PREACT® SECURE™ TECHNICAL MANUAL

SEPTEMBER 2026

Commitment to Fair Testing

ACT endorses and is committed to complying with the *Standards for Educational and Psychological Testing* (American Educational Research Association [AERA], American Psychological Association [APA], & National Council on Measurement in Education [NCME], 2014). ACT also endorses the *Code of Fair Testing Practices in Education* (Joint Committee on Testing Practices, 2004), which discusses the obligations of those who develop, administer, or use educational tests and test data, particularly in the following four areas: developing and selecting appropriate tests, administering and scoring tests, reporting and interpreting test results, and communicating with test takers. ACT also endorses and is committed to complying with the *Code of Professional Responsibilities in Educational Measurement* (NCME Ad Hoc Committee on the Development of a Code of Ethics, 2023), which specifies the professional responsibilities of those involved with various aspects of tests, including their development, marketing, interpretation, and use.

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Preface

The *PreACT® Secure™ Technical Manual* contains technical information about the PreACT Secure test. The principal purpose of the manual is to document technical characteristics of the PreACT Secure test in light of its intended purposes. The *PreACT Secure Technical Manual* documents the collection of validity evidence that supports appropriate interpretations of test scores and describes various content and psychometric aspects of PreACT Secure. Multiple test design and development processes are articulated documenting how ACT builds the assessment in line with the validity argument and how concepts such as construct validity, fairness, and accessibility are attended to throughout the process. Also described are routine analyses designed to support ongoing and continuous improvement and research intended to assure that the program remains psychometrically sound.

We encourage individuals who want more detailed information on a topic discussed in this bulletin, or on a related topic, to contact ACT. Please direct comments or inquiries to The ACT Test: Contact Us.

Chapter 1:
PreACT Secure

ACT's Mission

ACT has been dedicated to improving college and career readiness for all students since its inception in 1959. ACT's renowned longitudinal system of assessments, with the ACT® test as a capstone, has provided students, educators, and policymakers with unparalleled measures of college and career readiness. ACT's mission is helping people achieve education and workplace success.

1.1 Philosophical Basis for ACT Tests

PreACT® Secure™ shares a philosophical basis with the ACT. These two testing programs measure student development in English, math, reading, and science. One principal difference between the two programs is length: PreACT Secure has fewer items than the ACT. PreACT Secure, targeted for 10th grade, also has a greater emphasis on knowledge and skills typically attained early in students' secondary school experience (by the end of Grade 10). The ACT, for 11th and 12th grades, focuses on knowledge and skills attained as the cumulative effect of the school experience.

Because the content of PreACT Secure is linked to the ACT framework, understanding the philosophical basis for PreACT Secure requires an appreciation of the philosophical basis for the ACT.

The ACT measures how prepared students are for first-year college courses in core subjects. The principal philosophical basis for the ACT is that college preparedness is best assessed by measuring, as directly as possible, the academic skills that students will need to perform college-level work. Thus, the ACT is designed to determine how skilled students are at solving problems, grasping implied meanings, drawing inferences, evaluating ideas, and making judgments in subject-matter areas important to success in college.

Also, the ACT is oriented toward the general content areas of college and high school instructional programs. The test questions require that students integrate the knowledge and skills they possess in major curriculum areas with the stimulus material provided by the test. Briefly, then, the philosophical basis for the ACT rests on two pillars: (a) the tests should measure academic skills necessary for education and work after high school, and (b) the content of the tests should assess common state standards and objectives in core academics in ELA, math, and science.

1.2 Overview of PreACT Secure

PreACT Secure is very similar to PreACT®. The primary difference is that PreACT Secure offers greater security through shorter testing windows and secure control of test content. We expect PreACT Secure scores to support the same interpretations that have been established for PreACT scores. However, PreACT Secure may offer advantages over PreACT for uses and

interpretations involving higher-stakes decisions. In this technical manual, much of the information provided for PreACT Secure is the same as that provided for PreACT. Reporting features supporting the interpretations of PreACT Secure test scores, such as readiness benchmarks and national norms, are based on studies of PreACT test scores. As more data are collected for PreACT Secure, we will evaluate whether different score interpretations are needed for PreACT Secure and PreACT.

PreACT Secure is designed to predict performance on the ACT test for English, math, reading, and science; it is targeted for 10th grade but can be administered to students at any grade level.

Like all ACT assessment programs, PreACT Secure is based on the belief that students—and their parents or guardians, teachers, counselors, and school administrators—will make more productive plans and decisions if they have organized, relevant information available when they need it most.

PreACT Secure is vertically aligned to measure educational progress in the context of preparing for the ACT and planning for college and careers. PreACT Secure includes four multiple-choice test sections—English, math, reading, and science (optional). The results from PreACT Secure can help students plan their coursework and other learning opportunities to help ensure that they are prepared for the ACT and their postsecondary goals. High schools can use PreACT Secure data for academic advising, counseling, and program evaluation. The secure nature of the assessment also lends itself to evaluating student readiness for college courses and advanced high school courses, identifying students likely to succeed in talented and gifted programs, and determining student eligibility for scholarships. PreACT Secure may be used for local, state, or federal accountability, where accepted.

ACT provides customers with administration materials, including interpretive guides for score reports. The PreACT Secure individual student report, which is available for each PreACT Secure examinee, contains sections about the student's scores, predicted ACT and ACT® WorkKeys® National Career Readiness Certificate™ (NCRC®) scores, and Ideas for Progress. The interpretive guide called Using Your PreACT Secure Results, along with the PreACT Secure individual student report, can help students get a better sense of where they are, where they might want to go, and how to get there.

