction	

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TABLE 3H

MISSOURI Biology I Course Level Expectations	PLAN Science College Readiness Standards
Strand 3: Characteristic and Interactions of Living Organisms	
Big Idea 2. Living organisms carry out life processes in order to survive	
E. Protein structure and function are coded by the DNA (Deoxyribonucleic acid) molecule • Explain how the DNA code determines the sequence of amino acids necessary for protein synthesis • Recognize the function of protein in cell structure and function (i.e., enzyme action, growth and repair of body parts, regulation of cell division and differentiation)	
F. Cellular activities and responses can maintain stability internally while external conditions are changing (homeostasis) • Explain the significance of the selectively permeable membrane to the transport of molecules♦ • Predict the movement of moleculesacross a selectively permeable membrane (i.e., diffusion, osmosis, active transport) needed for a cell to maintain homeostasis given concentration gradients and different sizes of molecules♦ • Explain how water is important to cells (e.g., is a buffer for body temperature, provides soluble environment for chemical reactions, serves as a reactant in chemical reactions, provides hydration that maintains cell turgidity, maintains protein shape)♦	
G.	[No CLEs in Biology I course]

TABLE 3H

MISSOURI Biology I Course Level Expectations	PLAN Science College Readiness Standards
Strand 3: Characteristic and Interactions of Living Organisms	
Big Idea 3. There is a genetic basis for the transfer of biological characteristics from one generation to the next through reproductive processes	
A. Reproduction can occur asexually or sexually • Distinguish between asexual (i.e., binary fission, budding, cloning) and sexual reproduction	
B. All living organisms have genetic material (DNA) that carries hereditary information • Describe the chemical and structural properties of DNA (e.g., DNA is a large polymer formed from linked subunits of four kinds of nitrogen bases; genetic information is encoded in genes based on the sequence of subunits; each DNA molecule in a cell forms a single chromosome) (Assess the concepts – NOT memorization of nitrogen base pairs)♦ • Recognize that DNA codes for proteins, which are expressed as the heritable characteristics of an organism♦ • Recognize that degree of relatedness can be determined by comparing DNA sequences • Explain how an error in the DNA molecule (mutation) can be transferred during replication • Identify possible external causes (e.g., heat, radiation, certain chemicals) and effects of DNA mutations (e.g., altered proteins which may affect chemical reactions and structural development)♦	
C. Chromosomes are components of cells that occur in pairs and carry hereditary information from one cell to daughter cells and from parent to offspring during reproduction • Recognize the chromosomes of daughter cells, formed through the processes of asexual reproduction and mitosis, the formation of somatic (body) cells in multicellular organisms, are identical to the chromosomes of the parent cell♦ • Recognize that during meiosis, the formation of sex cells, chromosomes are reduced to half the number present in the parent cell♦ • Explain how fertilization restores the diploid number of chromosomes♦ • Identify the implications of human sex chromosomes for sex determination	

TABLE 3H

MISSOURI Biology I Course Level Expectations	PLAN Science College Readiness Standards
Strand 3: Characteristic and Interactions of Living Organisms	
Big Idea 3. There is a genetic basis for the transfer of biological characteristics from one generation to the next through reproductive processes	
D. There is heritable variation within every species of organism • Describe the advantages and disadvantages of asexual and sexual reproduction with regard to variation within a population♦ • Describe how genes can be altered and combined to create genetic variation within a species (e.g., mutation, recombination of genes) • Recognize that new heritable characteristics can only result from new combinations of existing genes or from mutations of genes in an organism's sex cells♦	
E. The pattern of inheritance for many traits can be predicted by using the principles of Mendelian genetics • Explain how genotypes (heterozygous and homozygous) contribute to phenotypic variation within a species♦ • Predict the probability of the occurrence of specific traits, including sex-linked traits, in an offspring by using a monohybrid cross • Explain how sex-linked traits may or may not result in the expression of a genetic disorder (e.g., hemophilia, muscular dystrophy, color blindness) depending on gender	

TABLE 3H

MISSOURI Biology I Course Level Expectations	PLAN Science College Readiness Standards
Strand 4: Changes in Ecosystems and Interactions of Organisms with their Environments	
Big Idea 1. Organisms are interdependent with one another and with their environment	
A. All populations living together within a community interact with one another and with their environment in order to survive and maintain a balanced ecosystem • Explain the nature of interactions between organisms in predator/prey relationships and different symbiotic relationships (i.e., mutualism, commensalism, parasitism)♦ • Explain howcooperative (e.g., symbiotic) and competitive (e.g., predator/prey) relationships help maintain balance within an ecosystem♦ • Explain why no two species can occupy the same niche in a community • Through the years, two concepts of niche have evolved in ecology. The first is the place niche, the physical space in which an organism lives. The second is the ecological niche, and it encompasses the particular location occupied by an organism and its functional role in the community. The functional role of a species is not limited to its placement along a food pyramid; it also includes the interactions of a species with other organisms while obtaining food. For example, the methods used to tolerate the physical factors of its environment, such as climate, water, nutrients, soils, and parasites, are all part of its functional role. In other words, the ecological niche of an organism is its natural history: all the interactions and interrelationships of the species with other organisms and the environment.	
B. Living organisms have the capacity to produce populations of infinite size, but environments and resources are finite • Identify and explain the limiting factors (biotic and abiotic) that may affect the carrying capacity of a population within an ecosystem♦ • Predict how populations within an ecosystem may change in number and/or structure in response to hypothesized changes in biotic and/or abiotic factors	

TABLE 3H

MISSOURI Biology I Course Level Expectations	PLAN Science College Readiness Standards
Strand 4: Changes in Ecosystems and Interactions of Organisms with their Environments	
Big Idea 1. Organisms are interdependent with one another and with their environment	
C. All organisms, including humans, and their activities cause changes in their environment that affect the ecosystem • Devise a multi-step plan to restore the stability and/or biodiversity of an ecosystem when given a scenario describing the possible adverse effects of human interactions with that ecosystem (e.g., destruction caused by direct harvesting, pollution, atmospheric changes) • Predict and explain how natural or human caused changes (biological, chemical and/or physical) in one ecosystem may affect other ecosystems due to natural mechanisms (e.g., global wind patterns, water cycle, ocean currents)	
D. The diversity of species within an ecosystem is affected by changes in the environment, which can be caused by other organisms or outside processes • Predict the impact (beneficial or harmful) a natural environmental event (e.g., forest fire, flood, volcanic eruption, avalanche) or human caused change (e.g., acid rain, global warming, pollution, deforestation, introduction of an exotic species) may have on the diversity of different species in an ecosystem♦ • Predict the impact (beneficial or harmful) a natural or human caused environmental event (e.g., forest fire, flood, volcanic eruption, avalanche, acid rain, global warming, pollution, deforestation, introduction of an exotic species) may have on the biodiversity of a community♦ • Describe possible causes of extinction of a population	

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TABLE 3H

MISSOURI Biology I Course Level Expectations	PLAN Science College Readiness Standards
Strand 4: Changes in Ecosystems and Interactions of Organisms with their Environments	
Big Idea 2. Matter and energy flow through the ecosystem	
A. As energy flows through the ecosystem, all organisms capture a portion of that energy and transform it to a form they can use • Illustrate and describe the flow of energy within a food web • Explain why there are generally more producers than consumers in an energy pyramid • Predict how the use and flow of energy will be altered due to changes in a food web♦	
B. Matter is recycled through an ecosystem • Explain the processes involved in the recycling of nitrogen, oxygen, and carbon through an ecosystem • Explain the importance of the recycling of nitrogen, oxygen, and carbon within an ecosystem	

TABLE 3H

MISSOURI Biology I Course Level Expectations	PLAN Science College Readiness Standards
Strand 4: Changes in Ecosystems and Interactions of Organisms with their Environments	
Big Idea 3. Genetic variation sorted by the natural selection process explains evidence of biological evolution	
A. Evidence for the nature and rates of evolution can be found in anatomical and molecular characteristics of organisms and in the fossil record • Interpret fossil evidence to explain the relatedness of organisms using the principles of superposition and fossil correlation • Evaluate the evidence that supports the theory of biological evolution (e.g., fossil records, similarities between DNA and protein structures, similarities between developmental stages of organisms, homologous and vestigial structures)♦	
B. Reproduction is essential to the continuation of every species • Define a species in terms of the ability to mate and produce fertile offspring♦ • Explain the importance of reproduction to the survival of a species (i.e., the failure of a species to reproduce will lead to extinction of that species)♦	
C. Natural selection is the process of sorting individuals based on their ability to survive and reproduce within their ecosystem • Identify examples of adaptations that may have resulted from variations favored by natural selection (e.g., long-necked giraffes, long-eared jack rabbits) and describe how that variation may have provided populations an advantage for survival♦ • Explain how genetic homogeneity may cause a population to be more susceptible to extinction (e.g., succumbing to a disease for which there is no natural resistance) • Explain how environmental factors (e.g., habitat loss, climate change, pollution, introduction of non-native species) can be agents of natural selection♦ • Given a scenario describing an environmental change, hypothesize why a given species was unable to survive	

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TABLE 3H

MISSOURI Biology I Course Level Expectations	PLAN Science College Readiness Standards
Strand 5: Processes and Interactions of the Earth's Systems (Geosphere, Atmosphere, and Hydrosphere)	
Big Idea 1.	[No CLEs in Biology I course]
Big Idea 2.	[No CLEs in Biology I course]
Big Idea 3. Human activity is dependent upon and affects Earth's resources and systems	
A. Earth's materials are limited natural resources affected by human activity • Predict local and/or global effects of environmental changes when given a scenario describing how the composition of the geosphere, hydrosphere, or atmosphere is altered by natural phenomena or human activities • Recognize how the geomorphology of Missouri (i.e., different types of Missouri soil and rock materials such as limestone, granite, clay, loam; land formations such as karst (cave) formations, glaciated plains, river channels) affects the survival of organisms	
Strand 6: Composition and Structure of the Universe and the Motion of the Objects Within It	
Big Idea 1. The universe has observable properties and structure	
A.	[No CLEs in Biology I course]
B. The Earth has a composition and location suitable to sustain life • Explain how Earth's environmental characteristics and location in the universe (e.g., atmosphere, temperature, orbital path, magnetic field, mass-gravity, location in solar system) provide a life-supporting environment	
C.	[No CLEs in Biology I course]
Big Idea 2.	[No CLEs in Biology I course]

TABLE 3H

MISSOURI Biology I Course Level Expectations	PLAN Science College Readiness Standards
Strand 7: Scientific Inquiry	
Big Idea 1. Science understanding is developed through the use of science process skills, scientific knowledge, scientific investigation, reasoning, and critical thinking	
A. Scientific inquiry includes the ability of students to formulate a testable question and explanation, and to select appropriate investigative methods in order to obtain evidence relevant to the explanation • Formulate testable questions and hypotheses♦ • Analyzing an experiment, identify the components (i.e., independent variable, dependent variables, control of constants, multiple trials) and explain their importance to the design of a valid experiment♦ • Design and conduct a valid experiment♦ • Recognize it is not always possible, for practical or ethical reasons, to control some conditions (e.g., when sampling or testing humans, when observing animal behaviors in nature)♦ • Acknowledge some scientific explanations (e.g., explanations of astronomical or meteorological phenomena) cannot be tested using a controlled laboratory experiment, but instead by using a model, due to the limits of the laboratory environment, resources, and/or technologies • Acknowledge there is no fixed procedure called "the scientific method", but that some investigations involve systematic observations, carefully collected and relevant evidence, logical reasoning, and some imagination in developing hypotheses and other explanations • Evaluate the design of an experiment and make suggestions for reasonable improvements♦	**Interpretation of Data:** Select a single piece of data (numerical or nonnumerical) from a simple data presentation (e.g., a table or graph with two or three variables; a food web diagram) Identify basic features of a table, graph, or diagram (e.g., headings, units of measurement, axis labels) Select two or more pieces of data from a simple data presentation Understand basic scientific terminology Find basic information in a brief body of text Determine how the value of one variable changes as the value of another variable changes in a simple data presentation Compare or combine data from a simple data presentation (e.g., order or sum data from a table) Translate information into a table, graph, or diagram **Scientific Investigation:** Understand the methods and tools used in a simple experiment Understand a simple experimental design Identify a control in an experiment Determine the experimental conditions that would produce specified results Determine the hypothesis for an experiment Identify an alternate method for testing a hypothesis **Evaluation of Models, Inferences, and Experimental Results:** Select a simple hypothesis, prediction, or conclusion that is supported by a data presentation or a model Identify key issues or assumptions in a model Determine whether given information supports or contradicts a simple hypothesis or conclusion, and why Identify strengths and weaknesses in one or more models Select a data presentation or a model that supports or contradicts a hypothesis, prediction, or conclusion

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TABLE 3H

MISSOURI Biology I Course Level Expectations	PLAN Science College Readiness Standards
Strand 7: Scientific Inquiry	
Big Idea 1. Science understanding is developed through the use of science process skills, scientific knowledge, scientific investigation, reasoning, and critical thinking	
B. Scientific inquiry relies upon gathering evidence from qualitative and quantitative observations • Make qualitative and quantitative observations using the appropriate senses, tools and equipment to gather data (e.g., microscopes, thermometers, analog and digital meters, computers, spring scales, balances, metric rulers, graduated cylinders) • Measure length to the nearest millimeter, mass to the nearest gram, volume to the nearest milliliter, force (weight) to the nearest Newton, temperature to the nearest degree Celsius, time to the nearest second♦ • Determine the appropriate tools and techniques to collect, analyze, and interpret data♦ • Judge whether measurements and computation of quantities are reasonable♦ • Calculate the range, average/mean, percent, and ratios for sets of data♦ • Recognize observation is biased by the experiences and knowledge of the observer (e.g., strong beliefs about what should happen in particular circumstances can prevent the detection of other results)	**Interpretation of Data:** Select a single piece of data (numerical or nonnumerical) from a simple data presentation (e.g., a table or graph with two or three variables; a food web diagram) Identify basic features of a table, graph, or diagram (e.g., headings, units of measurement, axis labels) Select two or more pieces of data from a simple data presentation Understand basic scientific terminology Find basic information in a brief body of text Determine how the value of one variable changes as the value of another variable changes in a simple data presentation Compare or combine data from a simple data presentation (e.g., order or sum data from a table) Translate information into a table, graph, or diagram Interpolate between data points in a table or graph Identify and/or use a simple (e.g., linear) mathematical relationship between data **Scientific Investigation:** Understand the methods and tools used in a simple experiment Understand a simple experimental design **Evaluation of Models, Inferences, and Experimental Results:** Select a simple hypothesis, prediction, or conclusion that is supported by a data presentation or a model

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TABLE 3H

MISSOURI Biology I Course Level Expectations	PLAN Science College Readiness Standards
Strand 7: Scientific Inquiry	
Big Idea 1. Science understanding is developed through the use of science process skills, scientific knowledge, scientific investigation, reasoning, and critical thinking	
C. Scientific inquiry includes evaluation of explanations (laws/principles, theories/models) in light of evidence (data) and scientific principles (understandings) • Use quantitative and qualitative data as support for reasonable explanations (conclusions)♦ • Analyze experimental data to determine patterns, relationships, perspectives, and credibility of explanations (e.g., predict/extrapolate data, explain the relationship between the independent and dependent variable)♦ • Identify the possible effects of errors in observations, measurements, and calculations, on the validity and reliability of data and resultant explanations (conclusions)♦ • Analyze whether evidence (data) and scientific principles support proposed explanations (laws/principles, theories/models)♦	**Interpretation of Data:** Select a single piece of data (numerical or nonnumerical) from a simple data presentation (e.g., a table or graph with two or three variables; a food web diagram) Identify basic features of a table, graph, or diagram (e.g., headings, units of measurement, axis labels) Select two or more pieces of data from a simple data presentation Understand basic scientific terminology Find basic information in a brief body of text Determine how the value of one variable changes as the value of another variable changes in a simple data presentation Compare or combine data from a simple data presentation (e.g., order or sum data from a table) Translate information into a table, graph, or diagram Interpolate between data points in a table or graph Identify and/or use a simple (e.g., linear) mathematical relationship between data Extrapolate from data points in a table or graph **Scientific Investigation:** Understand the methods and tools used in a simple experiment Understand a simple experimental design Identify a control in an experiment **Evaluation of Models, Inferences, and Experimental Results:** Select a simple hypothesis, prediction, or conclusion that is supported by a data presentation or a model Identify key issues or assumptions in a model Determine whether given information supports or contradicts a simple hypothesis or conclusion, and why Identify strengths and weaknesses in one or more models Determine which model(s) is(are) supported or weakened by new information Select a data presentation or a model that supports or contradicts a hypothesis, prediction, or conclusion

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TABLE 3H

MISSOURI Biology I Course Level Expectations	PLAN Science College Readiness Standards
Strand 7: Scientific Inquiry	
Big Idea 1. Science understanding is developed through the use of science process skills, scientific knowledge, scientific investigation, reasoning, and critical thinking	

D. The nature of science relies upon communication of results and justification of explanations
• Communicate the procedures and results of investigations and explanations through:♦
  • oral presentations
  • drawings and maps
  • data tables (allowing for the recording and analysis of data relevant to the experiment such as independent and dependent variables, multiple trials, beginning and ending times or temperatures, derived quantities)
  • graphs (bar, single, and multiple line)
  • equations and writings
• Communicate and defend a scientific argument
• Explain the importance of the public presentation of scientific work and supporting evidence to the scientific community (e.g., work and evidence must be critiqued, reviewed, and validated by peers; needed for subsequent investigations by peers; results can influence the decisions regarding future scientific work)♦
	Interpretation of Data:
	Select a single piece of data (numerical or nonnumerical) from a simple data presentation (e.g., a table or graph with two or three variables; a food web diagram)
	Identify basic features of a table, graph, or diagram (e.g., headings, units of measurement, axis labels)
	Select two or more pieces of data from a simple data presentation
	Understand basic scientific terminology
	Find basic information in a brief body of text
	Determine how the value of one variable changes as the value of another variable changes in a simple data presentation
	Compare or combine data from a simple data presentation (e.g., order or sum data from a table)
	Translate information into a table, graph, or diagram
	Scientific Investigation:
	Understand the methods and tools used in a simple experiment
	Understand a simple experimental design
	Evaluation of Models, Inferences, and Experimental Results:
	Select a simple hypothesis, prediction, or conclusion that is supported by a data presentation or a model
	Identify key issues or assumptions in a model
	Determine whether given information supports or contradicts a simple hypothesis or conclusion, and why
	Identify strengths and weaknesses in one or more models
	Select a data presentation or a model that supports or contradicts a hypothesis, prediction, or conclusion

TABLE 3H

MISSOURI Biology I Course Level Expectations	PLAN Science College Readiness Standards
Strand 8: Impact of Science, Technology and Human Activity	
Big Idea 1. The nature of technology can advance, and is advanced by, science as it seeks to apply scientific knowledge in ways that meet human needs	
A.	[No CLEs in Biology I course]
B. Advances in technology often result in improved data collection and an increase in scientific information • Recognize the relationships linking technology and science (e.g., how technological problems may create a demand for new science knowledge, how new technologies make it possible for scientists to extend research and advance science)	
Big Idea 2. Historical and cultural perspectives of scientific explanations help to improve understanding of the nature of science and how science knowledge and technology evolve over time	
A. People of different gender and ethnicity have contributed to scientific discoveries and the invention of technological innovations • Recognize contributions to science are not limited to the work of one particular group, but are made by a diverse group of scientists representing various ethnic and gender groups • Recognize gender and ethnicity of scientists often influence the questions asked and/or the methods used in scientific research and may limit or advance science knowledge and/or technology	
B. Scientific theories are developed based on the body of knowledge that exists at any particular time and must be rigorously questioned and tested for validity • Identify and describe how explanations (laws/ principles, theories/models) of scientific phenomena have changed over time as a result of new evidence (e.g., cell theory, theories of spontaneous generation and biogenesis, theories of extinction, evolution theory, structure of the cell membrane, genetic theory of inheritance)♦ • Identify and analyze current theories that are being questioned, and compare them to new theories that have emerged to challenge older ones (e.g., theories of evolution, extinction, global warming)	**Evaluation of Models, Inferences, and Experimental Results:** Select a simple hypothesis, prediction, or conclusion that is supported by a data presentation or a model Identify key issues or assumptions in a model Determine whether given information supports or contradicts a simple hypothesis or conclusion, and why Identify strengths and weaknesses in one or more models Identify similarities and differences between models Determine which model(s) is(are) supported or weakened by new information Select a data presentation or a model that supports or contradicts a hypothesis, prediction, or conclusion

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TABLE 3H

MISSOURI Biology I Course Level Expectations	PLAN Science College Readiness Standards
Strand 8: Impact of Science, Technology and Human Activity	
Big Idea 3. Science and technology affect, and are affected by, society	
A.	[No CLEs in Biology I course]
B. Social, political, economic, ethical and environmental factors strongly influence, and are influenced by, the direction of progress of science and technology • Analyze the roles of science and society as they interact to determine the direction of scientific and technological progress (e.g., prioritization of and funding for new scientific research and technological development is determined on the basis of individual, political and social values and needs; understanding basic concepts and principles of science and technology influences debate about the economics, policies, politics, and ethics of various scientific and technological challenges) • Identify and describe major scientific and technological challenges to society and their ramifications for public policy (e.g., global warming, limitations to fossil fuels, genetic engineering of plants, space and/or medical research) • Analyze and evaluate the drawbacks (e.g., design constraints, unintended consequences, risks), benefits, and factors (i.e., social, political, economic, ethical, and environmental) affecting progress toward meeting major scientific and technological challenges (e.g., limitations placed on stem-cell research or genetic engineering, introduction of alien species, deforestation, bioterrorism, nuclear energy, genetic counseling, use of alternative energies for carbon fuels, use of pesticides)♦	
C. Scientific ethics require that scientists must not knowingly subject people or the community to health or property risks without their knowledge and consent • Identify and evaluate the need for informed consent in experimentation • Identify the ethical issues involved in experimentation (i.e., risks to organisms or environment) • Identify and evaluate the role of models as an ethical alternative to direct experimentation (e.g., using a model for a stream rather than pouring oil in an existing stream when studying the effects of oil pollution on aquatic plants)	

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TABLE 3H

MISSOURI Biology I Course Level Expectations	PLAN Science College Readiness Standards
Strand 8: Impact of Science, Technology and Human Activity	
Big Idea 3. Science and technology affect, and are affected by, society	
D. Scientific information is presented through a number of credible sources, but is at times influenced in such a way to become non-credible • Evaluate a given source for its scientific credibility (e.g., articles in a new periodical quoting an "eye witness," a scientist speaking within or outside his/her area of expertise) • Explain why accurate record-keeping, openness, and replication are essential for maintaining an investigator's credibility with other scientists and society♦	

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TABLE 3I

MISSOURI Biology I Course Level Expectations	ACT Science College Readiness Standards
Strand 1: Properties and Principles of Matter and Energy	
Big Idea 1. Changes in properties and states of matter provide evidence of the atomic theory of matter	
A.–H.	[No CLEs in Biology I course]
I. Mass is conserved during any physical or chemical change a. Compare the mass of the reactants to the mass of the products in a chemical reaction or physical change (e.g., biochemical processes, carbon dioxide-oxygen cycle, nitrogen cycle, decomposition and synthesis reactions involved in a food web) as support for the Law of Conservation of Mass♦	
Big Idea 2. Energy has a source, can be stored, and can be transferred but is conserved within a system	
A.–E.	[No CLEs in Biology I course]
F. Energy can be transferred within a system as the total amount of energy remains constant (i.e., Law of Conservation of Energy) • Classify the different ways to store energy (i.e., chemical, nuclear, thermal, mechanical, electromagnetic) and describe the transfer of energy as it changes from kinetic to potential, while the total amount of energy remains constant, within a system (e.g., biochemical processes, carbon dioxide-oxygen cycle, nitrogen cycle, food web)♦	
Strand 2: Properties and Principles of Force and Motion	[No CLEs in Biology I course]

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TABLE 3I

MISSOURI Biology I Course Level Expectations	ACT Science College Readiness Standards
Strand 3: Characteristic and Interactions of Living Organisms	
Big Idea 1. There is a fundamental unity underlying the diversity of all living organisms	
A.	[No CLEs in Biology I course]
B. Organisms progress through life cycles unique to different types of organisms • Recognize cells both increase in number and differentiate, becoming specialized in structure and function, during and after embryonic development♦ • Identify factors (e.g., biochemical, temperature) that may affect the differentiation of cells and the development of an organism	
C. Cells are the fundamental units of structure and function of all living things • Recognize all organisms are composed of cells, the fundamental units of structure and function • Describe the structure of cell parts (e.g., cell wall, cell membrane, cytoplasm, nucleus, chloroplast, mitochondrion, ribosome, vacuole) found in different types of cells (e.g., bacterial, plant, skin, nerve, blood, muscle) and the functions they perform (e.g., structural support, transport of materials, storage of genetic information, photosynthesis and respiration, synthesis of new molecules, waste disposal) that are necessary to the survival of the cell and organism♦	
D.	[No CLEs in Biology I course]
E. Biological classifications are based on how organisms are related • Explain how similarities used to group taxa might reflect evolutionary relationships (e.g., similarities in DNA and protein structures, internal anatomical features, patterns of development) • Explain how and why the classification of any taxon might change as more is learned about the organisms assigned to that taxon	

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TABLE 3I

MISSOURI Biology I Course Level Expectations	ACT Science College Readiness Standards
Strand 3: Characteristic and Interactions of Living Organisms	
Big Idea 2. Living organisms carry out life processes in order to survive	
A. The cell contains a set of structures called organelles that interact to carry out life processes through physical and chemical means • Compare and contrast the structure and function of mitochondria and chloroplasts • Compare and contrast the structure and function of cell wall and cell membranes • Explain physical and chemicalinteractions that occur between organelles (e.g. nucleus, cell membrane, chloroplast, mitochondrian, ribosome) as they carry out life processes♦	
B. Photosynthesis and cellular respiration are complementary processes necessary to the survival of most organisms on Earth • Explain the interrelationship between the processes of photosynthesis and cellular respiration (e.g., recycling of oxygen and carbon dioxide), comparing and contrasting photosynthesis and cellular respiration reactions (Do NOT assess intermediate reactions)♦ • Determine what factors affect the processes of photosynthesis and cellular respiration (i.e., light intensity, availability of reactants, temperature)♦	
C.	[No CLEs in Biology I course]
D. Cells carry out chemical transformations that use energy for the synthesis or breakdown of organic compounds • Summarize how energy transfer occurs during photosynthesis and cellular respiration as energy is stored in and released from the bonds of chemical compounds (i.e., ATP)♦ • Relate the structure of organic compounds (e.g., proteins, nucleic acids, lipids, carbohydrates) to their role in living systems♦ • Recognize energy is absorbed or released in the breakdown and/or synthesis of organic compounds • Explain how protein enzymes affect chemical reactions (e.g., the breakdown of food molecules, growth and repair, regulation)♦ • Interpret a data table showing the effects of an enzyme on a biochemical reaction	

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TABLE 3I

MISSOURI Biology I Course Level Expectations	ACT Science College Readiness Standards
Strand 3: Characteristic and Interactions of Living Organisms	
Big Idea 2. Living organisms carry out life processes in order to survive	
E. Protein structure and function are coded by the DNA (Deoxyribonucleic acid) molecule • Explain how the DNA code determines the sequence of amino acids necessary for protein synthesis • Recognize the function of protein in cell structure and function (i.e., enzyme action, growth and repair of body parts, regulation of cell division and differentiation)	
F. Cellular activities and responses can maintain stability internally while external conditions are changing (homeostasis) • Explain the significance of the selectively permeable membrane to the transport of molecules♦ • Predict the movement of moleculesacross a selectively permeable membrane (i.e., diffusion, osmosis, active transport) needed for a cell to maintain homeostasis given concentration gradients and different sizes of molecules♦ • Explain how water is important to cells (e.g., is a buffer for body temperature, provides soluble environment for chemical reactions, serves as a reactant in chemical reactions, provides hydration that maintains cell turgidity, maintains protein shape)♦	
G.	[No CLEs in Biology I course]

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TABLE 3I

MISSOURI Biology I Course Level Expectations	ACT Science College Readiness Standards
Strand 3: Characteristic and Interactions of Living Organisms	
Big Idea 3. There is a genetic basis for the transfer of biological characteristics from one generation to the next through reproductive processes	
A. Reproduction can occur asexually or sexually • Distinguish between asexual (i.e., binary fission, budding, cloning) and sexual reproduction	
B. All living organisms have genetic material (DNA) that carries hereditary information • Describe the chemical and structural properties of DNA (e.g., DNA is a large polymer formed from linked subunits of four kinds of nitrogen bases; genetic information is encoded in genes based on the sequence of subunits; each DNA molecule in a cell forms a single chromosome) (Assess the concepts – NOT memorization of nitrogen base pairs)♦ • Recognize that DNA codes for proteins, which are expressed as the heritable characteristics of an organism♦ • Recognize that degree of relatedness can be determined by comparing DNA sequences • Explain how an error in the DNA molecule (mutation) can be transferred during replication • Identify possible external causes (e.g., heat, radiation, certain chemicals) and effects of DNA mutations (e.g., altered proteins which may affect chemical reactions and structural development)♦	
C. Chromosomes are components of cells that occur in pairs and carry hereditary information from one cell to daughter cells and from parent to offspring during reproduction • Recognize the chromosomes of daughter cells, formed through the processes of asexual reproduction and mitosis, the formation of somatic (body) cells in multicellular organisms, are identical to the chromosomes of the parent cell♦ • Recognize that during meiosis, the formation of sex cells, chromosomes are reduced to half the number present in the parent cell♦ • Explain how fertilization restores the diploid number of chromosomes♦ • Identify the implications of human sex chromosomes for sex determination	

TABLE 3I

MISSOURI Biology I Course Level Expectations	ACT Science College Readiness Standards
Strand 3: Characteristic and Interactions of Living Organisms	
Big Idea 3. There is a genetic basis for the transfer of biological characteristics from one generation to the next through reproductive processes	
D. There is heritable variation within every species of organism • Describe the advantages and disadvantages of asexual and sexual reproduction with regard to variation within a population♦ • Describe how genes can be altered and combined to create genetic variation within a species (e.g., mutation, recombination of genes) • Recognize that new heritable characteristics can only result from new combinations of existing genes or from mutations of genes in an organism's sex cells♦	
E. The pattern of inheritance for many traits can be predicted by using the principles of Mendelian genetics • Explain how genotypes (heterozygous and homozygous) contribute to phenotypic variation within a species♦ • Predict the probability of the occurrence of specific traits, including sex-linked traits, in an offspring by using a monohybrid cross • Explain how sex-linked traits may or may not result in the expression of a genetic disorder (e.g., hemophilia, muscular dystrophy, color blindness) depending on gender	

TABLE 3I

MISSOURI Biology I Course Level Expectations	ACT Science College Readiness Standards
Strand 4: Changes in Ecosystems and Interactions of Organisms with their Environments	
Big Idea 1. Organisms are interdependent with one another and with their environment	
A. All populations living together within a community interact with one another and with their environment in order to survive and maintain a balanced ecosystem • Explain the nature of interactions between organisms in predator/prey relationships and different symbiotic relationships (i.e., mutualism, commensalism, parasitism)♦ • Explain howcooperative (e.g., symbiotic) and competitive (e.g., predator/prey) relationships help maintain balance within an ecosystem♦ • Explain why no two species can occupy the same niche in a community • Through the years, two concepts of niche have evolved in ecology. The first is the place niche, the physical space in which an organism lives. The second is the ecological niche, and it encompasses the particular location occupied by an organism and its functional role in the community. The functional role of a species is not limited to its placement along a food pyramid; it also includes the interactions of a species with other organisms while obtaining food. For example, the methods used to tolerate the physical factors of its environment, such as climate, water, nutrients, soils, and parasites, are all part of its functional role. In other words, the ecological niche of an organism is its natural history: all the interactions and interrelationships of the species with other organisms and the environment.	
B. Living organisms have the capacity to produce populations of infinite size, but environments and resources are finite • Identify and explain the limiting factors (biotic and abiotic) that may affect the carrying capacity of a population within an ecosystem♦ • Predict how populations within an ecosystem may change in number and/or structure in response to hypothesized changes in biotic and/or abiotic factors	

TABLE 3I

MISSOURI Biology I Course Level Expectations	ACT Science College Readiness Standards
Strand 4: Changes in Ecosystems and Interactions of Organisms with their Environments	
Big Idea 1. Organisms are interdependent with one another and with their environment	
C. All organisms, including humans, and their activities cause changes in their environment that affect the ecosystem • Devise a multi-step plan to restore the stability and/or biodiversity of an ecosystem when given a scenario describing the possible adverse effects of human interactions with that ecosystem (e.g., destruction caused by direct harvesting, pollution, atmospheric changes) • Predict and explain how natural or human caused changes (biological, chemical and/or physical) in one ecosystem may affect other ecosystems due to natural mechanisms (e.g., global wind patterns, water cycle, ocean currents)	
D. The diversity of species within an ecosystem is affected by changes in the environment, which can be caused by other organisms or outside processes • Predict the impact (beneficial or harmful) a natural environmental event (e.g., forest fire, flood, volcanic eruption, avalanche) or human caused change (e.g., acid rain, global warming, pollution, deforestation, introduction of an exotic species) may have on the diversity of different species in an ecosystem♦ • Predict the impact (beneficial or harmful) a natural or human caused environmental event (e.g., forest fire, flood, volcanic eruption, avalanche, acid rain, global warming, pollution, deforestation, introduction of an exotic species) may have on the biodiversity of a community♦ • Describe possible causes of extinction of a population	

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TABLE 3I

MISSOURI Biology I Course Level Expectations	ACT Science College Readiness Standards
Strand 4: Changes in Ecosystems and Interactions of Organisms with their Environments	
Big Idea 2. Matter and energy flow through the ecosystem	
A. As energy flows through the ecosystem, all organisms capture a portion of that energy and transform it to a form they can use • Illustrate and describe the flow of energy within a food web • Explain why there are generally more producers than consumers in an energy pyramid • Predict how the use and flow of energy will be altered due to changes in a food web♦	
B. Matter is recycled through an ecosystem • Explain the processes involved in the recycling of nitrogen, oxygen, and carbon through an ecosystem • Explain the importance of the recycling of nitrogen, oxygen, and carbon within an ecosystem	
Big Idea 3. Genetic variation sorted by the natural selection process explains evidence of biological evolution	
A. Evidence for the nature and rates of evolution can be found in anatomical and molecular characteristics of organisms and in the fossil record • Interpret fossil evidence to explain the relatedness of organisms using the principles of superposition and fossil correlation • Evaluate the evidence that supports the theory of biological evolution (e.g., fossil records, similarities between DNA and protein structures, similarities between developmental stages of organisms, homologous and vestigial structures)♦	
B. Reproduction is essential to the continuation of every species • Define a species in terms of the ability to mate and produce fertile offspring♦ • Explain the importance of reproduction to the survival of a species (i.e., the failure of a species to reproduce will lead to extinction of that species)♦	

TABLE 3I

MISSOURI Biology I Course Level Expectations	ACT Science College Readiness Standards
Strand 4: Changes in Ecosystems and Interactions of Organisms with their Environments	
Big Idea 2. Matter and energy flow through the ecosystem	
C. Natural selection is the process of sorting individuals based on their ability to survive and reproduce within their ecosystem • Identify examples of adaptations that may have resulted from variations favored by natural selection (e.g., long-necked giraffes, long-eared jack rabbits) and describe how that variation may have provided populations an advantage for survival♦ • Explain how genetic homogeneity may cause a population to be more susceptible to extinction (e.g., succumbing to a disease for which there is no natural resistance) • Explain how environmental factors (e.g., habitat loss, climate change, pollution, introduction of non-native species) can be agents of natural selection♦ • Given a scenario describing an environmental change, hypothesize why a given species was unable to survive	

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TABLE 3I

MISSOURI Biology I Course Level Expectations	ACT Science College Readiness Standards
Strand 5: Processes and Interactions of the Earth's Systems (Geosphere, Atmosphere, and Hydrosphere)	
Big Idea 1.	[No CLEs in Biology I course]
Big Idea 2.	[No CLEs in Biology I course]
Big Idea 3. Human activity is dependent upon and affects Earth's resources and systems	
A. Earth's materials are limited natural resources affected by human activity • Predict local and/or global effects of environmental changes when given a scenario describing how the composition of the geosphere, hydrosphere, or atmosphere is altered by natural phenomena or human activities • Recognize how the geomorphology of Missouri (i.e., different types of Missouri soil and rock materials such as limestone, granite, clay, loam; land formations such as karst (cave) formations, glaciated plains, river channels) affects the survival of organisms	
Strand 6: Composition and Structure of the Universe and the Motion of the Objects Within It	
Big Idea 1. The universe has observable properties and structure	
A.	[No CLEs in Biology I course]
B. The Earth has a composition and location suitable to sustain life • Explain how Earth's environmental characteristics and location in the universe (e.g., atmosphere, temperature, orbital path, magnetic field, mass-gravity, location in solar system) provide a life-supporting environment	
C.	[No CLEs in Biology I course]
Big Idea 2.	[No CLEs in Biology I course]

TABLE 3I

MISSOURI Biology I Course Level Expectations	ACT Science College Readiness Standards
Strand 7: Scientific Inquiry	
Big Idea 1. Science understanding is developed through the use of science process skills, scientific knowledge, scientific investigation, reasoning, and critical thinking	
A. Scientific inquiry includes the ability of students to formulate a testable question and explanation, and to select appropriate investigative methods in order to obtain evidence relevant to the explanation • Formulate testable questions and hypotheses♦ • Analyzing an experiment, identify the components (i.e., independent variable, dependent variables, control of constants, multiple trials) and explain their importance to the design of a valid experiment♦ • Design and conduct a valid experiment♦ • Recognize it is not always possible, for practical or ethical reasons, to control some conditions (e.g., when sampling or testing humans, when observing animal behaviors in nature)♦ • Acknowledge some scientific explanations (e.g., explanations of astronomical or meteorological phenomena) cannot be tested using a controlled laboratory experiment, but instead by using a model, due to the limits of the laboratory environment, resources, and/or technologies • Acknowledge there is no fixed procedure called "the scientific method", but that some investigations involve systematic observations, carefully collected and relevant evidence, logical reasoning, and some imagination in developing hypotheses and other explanations • Evaluate the design of an experiment and make suggestions for reasonable improvements♦	**Interpretation of Data:** Select a single piece of data (numerical or nonnumerical) from a simple data presentation (e.g., a table or graph with two or three variables; a food web diagram) Identify basic features of a table, graph, or diagram (e.g., headings, units of measurement, axis labels) Select two or more pieces of data from a simple data presentation Understand basic scientific terminology Find basic information in a brief body of text Determine how the value of one variable changes as the value of another variable changes in a simple data presentation Compare or combine data from a simple data presentation (e.g., order or sum data from a table) Translate information into a table, graph, or diagram **Scientific Investigation:** Understand the methods and tools used in a simple experiment Understand a simple experimental design Identify a control in an experiment Determine the experimental conditions that would produce specified results Determine the hypothesis for an experiment Identify an alternate method for testing a hypothesis **Evaluation of Models, Inferences, and Experimental Results:** Select a simple hypothesis, prediction, or conclusion that is supported by a data presentation or a model Identify key issues or assumptions in a model Determine whether given information supports or contradicts a simple hypothesis or conclusion, and why Identify strengths and weaknesses in one or more models Select a data presentation or a model that supports or contradicts a hypothesis, prediction, or conclusion

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MISSOURI Biology I Course Level Expectations	ACT Science College Readiness Standards
Strand 7: Scientific Inquiry	
Big Idea 1. Science understanding is developed through the use of science process skills, scientific knowledge, scientific investigation, reasoning, and critical thinking	
B. Scientific inquiry relies upon gathering evidence from qualitative and quantitative observations • Make qualitative and quantitative observations using the appropriate senses, tools and equipment to gather data (e.g., microscopes, thermometers, analog and digital meters, computers, spring scales, balances, metric rulers, graduated cylinders) • Measure length to the nearest millimeter, mass to the nearest gram, volume to the nearest milliliter, force (weight) to the nearest Newton, temperature to the nearest degree Celsius, time to the nearest second♦ • Determine the appropriate tools and techniques to collect, analyze, and interpret data♦ • Judge whether measurements and computation of quantities are reasonable♦ • Calculate the range, average/mean, percent, and ratios for sets of data♦ • Recognize observation is biased by the experiences and knowledge of the observer (e.g., strong beliefs about what should happen in particular circumstances can prevent the detection of other results)	**Interpretation of Data:** Select a single piece of data (numerical or nonnumerical) from a simple data presentation (e.g., a table or graph with two or three variables; a food web diagram) Identify basic features of a table, graph, or diagram (e.g., headings, units of measurement, axis labels) Select two or more pieces of data from a simple data presentation Understand basic scientific terminology Find basic information in a brief body of text Determine how the value of one variable changes as the value of another variable changes in a simple data presentation Compare or combine data from a simple data presentation (e.g., order or sum data from a table) Translate information into a table, graph, or diagram Interpolate between data points in a table or graph Identify and/or use a simple (e.g., linear) mathematical relationship between data **Scientific Investigation:** Understand the methods and tools used in a simple experiment Understand a simple experimental design Understand precision and accuracy issues **Evaluation of Models, Inferences, and Experimental Results:** Select a simple hypothesis, prediction, or conclusion that is supported by a data presentation or a model

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MISSOURI Biology I Course Level Expectations	ACT Science College Readiness Standards
Strand 7: Scientific Inquiry	
Big Idea 1. Science understanding is developed through the use of science process skills, scientific knowledge, scientific investigation, reasoning, and critical thinking	
C. Scientific inquiry includes evaluation of explanations (laws/principles, theories/models) in light of evidence (data) and scientific principles (understandings) • Use quantitative and qualitative data as support for reasonable explanations (conclusions)♦ • Analyze experimental data to determine patterns, relationships, perspectives, and credibility of explanations (e.g., predict/extrapolate data, explain the relationship between the independent and dependent variable)♦ • Identify the possible effects of errors in observations, measurements, and calculations, on the validity and reliability of data and resultant explanations (conclusions)♦ • Analyze whether evidence (data) and scientific principles support proposed explanations (laws/principles, theories/models)♦	**Interpretation of Data:** Select a single piece of data (numerical or nonnumerical) from a simple data presentation (e.g., a table or graph with two or three variables; a food web diagram) Identify basic features of a table, graph, or diagram (e.g., headings, units of measurement, axis labels) Select two or more pieces of data from a simple data presentation Understand basic scientific terminology Find basic information in a brief body of text Determine how the value of one variable changes as the value of another variable changes in a simple data presentation Compare or combine data from a simple data presentation (e.g., order or sum data from a table) Translate information into a table, graph, or diagram Interpolate between data points in a table or graph Identify and/or use a simple (e.g., linear) mathematical relationship between data Extrapolate from data points in a table or graph **Scientific Investigation:** Understand the methods and tools used in a simple experiment Understand a simple experimental design Identify a control in an experiment Understand precision and accuracy issues **Evaluation of Models, Inferences, and Experimental Results:** Select a simple hypothesis, prediction, or conclusion that is supported by a data presentation or a model Identify key issues or assumptions in a model Determine whether given information supports or contradicts a simple hypothesis or conclusion, and why Identify strengths and weaknesses in one or more models Determine which model(s) is(are) supported or weakened by new information Select a data presentation or a model that supports or contradicts a hypothesis, prediction, or conclusion

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Strand 7: Scientific Inquiry	
Big Idea 1. Science understanding is developed through the use of science process skills, scientific knowledge, scientific investigation, reasoning, and critical thinking	

D. The nature of science relies upon communication of results and justification of explanations
• Communicate the procedures and results of investigations and explanations through:♦
  • oral presentations
  • drawings and maps
  • data tables (allowing for the recording and analysis of data relevant to the experiment such as independent and dependent variables, multiple trials, beginning and ending times or temperatures, derived quantities)
  • graphs (bar, single, and multiple line)
  • equations and writings
• Communicate and defend a scientific argument
• Explain the importance of the public presentation of scientific work and supporting evidence to the scientific community (e.g., work and evidence must be critiqued, reviewed, and validated by peers; needed for subsequent investigations by peers; results can influence the decisions regarding future scientific work)♦
	Interpretation of Data:
	Select a single piece of data (numerical or nonnumerical) from a simple data presentation (e.g., a table or graph with two or three variables; a food web diagram)
	Identify basic features of a table, graph, or diagram (e.g., headings, units of measurement, axis labels)
	Select two or more pieces of data from a simple data presentation
	Understand basic scientific terminology
	Find basic information in a brief body of text
	Determine how the value of one variable changes as the value of another variable changes in a simple data presentation
	Compare or combine data from a simple data presentation (e.g., order or sum data from a table)
	Translate information into a table, graph, or diagram
	Scientific Investigation:
	Understand the methods and tools used in a simple experiment
	Understand a simple experimental design
	Evaluation of Models, Inferences, and Experimental Results:
	Select a simple hypothesis, prediction, or conclusion that is supported by a data presentation or a model
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TABLE 3I

MISSOURI Biology I Course Level Expectations	ACT Science College Readiness Standards
Strand 8: Impact of Science, Technology and Human Activity	
Big Idea 1. The nature of technology can advance, and is advanced by, science as it seeks to apply scientific knowledge in ways that meet human needs	
A.	[No CLEs in Biology I course]
B. Advances in technology often result in improved data collection and an increase in scientific information • Recognize the relationships linking technology and science (e.g., how technological problems may create a demand for new science knowledge, how new technologies make it possible for scientists to extend research and advance science)	
Big Idea 2. Historical and cultural perspectives of scientific explanations help to improve understanding of the nature of science and how science knowledge and technology evolve over time	
A. People of different gender and ethnicity have contributed to scientific discoveries and the invention of technological innovations • Recognize contributions to science are not limited to the work of one particular group, but are made by a diverse group of scientists representing various ethnic and gender groups • Recognize gender and ethnicity of scientists often influence the questions asked and/or the methods used in scientific research and may limit or advance science knowledge and/or technology	
B. Scientific theories are developed based on the body of knowledge that exists at any particular time and must be rigorously questioned and tested for validity • Identify and describe how explanations (laws/ principles, theories/models) of scientific phenomena have changed over time as a result of new evidence (e.g., cell theory, theories of spontaneous generation and biogenesis, theories of extinction, evolution theory, structure of the cell membrane, genetic theory of inheritance)♦ • Identify and analyze current theories that are being questioned, and compare them to new theories that have emerged to challenge older ones (e.g., theories of evolution, extinction, global warming)	**Evaluation of Models, Inferences, and Experimental Results:** Select a simple hypothesis, prediction, or conclusion that is supported by a data presentation or a model Identify key issues or assumptions in a model Determine whether given information supports or contradicts a simple hypothesis or conclusion, and why Identify strengths and weaknesses in one or more models Identify similarities and differences between models Determine which model(s) is(are) supported or weakened by new information Select a data presentation or a model that supports or contradicts a hypothesis, prediction, or conclusion

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TABLE 3I

MISSOURI Biology I Course Level Expectations	ACT Science College Readiness Standards
Strand 8: Impact of Science, Technology and Human Activity	
Big Idea 3. Science and technology affect, and are affected by, society	
A.	[No CLEs in Biology I course]
B. Social, political, economic, ethical and environmental factors strongly influence, and are influenced by, the direction of progress of science and technology • Analyze the roles of science and society as they interact to determine the direction of scientific and technological progress (e.g., prioritization of and funding for new scientific research and technological development is determined on the basis of individual, political and social values and needs; understanding basic concepts and principles of science and technology influences debate about the economics, policies, politics, and ethics of various scientific and technological challenges) • Identify and describe major scientific and technological challenges to society and their ramifications for public policy (e.g., global warming, limitations to fossil fuels, genetic engineering of plants, space and/or medical research) • Analyze and evaluate the drawbacks (e.g., design constraints, unintended consequences, risks), benefits, and factors (i.e., social, political, economic, ethical, and environmental) affecting progress toward meeting major scientific and technological challenges (e.g., limitations placed on stem-cell research or genetic engineering, introduction of alien species, deforestation, bioterrorism, nuclear energy, genetic counseling, use of alternative energies for carbon fuels, use of pesticides)♦	
C. Scientific ethics require that scientists must not knowingly subject people or the community to health or property risks without their knowledge and consent • Identify and evaluate the need for informed consent in experimentation • Identify the ethical issues involved in experimentation (i.e., risks to organisms or environment) • Identify and evaluate the role of models as an ethical alternative to direct experimentation (e.g., using a model for a stream rather than pouring oil in an existing stream when studying the effects of oil pollution on aquatic plants)	

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TABLE 3I

MISSOURI Biology I Course Level Expectations	ACT Science College Readiness Standards
Strand 8: Impact of Science, Technology and Human Activity	
Big Idea 3. Science and technology affect, and are affected by, society	
D. Scientific information is presented through a number of credible sources, but is at times influenced in such a way to become non-credible • Evaluate a given source for its scientific credibility (e.g., articles in a new periodical quoting an "eye witness," a scientist speaking within or outside his/her area of expertise) • Explain why accurate record-keeping, openness, and replication are essential for maintaining an investigator's credibility with other scientists and society♦	

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TABLE 3J

MISSOURI Chemistry I Course Level Expectations	PLAN Science College Readiness Standards
Strand 1: Properties and Principles of Matter and Energy	
Big Idea 1. Changes in properties and states of matter provide evidence of the atomic theory of matter	
A. Objects, and the materials they are made of, have properties that can be used to describe and classify them a. Compare the densities of regular and irregular objects using their respective measures of volume and mass♦ b. Identify pure substances by their physical and chemical properties (i.e., color, luster/reflectivity, hardness, conductivity, density, pH, melting point, boiling point, specific heat, solubility, phase at room temperature, chemical reactivity)♦ c. Classify a substance as being made up of one kind of atom (element) or a compound when given the molecular formula or structural formula (or electron dot diagram) for the substance♦ d. Compare and contrast the common properties of metals, nonmetals, metalloids (semi-conductors), and noble gases♦	
B. Properties of mixtures depend upon the concentrations, properties, and interactions of particles a. Classify solutions as either dilute or concentrated; as either saturated, unsaturated, or supersaturated♦ b. Compare and contrast the properties of acidic, basic, and neutral solutions♦ c. Predict the effects of solvent and solute polarity on solubility ("like dissolves like"); and predict the effects of temperature, surface area, particle size, and agitation on rates of solubility♦	
C.	[No CLEs in Chemistry I course]
D. Physical changes in states of matter due to thermal changes in materials can be explained by the Kinetic Theory of Matter a. Using the Kinetic Theory model, explain the changes that occur in the distance between atoms/molecules and temperature of a substance as energy is absorbed or released during a phase change♦ b. Predict the effect of a temperature change on the properties (e.g., pressure, density) of a material (solids, liquids, gases)♦ c. Predict the effect of pressure changes on the properties (e.g., temperature, density) of a material (solids, liquids, gases)♦	

TABLE 3J

MISSOURI Chemistry I Course Level Expectations	PLAN Science College Readiness Standards
Strand 1: Properties and Principles of Matter and Energy	
Big Idea 1. Changes in properties and states of matter provide evidence of the atomic theory of matter	
E. The atomic model describes the electrically neutral atom a. Describe the atom as having a dense, positive nucleus surrounded by a cloud of negative electrons♦ b. Calculate the number of protons, neutrons, and electrons of an isotope, given its mass number and atomic number♦ c. Describe the information provided by the atomic number and the mass number (i.e., electrical charge, chemical stability)♦	
F. The periodic table organizes the elements according to their atomic structure and chemical reactivity a. Explain the structure of the periodic table in terms of the elements with common properties (groups/ families) and repeating properties (periods)♦ b. Classify elements as metals, nonmetals, metalloids (semi-conductors), and noble gases according to their location on the Periodic Table♦ c. Predict the chemical reactivity of elements, and the type of bonds that may result between them, using the Periodic Table♦	
G. Properties of objects and states of matter can change chemically and/or physically a. Distinguish between physical and chemical changes in matter♦	
H. Chemical bonding is the combining of different pure substances (elements, compounds) to form new substances with different properties a. Describe how the valence electron configuration determines how atoms interact and may bond♦ b. [No CLE in Chemistry I course] c. Compare and contrast the types of chemical bonds (i.e., ionic, covalent)♦ d. Predict the products of an acid/base (neutralization), oxidation (rusting), and combustion (burning) reaction♦	
I. Mass is conserved during any physical or chemical change a. Compare the mass of the reactants to the mass of the products in a chemical reaction or physical change as support for the Law of Conservation of Mass♦ b. Recognize whether the number of atoms of the reactants and products in a chemical equation are balanced♦	

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TABLE 3J

MISSOURI Chemistry I Course Level Expectations	PLAN Science College Readiness Standards
Strand 1: Properties and Principles of Matter and Energy	
Big Idea 2. Energy has a source, can be stored, and can be transferred but is conserved within a system	
A. Forms of energy have a source, a means of transfer (work and heat), and a receiver a. Differentiate between thermal energy (the total internal energy of a substance which is dependent upon mass), heat (thermal energy that transfers from one object or system to another due to a difference in temperature), and temperature (the measure of average kinetic energy of molecules or atoms in a substance) b. Describe the relationship among wavelength, energy, and frequency as illustrated by the electromagnetic spectrum c. [No CLE in Chemistry I course] d. Describe the effect of different frequencies of electromagnetic waves on the Earth and living organisms (e.g., radio, infrared, visible, ultraviolet, gamma, cosmic rays)	
B.–C.	[No CLEs in Chemistry I course]
D. Chemical reactions involve changes in the bonding of atoms with the release or absorption of energy • Describe evidence of energy transfer and transformations that occur during exothermic and endothermic chemical reactions♦	
E. Nuclear energy is a major source of energy throughout the universe • Describe how changes in the nucleus of an atom during a nuclear reaction (i.e., nuclear decay, fusion, fission) result in emission of radiation♦	
F. Energy can be transferred within a system as the total amount of energy remains constant (i.e., Law of Conservation of Energy) • Classify the different ways to store energy (i.e., chemical, nuclear, thermal, mechanical, electromagnetic) and describe the transfer of energy as it changes from kinetic to potential, while the total amount of energy remains constant, within a system (e.g., using gasoline to move a car, photocell generating electricity, biochemical reaction, energy generated by nuclear reactor)♦	

TABLE 3J

MISSOURI Chemistry I Course Level Expectations	PLAN Science College Readiness Standards
Strand 2: Properties and Principles of Force and Motion	[No CLEs in Chemistry I course]
Strand 3: Characteristic and Interactions of Living Organisms	[No CLEs in Chemistry I course]
Strand 4: Changes in Ecosystems and Interactions of Organisms with their Environments	[No CLEs in Chemistry I course]
Strand 5: Processes and Interactions of the Earth's Systems (Geosphere, Atmosphere, and Hydrosphere)	
Big Idea 1. Earth's Systems (geosphere, atmosphere, and hydrosphere) have common components and unique structures	
A.	[No CLEs in Chemistry I course]
B. The hydrosphere is composed of water (a material with unique properties) and other materials • Recognize the importance of water as a solvent in the environment as it relates to acid rain and water pollution	
C. The atmosphere (air) is composed of a mixture of gases, including water vapor, and minute particles • Relate the composition of gases and temperature of the layers of the atmosphere (i.e., troposphere, stratosphere, ionosphere) to cloud formation and transmission of radiation (e.g., ultraviolet, infrared) • Describe the causes and consequences of observed and predicted changes in the ozone layer	
Big Idea 2. Earth's Systems (geosphere, atmosphere, and hydrosphere) interact with one another as they undergo change by common processes	
A.–E.	[No CLEs in Chemistry I course]
F. Climate is a description of average weather conditions in a given area due to the transfer of energy and matter through Earth's systems • Provide evidence (e.g., variations in sea level, glaciation, and permafrost layers, fossils, desertification) that supports theories of climate change due to natural phenomena and/or human interactions	
Big Idea 3.	[No CLEs in Chemistry I course]
Strand 6: Composition and Structure of the Universe and the Motion of the Objects Within It	[No CLEs in Chemistry I course]

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	Select two or more pieces of data from a simple data presentation
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	Find basic information in a brief body of text
	Determine how the value of one variable changes as the value of another variable changes in a simple data presentation
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TABLE 3J

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Big Idea 1.	[No CLEs in Chemistry I course]
Big Idea 2. Historical and cultural perspectives of scientific explanations help to improve understanding of the nature of science and how science knowledge and technology evolve over time	
A. People of different gender and ethnicity have contributed to scientific discoveries and the invention of technological innovations • Recognize contributions to science are not limited to the work of one particular group, but are made by a diverse group of scientists representing various ethnic and gender groups	
B. Scientific theories are developed based on the body of knowledge that exists at any particular time and must be rigorously questioned and tested for validity • Identify and describe how explanations (laws/ principles, theories/models) of scientific phenomena have changed over time as a result of new evidence (e.g., basic structure of matter, structure of an atom)♦	**Evaluation of Models, Inferences, and Experimental Results:** Select a simple hypothesis, prediction, or conclusion that is supported by a data presentation or a model Identify key issues or assumptions in a model Determine whether given information supports or contradicts a simple hypothesis or conclusion, and why Identify strengths and weaknesses in one or more models Identify similarities and differences between models Determine which model(s) is(are) supported or weakened by new information Select a data presentation or a model that supports or contradicts a hypothesis, prediction, or conclusion

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TABLE 3J

MISSOURI Chemistry I Course Level Expectations	PLAN Science College Readiness Standards
Strand 8: Impact of Science, Technology and Human Activity	
Big Idea 3. Science and technology affect, and are affected by, society	
A.	[No CLEs in Chemistry I course]
B. Social, political, economic, ethical and environmental factors strongly influence, and are influenced by, the direction of progress of science and technology • Analyze the roles of science and society as they interact to determine the direction of scientific and technological progress (e.g., prioritization of and funding for new scientific research and technological development is determined on the basis of individual, political and social values and needs; understanding basic concepts and principles of science and technology influences debate about the economics, policies, politics, and ethics of various scientific and technological challenges) • Identify and describe major scientific and technological challenges to society and their ramifications for public policy (e.g., global warming, limitations to fossil fuels, genetic engineering of plants, space and/or medical research)	
C.	[No CLEs in Chemistry I course]
D. Scientific information is presented through a number of credible sources, but is at times influenced in such a way to become non-credible • Evaluate a given source for its scientific credibility (e.g., articles in a new periodical quoting an "eye witness," a scientist speaking within or outside his/her area of expertise) • Explain why accurate record-keeping, openness, and replication are essential for maintaining an investigator's credibility with other scientists and society♦	

TABLE 3K

MISSOURI Chemistry I Course Level Expectations	ACT Science College Readiness Standards
Strand 1: Properties and Principles of Matter and Energy	
Big Idea 1. Changes in properties and states of matter provide evidence of the atomic theory of matter	
A. Objects, and the materials they are made of, have properties that can be used to describe and classify them a. Compare the densities of regular and irregular objects using their respective measures of volume and mass♦ b. Identify pure substances by their physical and chemical properties (i.e., color, luster/reflectivity, hardness, conductivity, density, pH, melting point, boiling point, specific heat, solubility, phase at room temperature, chemical reactivity)♦ c. Classify a substance as being made up of one kind of atom (element) or a compound when given the molecular formula or structural formula (or electron dot diagram) for the substance♦ d. Compare and contrast the common properties of metals, nonmetals, metalloids (semi-conductors), and noble gases♦	
B. Properties of mixtures depend upon the concentrations, properties, and interactions of particles a. Classify solutions as either dilute or concentrated; as either saturated, unsaturated, or supersaturated♦ b. Compare and contrast the properties of acidic, basic, and neutral solutions♦ c. Predict the effects of solvent and solute polarity on solubility ("like dissolves like"); and predict the effects of temperature, surface area, particle size, and agitation on rates of solubility♦	
C.	[No CLEs in Chemistry I course]
D. Physical changes in states of matter due to thermal changes in materials can be explained by the Kinetic Theory of Matter a. Using the Kinetic Theory model, explain the changes that occur in the distance between atoms/molecules and temperature of a substance as energy is absorbed or released during a phase change♦ b. Predict the effect of a temperature change on the properties (e.g., pressure, density) of a material (solids, liquids, gases)♦ c. Predict the effect of pressure changes on the properties (e.g., temperature, density) of a material (solids, liquids, gases)♦	

TABLE 3K

MISSOURI Chemistry I Course Level Expectations	ACT Science College Readiness Standards
Strand 1: Properties and Principles of Matter and Energy	
Big Idea 1. Changes in properties and states of matter provide evidence of the atomic theory of matter	
E. The atomic model describes the electrically neutral atom a. Describe the atom as having a dense, positive nucleus surrounded by a cloud of negative electrons♦ b. Calculate the number of protons, neutrons, and electrons of an isotope, given its mass number and atomic number♦ c. Describe the information provided by the atomic number and the mass number (i.e., electrical charge, chemical stability)♦	
F. The periodic table organizes the elements according to their atomic structure and chemical reactivity a. Explain the structure of the periodic table in terms of the elements with common properties (groups/ families) and repeating properties (periods)♦ b. Classify elements as metals, nonmetals, metalloids (semi-conductors), and noble gases according to their location on the Periodic Table♦ c. Predict the chemical reactivity of elements, and the type of bonds that may result between them, using the Periodic Table♦	
G. Properties of objects and states of matter can change chemically and/or physically a. Distinguish between physical and chemical changes in matter♦	
H. Chemical bonding is the combining of different pure substances (elements, compounds) to form new substances with different properties a. Describe how the valence electron configuration determines how atoms interact and may bond♦ b. [No CLE in Chemistry I course] c. Compare and contrast the types of chemical bonds (i.e., ionic, covalent)♦ d. Predict the products of an acid/base (neutralization), oxidation (rusting), and combustion (burning) reaction♦	
I. Mass is conserved during any physical or chemical change a. Compare the mass of the reactants to the mass of the products in a chemical reaction or physical change as support for the Law of Conservation of Mass♦ b. Recognize whether the number of atoms of the reactants and products in a chemical equation are balanced♦	

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TABLE 3K

MISSOURI Chemistry I Course Level Expectations	ACT Science College Readiness Standards
Strand 1: Properties and Principles of Matter and Energy	
Big Idea 2. Energy has a source, can be stored, and can be transferred but is conserved within a system	
A. Forms of energy have a source, a means of transfer (work and heat), and a receiver a. Differentiate between thermal energy (the total internal energy of a substance which is dependent upon mass), heat (thermal energy that transfers from one object or system to another due to a difference in temperature), and temperature (the measure of average kinetic energy of molecules or atoms in a substance) b. Describe the relationship among wavelength, energy, and frequency as illustrated by the electromagnetic spectrum c. [No CLE in Chemistry I course] d. Describe the effect of different frequencies of electromagnetic waves on the Earth and living organisms (e.g., radio, infrared, visible, ultraviolet, gamma, cosmic rays)	
B.–C.	[No CLEs in Chemistry I course]
D. Chemical reactions involve changes in the bonding of atoms with the release or absorption of energy • Describe evidence of energy transfer and transformations that occur during exothermic and endothermic chemical reactions♦	
E. Nuclear energy is a major source of energy throughout the universe • Describe how changes in the nucleus of an atom during a nuclear reaction (i.e., nuclear decay, fusion, fission) result in emission of radiation♦	
F. Energy can be transferred within a system as the total amount of energy remains constant (i.e., Law of Conservation of Energy) • Classify the different ways to store energy (i.e., chemical, nuclear, thermal, mechanical, electromagnetic) and describe the transfer of energy as it changes from kinetic to potential, while the total amount of energy remains constant, within a system (e.g., using gasoline to move a car, photocell generating electricity, biochemical reaction, energy generated by nuclear reactor)♦	
Strand 2: Properties and Principles of Force and Motion	[No CLEs in Chemistry I course]
Strand 3: Characteristic and Interactions of Living Organisms	[No CLEs in Chemistry I course]
Strand 4: Changes in Ecosystems and Interactions of Organisms with their Environments	[No CLEs in Chemistry I course]

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TABLE 3K

MISSOURI Chemistry I Course Level Expectations	ACT Science College Readiness Standards
Strand 5: Processes and Interactions of the Earth's Systems (Geosphere, Atmosphere, and Hydrosphere)	
Big Idea 1. Earth's Systems (geosphere, atmosphere, and hydrosphere) have common components and unique structures	
A.	[No CLEs in Chemistry I course]
B. The hydrosphere is composed of water (a material with unique properties) and other materials • Recognize the importance of water as a solvent in the environment as it relates to acid rain and water pollution	
C. The atmosphere (air) is composed of a mixture of gases, including water vapor, and minute particles • Relate the composition of gases and temperature of the layers of the atmosphere (i.e., troposphere, stratosphere, ionosphere) to cloud formation and transmission of radiation (e.g., ultraviolet, infrared) • Describe the causes and consequences of observed and predicted changes in the ozone layer	
Big Idea 2. Earth's Systems (geosphere, atmosphere, and hydrosphere) interact with one another as they undergo change by common processes	
A.–E.	[No CLEs in Chemistry I course]
F. Climate is a description of average weather conditions in a given area due to the transfer of energy and matter through Earth's systems • Provide evidence (e.g., variations in sea level, glaciation, and permafrost layers, fossils, desertification) that supports theories of climate change due to natural phenomena and/or human interactions	
Big Idea 3.	[No CLEs in Chemistry I course]
Strand 6: Composition and Structure of the Universe and the Motion of the Objects Within It	[No CLEs in Chemistry I course]

TABLE 3K

MISSOURI Chemistry I Course Level Expectations	ACT Science College Readiness Standards
Strand 7: Scientific Inquiry	
Big Idea 1. Science understanding is developed through the use of science process skills, scientific knowledge, scientific investigation, reasoning, and critical thinking	
A. Scientific inquiry includes the ability of students to formulate a testable question and explanation, and to select appropriate investigative methods in order to obtain evidence relevant to the explanation • Formulate testable questions and hypotheses • Analyzing an experiment, identify the components (i.e., independent variable, dependent variables, control of constants, multiple trials) and explain their importance to the design of a valid experiment♦ • Design and conduct a valid experiment • Recognize it is not always possible, for practical or ethical reasons, to control some conditions (e.g., when sampling or testing humans, when observing animal behaviors in nature) • Acknowledge some scientific explanations (e.g., explanations of astronomical or meteorological phenomena) cannot be tested using a controlled laboratory experiment, but instead by using a model, due to the limits of the laboratory environment, resources, and/or technologies • Acknowledge there is no fixed procedure called "the scientific method", but that some investigations involve systematic observations, carefully collected and relevant evidence, logical reasoning, and some imagination in developing hypotheses and other explanations • Evaluate the design of an experiment and make suggestions for reasonable improvements♦	**Interpretation of Data:** Select a single piece of data (numerical or nonnumerical) from a simple data presentation (e.g., a table or graph with two or three variables; a food web diagram) Identify basic features of a table, graph, or diagram (e.g., headings, units of measurement, axis labels) Select two or more pieces of data from a simple data presentation Understand basic scientific terminology Find basic information in a brief body of text Determine how the value of one variable changes as the value of another variable changes in a simple data presentation Compare or combine data from a simple data presentation (e.g., order or sum data from a table) Translate information into a table, graph, or diagram **Scientific Investigation:** Understand the methods and tools used in a simple experiment Understand a simple experimental design Identify a control in an experiment Determine the experimental conditions that would produce specified results Determine the hypothesis for an experiment Identify an alternate method for testing a hypothesis **Evaluation of Models, Inferences, and Experimental Results:** Select a simple hypothesis, prediction, or conclusion that is supported by a data presentation or a model Identify key issues or assumptions in a model Determine whether given information supports or contradicts a simple hypothesis or conclusion, and why Identify strengths and weaknesses in one or more models Select a data presentation or a model that supports or contradicts a hypothesis, prediction, or conclusion

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TABLE 3K

MISSOURI Chemistry I Course Level Expectations	ACT Science College Readiness Standards
Strand 7: Scientific Inquiry	
Big Idea 1. Science understanding is developed through the use of science process skills, scientific knowledge, scientific investigation, reasoning, and critical thinking	
B. Scientific inquiry relies upon gathering evidence from qualitative and quantitative observations • Make qualitative and quantitative observations using the appropriate senses, tools and equipment to gather data (e.g., microscopes, thermometers, analog and digital meters, computers, spring scales, balances, metric rulers, graduated cylinders) • Measure length to the nearest millimeter, mass to the nearest gram, volume to the nearest milliliter, force (weight) to the nearest Newton, temperature to the nearest degree Celsius, time to the nearest second • Determine the appropriate tools and techniques to collect, analyze, and interpret data • Judge whether measurements and computation of quantities are reasonable • Calculate the range, average/mean, percent, and ratios for sets of data • Recognize observation is biased by the experiences and knowledge of the observer (e.g., strong beliefs about what should happen in particular circum-stances can prevent the detection of other results)	**Interpretation of Data:** Select a single piece of data (numerical or nonnumerical) from a simple data presentation (e.g., a table or graph with two or three variables; a food web diagram) Identify basic features of a table, graph, or diagram (e.g., headings, units of measurement, axis labels) Select two or more pieces of data from a simple data presentation Understand basic scientific terminology Find basic information in a brief body of text Determine how the value of one variable changes as the value of another variable changes in a simple data presentation Compare or combine data from a simple data presentation (e.g., order or sum data from a table) Translate information into a table, graph, or diagram Interpolate between data points in a table or graph Identify and/or use a simple (e.g., linear) mathematical relationship between data **Scientific Investigation:** Understand the methods and tools used in a simple experiment Understand a simple experimental design Understand precision and accuracy issues **Evaluation of Models, Inferences, and Experimental Results:** Select a simple hypothesis, prediction, or conclusion that is supported by a data presentation or a model

TABLE 3K

MISSOURI Chemistry I Course Level Expectations	ACT Science College Readiness Standards
Strand 7: Scientific Inquiry	
Big Idea 1. Science understanding is developed through the use of science process skills, scientific knowledge, scientific investigation, reasoning, and critical thinking	
C. Scientific inquiry includes evaluation of explanations (laws/principles, theories/models) in light of evidence (data) and scientific principles (understandings) • Use quantitative and qualitative data as support for reasonable explanations (conclusions)♦ • Analyze experimental data to determine patterns, relationships, perspectives, and credibility of explanations (e.g., predict/extrapolate data, explain the relationship between the independent and dependent variable)♦ • Identify the possible effects of errors in observations, measurements, and calculations, on the validity and reliability of data and resultant explanations (conclusions) • Analyze whether evidence (data) and scientific principles support proposed explanations (laws/principles, theories/models)♦	**Interpretation of Data:** Select a single piece of data (numerical or nonnumerical) from a simple data presentation (e.g., a table or graph with two or three variables; a food web diagram) Identify basic features of a table, graph, or diagram (e.g., headings, units of measurement, axis labels) Select two or more pieces of data from a simple data presentation Understand basic scientific terminology Find basic information in a brief body of text Determine how the value of one variable changes as the value of another variable changes in a simple data presentation Compare or combine data from a simple data presentation (e.g., order or sum data from a table) Translate information into a table, graph, or diagram Interpolate between data points in a table or graph Identify and/or use a simple (e.g., linear) mathematical relationship between data Extrapolate from data points in a table or graph **Scientific Investigation:** Understand the methods and tools used in a simple experiment Understand a simple experimental design Identify a control in an experiment Understand precision and accuracy issues **Evaluation of Models, Inferences, and Experimental Results:** Select a simple hypothesis, prediction, or conclusion that is supported by a data presentation or a model Identify key issues or assumptions in a model Determine whether given information supports or contradicts a simple hypothesis or conclusion, and why Identify strengths and weaknesses in one or more models Determine which model(s) is(are) supported or weakened by new information Select a data presentation or a model that supports or contradicts a hypothesis, prediction, or conclusion

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TABLE 3K

MISSOURI Chemistry I Course Level Expectations	ACT Science College Readiness Standards
Strand 7: Scientific Inquiry	
Big Idea 1. Science understanding is developed through the use of science process skills, scientific knowledge, scientific investigation, reasoning, and critical thinking	

D. The nature of science relies upon communication of results and justification of explanations
• Communicate the procedures and results of investigations and explanations through:
  • oral presentations
  • drawings and maps
  • data tables (allowing for the recording and analysis of data relevant to the experiment such as independent and dependent variables, multiple trials, beginning and ending times or temperatures, derived quantities)
  • graphs (bar, single, and multiple line)
  • equations and writings
• Communicate and defend a scientific argument
• Explain the importance of the public presentation of scientific work and supporting evidence to the scientific community (e.g., work and evidence must be critiqued, reviewed, and validated by peers; needed for subsequent investigations by peers; results can influence the decisions regarding future scientific work)
	Interpretation of Data:
	Select a single piece of data (numerical or nonnumerical) from a simple data presentation (e.g., a table or graph with two or three variables; a food web diagram)
	Identify basic features of a table, graph, or diagram (e.g., headings, units of measurement, axis labels)
	Select two or more pieces of data from a simple data presentation
	Understand basic scientific terminology
	Find basic information in a brief body of text
	Determine how the value of one variable changes as the value of another variable changes in a simple data presentation
	Compare or combine data from a simple data presentation (e.g., order or sum data from a table)
	Translate information into a table, graph, or diagram
	Scientific Investigation:
	Understand the methods and tools used in a simple experiment
	Understand a simple experimental design
	Evaluation of Models, Inferences, and Experimental Results:
	Select a simple hypothesis, prediction, or conclusion that is supported by a data presentation or a model
	Identify key issues or assumptions in a model
	Determine whether given information supports or contradicts a simple hypothesis or conclusion, and why
	Identify strengths and weaknesses in one or more models
	Select a data presentation or a model that supports or contradicts a hypothesis, prediction, or conclusion

TABLE 3K

MISSOURI Chemistry I Course Level Expectations	ACT Science College Readiness Standards
Strand 8: Impact of Science, Technology and Human Activity	
Big Idea 1.	[No CLEs in Chemistry I course]
Big Idea 2. Historical and cultural perspectives of scientific explanations help to improve understanding of the nature of science and how science knowledge and technology evolve over time	
A. People of different gender and ethnicity have contributed to scientific discoveries and the invention of technological innovations • Recognize contributions to science are not limited to the work of one particular group, but are made by a diverse group of scientists representing various ethnic and gender groups	
B. Scientific theories are developed based on the body of knowledge that exists at any particular time and must be rigorously questioned and tested for validity • Identify and describe how explanations (laws/ principles, theories/models) of scientific phenomena have changed over time as a result of new evidence (e.g., basic structure of matter, structure of an atom)♦	**Evaluation of Models, Inferences, and Experimental Results:** Select a simple hypothesis, prediction, or conclusion that is supported by a data presentation or a model Identify key issues or assumptions in a model Determine whether given information supports or contradicts a simple hypothesis or conclusion, and why Identify strengths and weaknesses in one or more models Identify similarities and differences between models Determine which model(s) is(are) supported or weakened by new information Select a data presentation or a model that supports or contradicts a hypothesis, prediction, or conclusion

TABLE 3K

MISSOURI Chemistry I Course Level Expectations	ACT Science College Readiness Standards
Strand 8: Impact of Science, Technology and Human Activity	
Big Idea 3. Science and technology affect, and are affected by, society	
A.	[No CLEs in Chemistry I course]
B. Social, political, economic, ethical and environmental factors strongly influence, and are influenced by, the direction of progress of science and technology • Analyze the roles of science and society as they interact to determine the direction of scientific and technological progress (e.g., prioritization of and funding for new scientific research and technological development is determined on the basis of individual, political and social values and needs; understanding basic concepts and principles of science and technology influences debate about the economics, policies, politics, and ethics of various scientific and technological challenges) • Identify and describe major scientific and technological challenges to society and their ramifications for public policy (e.g., global warming, limitations to fossil fuels, genetic engineering of plants, space and/or medical research)	
C.	[No CLEs in Chemistry I course]
D. Scientific information is presented through a number of credible sources, but is at times influenced in such a way to become non-credible • Evaluate a given source for its scientific credibility (e.g., articles in a new periodical quoting an "eye witness," a scientist speaking within or outside his/her area of expertise) • Explain why accurate record-keeping, openness, and replication are essential for maintaining an investigator's credibility with other scientists and society♦	

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TABLE 3L

MISSOURI Physics I Course Level Expectations	PLAN Science College Readiness Standards
Strand 1: Properties and Principles of Matter and Energy	
Big Idea 1. Changes in properties and states of matter provide evidence of the atomic theory of matter	
A. Objects, and the materials they are made of, have properties that can be used to describe and classify them a. Compare the densities of regular and irregular objects using their respective measures of volume and mass b.–d. [No CLEs in Physics I course]	
B.–I.	[No CLEs in Physics I course]

TABLE 3L

MISSOURI Physics I Course Level Expectations	PLAN Science College Readiness Standards
Strand 1: Properties and Principles of Matter and Energy	
Big Idea 2. Energy has a source, can be stored, and can be transferred but is conserved within a system	
A. Forms of energy have a source, a means of transfer (work and heat), and a receiver a–c. [No CLEs in Physics I course] d. Describe sources and common uses of different forms of energy: chemical, nuclear, thermal, mechanical, electromagnetic♦ e. Identify and evaluate advantages/disadvantages of using various sources of energy (e.g., wind, solar, geothermal, hydroelectric, biomass, fossil fuel) for human activity f. Describe the effect of different frequencies of electromagnetic waves on the Earth and living organisms (e.g., radio, infrared, visible, ultraviolet, gamma, cosmic rays)	
B. Mechanical energy comes from the motion (kinetic energy) and/or relative position (potential energy) of an object a. Relate kinetic energy to an object's mass and its velocity♦ b. Relate an object's gravitational potential energy to its weight and height relative to the surface of the Earth♦ c. Distinguish between examples of kinetic and potential energy (i.e., gravitational, elastic) within a system♦ d. Describe the effect of work on an object's kinetic and potential energy♦	
C. Electromagnetic energy from the Sun (solar radiation) is a major source of energy on Earth • Identify stars as producers of electromagnetic energy • Describe how electromagnetic energy is transferred through space as electromagnetic waves of varying wavelength and frequency♦	
D.	[No CLEs in Physics I course]
E. Nuclear energy is a major source of energy throughout the universe • Identify the role of nuclear energy as it serves as a source of energy for the Earth, stars, and human activity (e.g., source of electromagnetic radiation, thermal energy within mantle, nuclear power plants, fuel for stars)	

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TABLE 3L

MISSOURI Physics I Course Level Expectations	PLAN Science College Readiness Standards
Strand 1: Properties and Principles of Matter and Energy	
Big Idea 2. Energy has a source, can be stored, and can be transferred but is conserved within a system	
F. Energy can be transferred within a system as the total amount of energy remains constant (i.e., Law of Conservation of Energy) • Describe the transfer of energy that occurs as energy changes from kinetic to potential within a system (e.g., car moving on rollercoaster track, child swinging, diver jumping off a board)♦ • Compare the efficiency of systems (recognizing that, as work is done, the amount of usable energy decreases)♦ • Classify the different ways to store energy (i.e., chemical, nuclear, thermal, mechanical, electromagnetic) and describe the transfer of energy as it changes from kinetic to potential, while the total amount of energy remains constant, within a system (e.g., using gasoline to move a car, photocell generating electricity, electromagnetic motor doing work, energy generated by nuclear reactor)♦	

TABLE 3L

MISSOURI Physics I Course Level Expectations	PLAN Science College Readiness Standards
Strand 2: Properties and Principles of Force and Motion	
Big Idea 1. The motion of an object is described by its change in position relative to another object or point	
A. The motion of an object is described as a change in position, direction, and speed relative to another object (frame of reference) • Represent and analyze the motion of an object graphically♦ • Analyze the velocity of two objects in terms of distance and time (i.e., verbally, diagrammatically, graphically, mathematically)♦	
B. An object that is accelerating is speeding up, slowing down, or changing direction • Measure and analyze an object's motion in terms of speed, velocity, and acceleration (i.e., verbally, diagrammatically, graphically, mathematically)♦	
C. Momentum depends on the mass of the object and the velocity with which it is traveling • Compare the momentum of two objects in terms of mass and velocity (Do NOT assess calculations) • Explain that the total momentum remains constant within a system	

TABLE 3L

MISSOURI Physics I Course Level Expectations	PLAN Science College Readiness Standards
Strand 2: Properties and Principles of Force and Motion	
Big Idea 2. Forces affect motion	
A. Forces are classified as either contact forces (pushes, pulls, friction, buoyancy) or non-contact forces (gravity, magnetism), that can be described in terms of direction and magnitude • Identify and describe the forces acting on an object (i.e., type of force, direction, magnitude in Newtons) using a force diagram and calculating net force♦	
B. Every object exerts a gravitational force on every other object • Describe gravity as an attractive force among all objects • Describe weight in terms of the force of a planet's or moon's gravity acting on a given mass♦ • Recognize all free falling bodies accelerate at the same rate due to gravity regardless of their mass♦	
C.	[No CLEs in Physics I course]
D. Newton's Laws of Motion explain the interaction of mass and forces, and are used to predict changes in motion • Recognize that inertia is a property of matter that can be described as an object's tendency to resist a change in motion, and is dependent upon the object's mass (Newton's First Law of Motion)♦ • Determine the effect (i.e., direction and magnitude) of the sum of the forces acting on an object (i.e., net force)♦ • Using information about net force and mass determine the effect on acceleration (Newton's Second Law of Motion)♦ • Identify forces acting on a falling object (i.e., weight, air resistance) and how those forces affect the rate of acceleration♦ • Analyze force pairs (i.e., action/reaction forces) when given a scenario (e.g., handball hits concrete wall, shotgun firing) and describe their magnitudes and directions. (Newton's Third Law of Motion)♦	
E. Perpendicular forces act independently of each other • Describe the force(s) that keep an object traveling in a circular path♦ • Describe the force(s) acting on a projectile on the Earth♦ • Predict the path of an object when the net force changes♦	

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TABLE 3L

MISSOURI Physics I Course Level Expectations	PLAN Science College Readiness Standards
Strand 2: Properties and Principles of Force and Motion	
Big Idea 2. Forces affect motion	
F. Work transfers energy into and out of a mechanical system • Describe the relationships among work, applied net force, and the distance an object moves • Explain how the efficiency of a mechanical system can be expressed as a ratio of work output to work input♦ • Describe power in terms of work and time♦ • Describe and analyze the relationships among force, distance, work, efficiency, and power♦	
Strand 3: Characteristic and Interactions of Living Organisms	[No CLEs in Physics I course]
Strand 4: Changes in Ecosystems and Interactions of Organisms with their Environments	[No CLEs in Physics I course]
Strand 5: Processes and Interactions of the Earth's Systems (Geosphere, Atmosphere, and Hydrosphere)	
Big Idea 1.	[No CLEs in Physics I course]
Big Idea 2.	[No CLEs in Physics I course]
Big Idea 3. Human activity is dependent upon and affects Earth's resources and systems	
A. Earth's materials are limited natural resources affected by human activity • Distinguish between renewable and nonrenewable energy resources♦ • Identify human activities that may adversely affect the composition of the atmosphere, hydrosphere, or geosphere	

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TABLE 3L

MISSOURI Physics I Course Level Expectations	PLAN Science College Readiness Standards
Strand 6: Composition and Structure of the Universe and the Motion of the Objects Within It	
Big Idea 1. The universe has observable properties and structure	
A. The Earth, Sun, and moon are part of a larger system that includes other planets and smaller celestial bodies • Describe and relate the positions and motions of the Sun-Earth solar system, the Milky-Way galaxy, and other galaxies within the universe (i.e., it is just one of several solar systems orbiting the center of a rotating spiral galaxy; that spiral galaxy is just one of many galaxies which orbit a common center of gravity; the expanding universe causes the distance between galaxies to increase)♦	
B. The Earth has a composition and location suitable to sustain life • Explain how Earth's environmental characteristics and location in the universe (e.g., atmosphere, temperature, orbital path, magnetic field, mass-gravity, location in solar system) provide a life-supporting environment • Compare the environmental characteristics and location in the universe of Earth and other celestial bodies (e.g., planets, moons) to determine ability to support life	
C. Most of the information we know about the universe comes from the electromagnetic spectrum • Identify information that the electromagnetic spectrum provides about the stars and the universe (e.g., chemical composition, temperature, age of stars, location of black holes, motion of celestial bodies)♦ • Evaluate the advantages/ disadvantages of using different tools (e.g., spectroscope, different types of telescopes, probes) to gather information about the universe (e.g., background radiation, magnetic fields, discovery of previously unknown celestial bodies)	

TABLE 3L

MISSOURI Physics I Course Level Expectations	PLAN Science College Readiness Standards
Strand 6: Composition and Structure of the Universe and the Motion of the Objects Within It	
Big Idea 2. Regular and predictable motions of objects in the universe can be described and explained as the result of gravitational forces	
A.–B.	[No CLEs in Physics I course]
C. The regular and predictable motions of a planet and moon relative to the Sun explain natural phenomena, such as day, month, year, shadows, moon phases, eclipses, tides, and seasons • Relate units of time (i.e., day, month, year) to the regular and predictable motion of the planets and moons and their positions in the Solar system • Explain seasonal phenomena (i.e., weather, length of day, temperature, intensity of sunlight) as a consequence of a planet's axial tilt as it rotates and a planet's orbital position as it revolves around the Sun • Provide evidence that can be observed from Earth that supports the fact Earth rotates on its axis and revolves around the Sun♦ • Predict the moon rise/set times, phases of the moon, and/or eclipses when given the relative positions of the moon, planet, and Sun • Explain how the gravitational forces, due to the relative positions of a planet, moon, and Sun, determine the height and frequency of tides	
D. Gravity is a force of attraction between objects in the solar system that governs their motion • Explain orbital motions of moons around planets, and planets around the Sun, as the result of gravitational forces between those objects♦	

TABLE 3L

MISSOURI Physics I Course Level Expectations	PLAN Science College Readiness Standards
Strand 7: Scientific Inquiry	
Big Idea 1. Science understanding is developed through the use of science process skills, scientific knowledge, scientific investigation, reasoning, and critical thinking	
A. Scientific inquiry includes the ability of students to formulate a testable question and explanation, and to select appropriate investigative methods in order to obtain evidence relevant to the explanation • Formulate testable questions and hypotheses • Analyzing an experiment, identify the components (i.e., independent variable, dependent variables, control of constants, multiple trials) and explain their importance to the design of a valid experiment♦ • Design and conduct a valid experiment • Recognize it is not always possible, for practical or ethical reasons, to control some conditions (e.g., when sampling or testing humans, when observing animal behaviors in nature) • Acknowledge some scientific explanations (e.g., explanations of astronomical or meteorological phenomena) cannot be tested using a controlled laboratory experiment, but instead by using a model, due to the limits of the laboratory environment, resources, and/or technologies • Acknowledge there is no fixed procedure called "the scientific method", but that some investigations involve systematic observations, carefully collected and relevant evidence, logical reasoning, and some imagination in developing hypotheses and other explanations • Evaluate the design of an experiment and make suggestions for reasonable improvements♦	**Interpretation of Data:** Select a single piece of data (numerical or nonnumerical) from a simple data presentation (e.g., a table or graph with two or three variables; a food web diagram) Identify basic features of a table, graph, or diagram (e.g., headings, units of measurement, axis labels) Select two or more pieces of data from a simple data presentation Understand basic scientific terminology Find basic information in a brief body of text Determine how the value of one variable changes as the value of another variable changes in a simple data presentation Compare or combine data from a simple data presentation (e.g., order or sum data from a table) Translate information into a table, graph, or diagram **Scientific Investigation:** Understand the methods and tools used in a simple experiment Understand a simple experimental design Identify a control in an experiment Determine the experimental conditions that would produce specified results Determine the hypothesis for an experiment Identify an alternate method for testing a hypothesis **Evaluation of Models, Inferences, and Experimental Results:** Select a simple hypothesis, prediction, or conclusion that is supported by a data presentation or a model Identify key issues or assumptions in a model Determine whether given information supports or contradicts a simple hypothesis or conclusion, and why Identify strengths and weaknesses in one or more models Select a data presentation or a model that supports or contradicts a hypothesis, prediction, or conclusion

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MISSOURI Physics I Course Level Expectations	PLAN Science College Readiness Standards
Strand 7: Scientific Inquiry	
Big Idea 1. Science understanding is developed through the use of science process skills, scientific knowledge, scientific investigation, reasoning, and critical thinking	
B. Scientific inquiry relies upon gathering evidence from qualitative and quantitative observations • Make qualitative and quantitative observations using the appropriate senses, tools and equipment to gather data (e.g., microscopes, thermometers, analog and digital meters, computers, spring scales, balances, metric rulers, graduated cylinders) • Measure length to the nearest millimeter, mass to the nearest gram, volume to the nearest milliliter, force (weight) to the nearest Newton, temperature to the nearest degree Celsius, time to the nearest second • Determine the appropriate tools and techniques to collect, analyze, and interpret data • Judge whether measurements and computation of quantities are reasonable • Calculate the range, average/mean, percent, and ratios for sets of data • Recognize observation is biased by the experiences and knowledge of the observer (e.g., strong beliefs about what should happen in particular circumstances can prevent the detection of other results)	**Interpretation of Data:** Select a single piece of data (numerical or nonnumerical) from a simple data presentation (e.g., a table or graph with two or three variables; a food web diagram) Identify basic features of a table, graph, or diagram (e.g., headings, units of measurement, axis labels) Select two or more pieces of data from a simple data presentation Understand basic scientific terminology Find basic information in a brief body of text Determine how the value of one variable changes as the value of another variable changes in a simple data presentation Compare or combine data from a simple data presentation (e.g., order or sum data from a table) Translate information into a table, graph, or diagram Interpolate between data points in a table or graph Identify and/or use a simple (e.g., linear) mathematical relationship between data **Scientific Investigation:** Understand the methods and tools used in a simple experiment Understand a simple experimental design **Evaluation of Models, Inferences, and Experimental Results:** Select a simple hypothesis, prediction, or conclusion that is supported by a data presentation or a model

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Strand 7: Scientific Inquiry	
Big Idea 1. Science understanding is developed through the use of science process skills, scientific knowledge, scientific investigation, reasoning, and critical thinking	
C. Scientific inquiry includes evaluation of explanations (laws/principles, theories/models) in light of evidence (data) and scientific principles (understandings) • Use quantitative and qualitative data as support for reasonable explanations (conclusions)♦ • Analyze experimental data to determine patterns, relationships, perspectives, and credibility of explanations (e.g., predict/extrapolate data, explain the relationship between the independent and dependent variable)♦ • Identify the possible effects of errors in observations, measurements, and calculations, on the validity and reliability of data and resultant explanations (conclusions) • Analyze whether evidence (data) and scientific principles support proposed explanations (laws/principles, theories/models)♦	**Interpretation of Data:** Select a single piece of data (numerical or nonnumerical) from a simple data presentation (e.g., a table or graph with two or three variables; a food web diagram) Identify basic features of a table, graph, or diagram (e.g., headings, units of measurement, axis labels) Select two or more pieces of data from a simple data presentation Understand basic scientific terminology Find basic information in a brief body of text Determine how the value of one variable changes as the value of another variable changes in a simple data presentation Compare or combine data from a simple data presentation (e.g., order or sum data from a table) Translate information into a table, graph, or diagram Interpolate between data points in a table or graph Identify and/or use a simple (e.g., linear) mathematical relationship between data Extrapolate from data points in a table or graph **Scientific Investigation:** Understand the methods and tools used in a simple experiment Understand a simple experimental design Identify a control in an experiment **Evaluation of Models, Inferences, and Experimental Results:** Select a simple hypothesis, prediction, or conclusion that is supported by a data presentation or a model Identify key issues or assumptions in a model Determine whether given information supports or contradicts a simple hypothesis or conclusion, and why Identify strengths and weaknesses in one or more models Determine which model(s) is(are) supported or weakened by new information Select a data presentation or a model that supports or contradicts a hypothesis, prediction, or conclusion

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Strand 7: Scientific Inquiry	
Big Idea 1. Science understanding is developed through the use of science process skills, scientific knowledge, scientific investigation, reasoning, and critical thinking	

D. The nature of science relies upon communication of results and justification of explanations
• Communicate the procedures and results of investigations and explanations through:
  • oral presentations
  • drawings and maps
  • data tables (allowing for the recording and analysis of data relevant to the experiment such as independent and dependent variables, multiple trials, beginning and ending times or temperatures, derived quantities)
  • graphs (bar, single, and multiple line)
  • equations and writings
• Communicate and defend a scientific argument
• Explain the importance of the public presentation of scientific work and supporting evidence to the scientific community (e.g., work and evidence must be critiqued, reviewed, and validated by peers; needed for subsequent investigations by peers; results can influence the decisions regarding future scientific work)
	Interpretation of Data:
	Select a single piece of data (numerical or nonnumerical) from a simple data presentation (e.g., a table or graph with two or three variables; a food web diagram)
	Identify basic features of a table, graph, or diagram (e.g., headings, units of measurement, axis labels)
	Select two or more pieces of data from a simple data presentation
	Understand basic scientific terminology
	Find basic information in a brief body of text
	Determine how the value of one variable changes as the value of another variable changes in a simple data presentation
	Compare or combine data from a simple data presentation (e.g., order or sum data from a table)
	Translate information into a table, graph, or diagram
	Scientific Investigation:
	Understand the methods and tools used in a simple experiment
	Understand a simple experimental design
	Evaluation of Models, Inferences, and Experimental Results:
	Select a simple hypothesis, prediction, or conclusion that is supported by a data presentation or a model
	Identify key issues or assumptions in a model
	Determine whether given information supports or contradicts a simple hypothesis or conclusion, and why
	Identify strengths and weaknesses in one or more models
	Select a data presentation or a model that supports or contradicts a hypothesis, prediction, or conclusion

TABLE 3L

MISSOURI Physics I Course Level Expectations	PLAN Science College Readiness Standards
Strand 8: Impact of Science, Technology and Human Activity	
Big Idea 1. The nature of technology can advance, and is advanced by, science as it seeks to apply scientific knowledge in ways that meet human needs	
A.	[No CLEs in Physics I course]
B. Advances in technology often result in improved data collection and an increase in scientific information • Recognize the relationships linking technology and science (e.g., how technological problems may create a demand for new science knowledge, how new technologies make it possible for scientists to extend research and advance science)	
Big Idea 2. Historical and cultural perspectives of scientific explanations help to improve understanding of the nature of science and how science knowledge and technology evolve over time	
A. People of different gender and ethnicity have contributed to scientific discoveries and the invention of technological innovations • Recognize contributions to science are not limited to the work of one particular group, but are made by a diverse group of scientists representing various ethnic and gender groups • Recognize gender and ethnicity of scientists often influence the questions asked and/or the methods used in scientific research and may limit or advance science knowledge and/or technology	
B. Scientific theories are developed based on the body of knowledge that exists at any particular time and must be rigorously questioned and tested for validity • Identify and analyze current theories that are being questioned, and compare them to new theories that have emerged to challenge older ones (e.g., theories of evolution, extinction, global warming)	**Evaluation of Models, Inferences, and Experimental Results:** Select a simple hypothesis, prediction, or conclusion that is supported by a data presentation or a model Identify key issues or assumptions in a model Determine whether given information supports or contradicts a simple hypothesis or conclusion, and why Identify strengths and weaknesses in one or more models Identify similarities and differences between models Determine which model(s) is(are) supported or weakened by new information Select a data presentation or a model that supports or contradicts a hypothesis, prediction, or conclusion

TABLE 3L

MISSOURI Physics I Course Level Expectations	PLAN Science College Readiness Standards
Strand 8: Impact of Science, Technology and Human Activity	
Big Idea 3. Science and technology affect, and are affected by, society	
A.	[No CLEs in Physics I course]
B. Social, political, economic, ethical and environmental factors strongly influence, and are influenced by, the direction of progress of science and technology • Analyze the roles of science and society as they interact to determine the direction of scientific and technological progress (e.g., prioritization of and funding for new scientific research and technological development is determined on the basis of individual, political and social values and needs; understanding basic concepts and principles of science and technology influences debate about the economics, policies, politics, and ethics of various scientific and technological challenges) • Analyze and evaluate the drawbacks (e.g., design constraints, unintended consequences, risks), benefits, and factors (i.e., social, political, economic, ethical, and environmental) affecting progress toward meeting major scientific and technological challenges (e.g., use of alternative energies to reduce the use of carbon fuels, use of satellite communications to gather information, nuclear energy, computer technology)	
C. Scientific ethics require that scientists must not knowingly subject people or the community to health or property risks without their knowledge and consent • Identify and evaluate the need for informed consent in experimentation • Identify the ethical issues involved in experimentation (i.e., risks to organisms or environment) • Identify and evaluate the role of models as an ethical alternative to direct experimentation (e.g., using a model for human subjects when safety features of crashed vehicles)	
D. Scientific information is presented through a number of credible sources, but is at times influenced in such a way to become non-credible • Evaluate a given source for its scientific credibility (e.g., articles in a new periodical quoting an "eye witness," a scientist speaking within or outside his/her area of expertise)♦ • Explain why accurate record-keeping, openness, and replication are essential for maintaining an investigator's credibility with other scientists and society	

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TABLE 3M

MISSOURI Physics I Course Level Expectations	ACT Science College Readiness Standards
Strand 1: Properties and Principles of Matter and Energy	
Big Idea 1. Changes in properties and states of matter provide evidence of the atomic theory of matter	
A. Objects, and the materials they are made of, have properties that can be used to describe and classify them a. Compare the densities of regular and irregular objects using their respective measures of volume and mass b.–d. [No CLEs in Physics I course]	
B.–I.	[No CLEs in Physics I course]

TABLE 3M

MISSOURI Physics I Course Level Expectations	ACT Science College Readiness Standards
Strand 1: Properties and Principles of Matter and Energy	
Big Idea 2. Energy has a source, can be stored, and can be transferred but is conserved within a system	
A. Forms of energy have a source, a means of transfer (work and heat), and a receiver a–c. [No CLEs in Physics I course] d. Describe sources and common uses of different forms of energy: chemical, nuclear, thermal, mechanical, electromagnetic♦ e. Identify and evaluate advantages/disadvantages of using various sources of energy (e.g., wind, solar, geothermal, hydroelectric, biomass, fossil fuel) for human activity f. Describe the effect of different frequencies of electromagnetic waves on the Earth and living organisms (e.g., radio, infrared, visible, ultraviolet, gamma, cosmic rays)	
B. Mechanical energy comes from the motion (kinetic energy) and/or relative position (potential energy) of an object a. Relate kinetic energy to an object's mass and its velocity♦ b. Relate an object's gravitational potential energy to its weight and height relative to the surface of the Earth♦ c. Distinguish between examples of kinetic and potential energy (i.e., gravitational, elastic) within a system♦ d. Describe the effect of work on an object's kinetic and potential energy♦	
C. Electromagnetic energy from the Sun (solar radiation) is a major source of energy on Earth • Identify stars as producers of electromagnetic energy • Describe how electromagnetic energy is transferred through space as electromagnetic waves of varying wavelength and frequency♦	
D.	[No CLEs in Physics I course]
E. Nuclear energy is a major source of energy throughout the universe • Identify the role of nuclear energy as it serves as a source of energy for the Earth, stars, and human activity (e.g., source of electromagnetic radiation, thermal energy within mantle, nuclear power plants, fuel for stars)	

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TABLE 3M

MISSOURI Physics I Course Level Expectations	ACT Science College Readiness Standards
Strand 1: Properties and Principles of Matter and Energy	
Big Idea 2. Energy has a source, can be stored, and can be transferred but is conserved within a system	
F. Energy can be transferred within a system as the total amount of energy remains constant (i.e., Law of Conservation of Energy) • Describe the transfer of energy that occurs as energy changes from kinetic to potential within a system (e.g., car moving on rollercoaster track, child swinging, diver jumping off a board)♦ • Compare the efficiency of systems (recognizing that, as work is done, the amount of usable energy decreases)♦ • Classify the different ways to store energy (i.e., chemical, nuclear, thermal, mechanical, electromagnetic) and describe the transfer of energy as it changes from kinetic to potential, while the total amount of energy remains constant, within a system (e.g., using gasoline to move a car, photocell generating electricity, electromagnetic motor doing work, energy generated by nuclear reactor)♦	

TABLE 3M

MISSOURI Physics I Course Level Expectations	ACT Science College Readiness Standards
Strand 2: Properties and Principles of Force and Motion	
Big Idea 1. The motion of an object is described by its change in position relative to another object or point	
A. The motion of an object is described as a change in position, direction, and speed relative to another object (frame of reference) • Represent and analyze the motion of an object graphically♦ • Analyze the velocity of two objects in terms of distance and time (i.e., verbally, diagrammatically, graphically, mathematically)♦	
B. An object that is accelerating is speeding up, slowing down, or changing direction • Measure and analyze an object's motion in terms of speed, velocity, and acceleration (i.e., verbally, diagrammatically, graphically, mathematically)♦	
C. Momentum depends on the mass of the object and the velocity with which it is traveling • Compare the momentum of two objects in terms of mass and velocity (Do NOT assess calculations) • Explain that the total momentum remains constant within a system	

TABLE 3M

MISSOURI Physics I Course Level Expectations	ACT Science College Readiness Standards
Strand 2: Properties and Principles of Force and Motion	
Big Idea 2. Forces affect motion	
A. Forces are classified as either contact forces (pushes, pulls, friction, buoyancy) or non-contact forces (gravity, magnetism), that can be described in terms of direction and magnitude • Identify and describe the forces acting on an object (i.e., type of force, direction, magnitude in Newtons) using a force diagram and calculating net force♦	
B. Every object exerts a gravitational force on every other object • Describe gravity as an attractive force among all objects • Describe weight in terms of the force of a planet's or moon's gravity acting on a given mass♦ • Recognize all free falling bodies accelerate at the same rate due to gravity regardless of their mass♦	
C.	[No CLEs in Physics I course]
D. Newton's Laws of Motion explain the interaction of mass and forces, and are used to predict changes in motion • Recognize that inertia is a property of matter that can be described as an object's tendency to resist a change in motion, and is dependent upon the object's mass (Newton's First Law of Motion)♦ • Determine the effect (i.e., direction and magnitude) of the sum of the forces acting on an object (i.e., net force)♦ • Using information about net force and mass determine the effect on acceleration (Newton's Second Law of Motion)♦ • Identify forces acting on a falling object (i.e., weight, air resistance) and how those forces affect the rate of acceleration♦ • Analyze force pairs (i.e., action/reaction forces) when given a scenario (e.g., handball hits concrete wall, shotgun firing) and describe their magnitudes and directions. (Newton's Third Law of Motion)♦	
E. Perpendicular forces act independently of each other • Describe the force(s) that keep an object traveling in a circular path♦ • Describe the force(s) acting on a projectile on the Earth♦ • Predict the path of an object when the net force changes♦	

TABLE 3M

MISSOURI Physics I Course Level Expectations	ACT Science College Readiness Standards
Strand 2: Properties and Principles of Force and Motion	
Big Idea 2. Forces affect motion	
F. Work transfers energy into and out of a mechanical system • Describe the relationships among work, applied net force, and the distance an object moves • Explain how the efficiency of a mechanical system can be expressed as a ratio of work output to work input♦ • Describe power in terms of work and time♦ • Describe and analyze the relationships among force, distance, work, efficiency, and power♦	
Strand 3: Characteristic and Interactions of Living Organisms	[No CLEs in Physics I course]
Strand 4: Changes in Ecosystems and Interactions of Organisms with their Environments	[No CLEs in Physics I course]
Strand 5: Processes and Interactions of the Earth's Systems (Geosphere, Atmosphere, and Hydrosphere)	
Big Idea 1.	[No CLEs in Physics I course]
Big Idea 2.	[No CLEs in Physics I course]
Big Idea 3. Human activity is dependent upon and affects Earth's resources and systems	
A. Earth's materials are limited natural resources affected by human activity • Distinguish between renewable and nonrenewable energy resources♦ • Identify human activities that may adversely affect the composition of the atmosphere, hydrosphere, or geosphere	

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TABLE 3M

MISSOURI Physics I Course Level Expectations	ACT Science College Readiness Standards
Strand 6: Composition and Structure of the Universe and the Motion of the Objects Within It	
Big Idea 1. The universe has observable properties and structure	
A. The Earth, Sun, and moon are part of a larger system that includes other planets and smaller celestial bodies • Describe and relate the positions and motions of the Sun-Earth solar system, the Milky-Way galaxy, and other galaxies within the universe (i.e., it is just one of several solar systems orbiting the center of a rotating spiral galaxy; that spiral galaxy is just one of many galaxies which orbit a common center of gravity; the expanding universe causes the distance between galaxies to increase)♦	
B. The Earth has a composition and location suitable to sustain life • Explain how Earth's environmental characteristics and location in the universe (e.g., atmosphere, temperature, orbital path, magnetic field, mass-gravity, location in solar system) provide a life-supporting environment • Compare the environmental characteristics and location in the universe of Earth and other celestial bodies (e.g., planets, moons) to determine ability to support life	
C. Most of the information we know about the universe comes from the electromagnetic spectrum • Identify information that the electromagnetic spectrum provides about the stars and the universe (e.g., chemical composition, temperature, age of stars, location of black holes, motion of celestial bodies)♦ • Evaluate the advantages/ disadvantages of using different tools (e.g., spectroscope, different types of telescopes, probes) to gather information about the universe (e.g., background radiation, magnetic fields, discovery of previously unknown celestial bodies)	

TABLE 3M

MISSOURI Physics I Course Level Expectations	ACT Science College Readiness Standards
Strand 6: Composition and Structure of the Universe and the Motion of the Objects Within It	
Big Idea 2. Regular and predictable motions of objects in the universe can be described and explained as the result of gravitational forces	
A.–B.	[No CLEs in Physics I course]
C. The regular and predictable motions of a planet and moon relative to the Sun explain natural phenomena, such as day, month, year, shadows, moon phases, eclipses, tides, and seasons • Relate units of time (i.e., day, month, year) to the regular and predictable motion of the planets and moons and their positions in the Solar system • Explain seasonal phenomena (i.e., weather, length of day, temperature, intensity of sunlight) as a consequence of a planet's axial tilt as it rotates and a planet's orbital position as it revolves around the Sun • Provide evidence that can be observed from Earth that supports the fact Earth rotates on its axis and revolves around the Sun♦ • Predict the moon rise/set times, phases of the moon, and/or eclipses when given the relative positions of the moon, planet, and Sun • Explain how the gravitational forces, due to the relative positions of a planet, moon, and Sun, determine the height and frequency of tides	
D. Gravity is a force of attraction between objects in the solar system that governs their motion • Explain orbital motions of moons around planets, and planets around the Sun, as the result of gravitational forces between those objects♦	

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Big Idea 1. Science understanding is developed through the use of science process skills, scientific knowledge, scientific investigation, reasoning, and critical thinking	
A. Scientific inquiry includes the ability of students to formulate a testable question and explanation, and to select appropriate investigative methods in order to obtain evidence relevant to the explanation • Formulate testable questions and hypotheses • Analyzing an experiment, identify the components (i.e., independent variable, dependent variables, control of constants, multiple trials) and explain their importance to the design of a valid experiment♦ • Design and conduct a valid experiment • Recognize it is not always possible, for practical or ethical reasons, to control some conditions (e.g., when sampling or testing humans, when observing animal behaviors in nature) • Acknowledge some scientific explanations (e.g., explanations of astronomical or meteorological phenomena) cannot be tested using a controlled laboratory experiment, but instead by using a model, due to the limits of the laboratory environment, resources, and/or technologies • Acknowledge there is no fixed procedure called "the scientific method", but that some investigations involve systematic observations, carefully collected and relevant evidence, logical reasoning, and some imagination in developing hypotheses and other explanations • Evaluate the design of an experiment and make suggestions for reasonable improvements♦	**Interpretation of Data:** Select a single piece of data (numerical or nonnumerical) from a simple data presentation (e.g., a table or graph with two or three variables; a food web diagram) Identify basic features of a table, graph, or diagram (e.g., headings, units of measurement, axis labels) Select two or more pieces of data from a simple data presentation Understand basic scientific terminology Find basic information in a brief body of text Determine how the value of one variable changes as the value of another variable changes in a simple data presentation Compare or combine data from a simple data presentation (e.g., order or sum data from a table) Translate information into a table, graph, or diagram **Scientific Investigation:** Understand the methods and tools used in a simple experiment Understand a simple experimental design Identify a control in an experiment Determine the experimental conditions that would produce specified results Determine the hypothesis for an experiment Identify an alternate method for testing a hypothesis **Evaluation of Models, Inferences, and Experimental Results:** Select a simple hypothesis, prediction, or conclusion that is supported by a data presentation or a model Identify key issues or assumptions in a model Determine whether given information supports or contradicts a simple hypothesis or conclusion, and why Identify strengths and weaknesses in one or more models Select a data presentation or a model that supports or contradicts a hypothesis, prediction, or conclusion

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Strand 7: Scientific Inquiry	
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  • drawings and maps
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  • graphs (bar, single, and multiple line)
  • equations and writings
• Communicate and defend a scientific argument
• Explain the importance of the public presentation of scientific work and supporting evidence to the scientific community (e.g., work and evidence must be critiqued, reviewed, and validated by peers; needed for subsequent investigations by peers; results can influence the decisions regarding future scientific work)
	Interpretation of Data:
	Select a single piece of data (numerical or nonnumerical) from a simple data presentation (e.g., a table or graph with two or three variables; a food web diagram)
	Identify basic features of a table, graph, or diagram (e.g., headings, units of measurement, axis labels)
	Select two or more pieces of data from a simple data presentation
	Understand basic scientific terminology
	Find basic information in a brief body of text
	Determine how the value of one variable changes as the value of another variable changes in a simple data presentation
	Compare or combine data from a simple data presentation (e.g., order or sum data from a table)
	Translate information into a table, graph, or diagram
	Scientific Investigation:
	Understand the methods and tools used in a simple experiment
	Understand a simple experimental design
	Evaluation of Models, Inferences, and Experimental Results:
	Select a simple hypothesis, prediction, or conclusion that is supported by a data presentation or a model
	Identify key issues or assumptions in a model
	Determine whether given information supports or contradicts a simple hypothesis or conclusion, and why
	Identify strengths and weaknesses in one or more models
	Select a data presentation or a model that supports or contradicts a hypothesis, prediction, or conclusion

TABLE 3M

MISSOURI Physics I Course Level Expectations	ACT Science College Readiness Standards
Strand 8: Impact of Science, Technology and Human Activity	
Big Idea 1. The nature of technology can advance, and is advanced by, science as it seeks to apply scientific knowledge in ways that meet human needs	
A.	[No CLEs in Physics I course]
B. Advances in technology often result in improved data collection and an increase in scientific information • Recognize the relationships linking technology and science (e.g., how technological problems may create a demand for new science knowledge, how new technologies make it possible for scientists to extend research and advance science)	
Big Idea 2. Historical and cultural perspectives of scientific explanations help to improve understanding of the nature of science and how science knowledge and technology evolve over time	
A. People of different gender and ethnicity have contributed to scientific discoveries and the invention of technological innovations • Recognize contributions to science are not limited to the work of one particular group, but are made by a diverse group of scientists representing various ethnic and gender groups • Recognize gender and ethnicity of scientists often influence the questions asked and/or the methods used in scientific research and may limit or advance science knowledge and/or technology	
B. Scientific theories are developed based on the body of knowledge that exists at any particular time and must be rigorously questioned and tested for validity • Identify and analyze current theories that are being questioned, and compare them to new theories that have emerged to challenge older ones (e.g., theories of evolution, extinction, global warming)	**Evaluation of Models, Inferences, and Experimental Results:** Select a simple hypothesis, prediction, or conclusion that is supported by a data presentation or a model Identify key issues or assumptions in a model Determine whether given information supports or contradicts a simple hypothesis or conclusion, and why Identify strengths and weaknesses in one or more models Identify similarities and differences between models Determine which model(s) is(are) supported or weakened by new information Select a data presentation or a model that supports or contradicts a hypothesis, prediction, or conclusion

TABLE 3M

MISSOURI Physics I Course Level Expectations	ACT Science College Readiness Standards
Strand 8: Impact of Science, Technology and Human Activity	
Big Idea 3. Science and technology affect, and are affected by, society	
A.	[No CLEs in Physics I course]
B. Social, political, economic, ethical and environmental factors strongly influence, and are influenced by, the direction of progress of science and technology • Analyze the roles of science and society as they interact to determine the direction of scientific and technological progress (e.g., prioritization of and funding for new scientific research and technological development is determined on the basis of individual, political and social values and needs; understanding basic concepts and principles of science and technology influences debate about the economics, policies, politics, and ethics of various scientific and technological challenges) • Analyze and evaluate the drawbacks (e.g., design constraints, unintended consequences, risks), benefits, and factors (i.e., social, political, economic, ethical, and environmental) affecting progress toward meeting major scientific and technological challenges (e.g., use of alternative energies to reduce the use of carbon fuels, use of satellite communications to gather information, nuclear energy, computer technology)	
C. Scientific ethics require that scientists must not knowingly subject people or the community to health or property risks without their knowledge and consent • Identify and evaluate the need for informed consent in experimentation • Identify the ethical issues involved in experimentation (i.e., risks to organisms or environment) • Identify and evaluate the role of models as an ethical alternative to direct experimentation (e.g., using a model for human subjects when safety features of crashed vehicles)	
D. Scientific information is presented through a number of credible sources, but is at times influenced in such a way to become non-credible • Evaluate a given source for its scientific credibility (e.g., articles in a new periodical quoting an "eye witness," a scientist speaking within or outside his/her area of expertise)♦ • Explain why accurate record-keeping, openness, and replication are essential for maintaining an investigator's credibility with other scientists and society	

♦ Assessed in MAP End-of-Course Exam

= Measured by ACT Science Test

_____ = Content sampled by ACT Science Test