PreACT Secure functions as a stand-alone assessment and as a precursor to the ACT. When used together, these assessments give high school educators a powerful interrelated sequence of instruments for measuring student development. PreACT 8/9® and/or PreACT 9® Secure™ can also be used with PreACT Secure and the ACT, providing an earlier measure of development toward college and career readiness. Used together, these assessments monitor growth across content areas so that individual students, programs, or initiatives can be compared to typical growth trajectories.

PreACT Secure and ACT test scores are reported on the same scale; the range of PreACT Secure scale scores is from 1 to 35, while the range of ACT scale scores is from 1 to 36.

PreACT Secure also provides standards-based interpretations through the ACT® College and Career Readiness Standards, statements that describe the knowledge and skills students have demonstrated through their performance on the test. Because the Standards focus on the integrated higher-order thinking skills that students develop in Grades K–12 and that are important for success both during and after high school, the Standards provide a common language for secondary and postsecondary educators.

Using the Standards, secondary educators can determine the skills students likely have and those they are ready to learn next. The Standards clarify college expectations in terms that high school teachers understand.

The Standards also offer teachers guidance for improving instruction to help correct student deficiencies in specific areas. PreACT Secure and ACT results can be used to identify students who are college ready or on target for college readiness. The ACT College Readiness Benchmarks for English, math, reading, science, and STEM were developed to help identify examinees who would likely be ready for college-level work in these subject areas. The PreACT Readiness Benchmarks are the scores indicating that students are on target to meet or exceed the ACT College Readiness Benchmarks. Chapter 5 provides details about the College and Career Readiness Standards and the College Readiness Benchmarks.

PreACT 8/9, PreACT, PreACT Secure, and ACT results give schools a way to get students engaged in planning their futures. Table 1.1 summarizes the assessments' components.

Table 1.1. Components of ACT College and Career Readiness Assessments

Component		Assessment			
		PreACT 8/9	PreACT	PreACT Secure	ACT
Academic assessments	English	X	X	X	X
	Math	X	X	X	X
	Reading	X	X	X	X
	Science (optional)	X	X	X	X
	Writing (optional)	—	—	—	X
Career and education planning	Interest Inventory	X	X	—	X
	Educational Opportunity Service	X	X	—	X
	Coursework and Grades	X	X	—	X
	Needs Assessment	X	X	—	X
	College and Career Plans	X	X	—	X
Other scores reported	Predicted PreACT Scores	X	—	—	—
	Predicted ACT Scores	X	X	X	—
	Progress Toward the ACT NCRC	X	X	X	X
	National Ranks	X	X	X	X
	Composite Score	X	X	X	X
	ELA Score (if English, reading, and writing taken)	—	—	—	X
	STEM Score (if math and science taken)	X	X	X	X
	Reporting Categories	X	X	X	X
Standards and Benchmarks	ACT College and Career Readiness Standards	X	X	X	X
	PreACT Readiness Benchmarks	X	X	X	—
	ACT College Readiness Benchmarks	—	—	—	X
Reporting	Individual Student Report	X	X	X	X
	Item Response Analysis*	X	X	—	—
	Roster Reports*	X	X	X	X
	Summary Reports*	X	X	X	X
	Data Tools*	X	X	X	X

*Available as educator reports only

1.2.1 PreACT Secure Individual Student Reports

The PreACT Secure individual student report facilitates interpretation of PreACT Secure scores with respect to college readiness, predicted performance on the ACT test, and national norms. Reporting category scores are presented for each test section (English, math, reading, and science, if taken), showing how students performed on different topics within each subject.

Ideas for progress based on the ACT College and Career Readiness Standards are organized by reporting category.

Each reporting category is based on a subset of items in the test section. For each reporting category, the student report shows the following:

- total points possible
- total points achieved
- percentage correct

Additionally, PreACT Secure reports a Progress Toward the ACT® WorkKeys® National Career Readiness Certificate™ (NCRC®) indicator. This indicator represents a prediction of the level students are likely to earn on the NCRC if they take ACT® WorkKeys® in 11th grade.

The report is accompanied by a booklet, Using Your PreACT Secure Results, which provides interpretive information about the test results, describes ACT services and policies, and tells examinees how to contact ACT for further information.

1.3 Purposes, Claims, Interpretations, and Uses of PreACT Secure

In creating PreACT Secure, ACT wrote a theory of action (TOA) that integrates content validity (academic research, curriculum information, and standards) with predictive validity (empirical data), thus following methodologies similar to those used to build the ACT. The TOA begins by answering fundamental questions about the purpose of the assessment, such as, “Who are the intended users? What are the intended uses of the assessment results? What claims should be supported by the assessment? What are the intended benefits that may result from using the assessment? What are the measurable outcomes from using the assessment?”

The answers to these questions emerge from rigorous research and data collection that inform and allow for the identification of high-value skill targets in each subject area, providing focal points for the development of tasks and test forms. The TOA’s process further gives rise to possible ways of achieving the intended goals of the assessment. For example, cognitive labs, piloting, and field-testing are used to validate results and iteratively improve the specifications and design of the assessment. Operational results are used to continuously improve the components of the assessment.

1.3.1 Intended Users

High school students are the target population and primary users of the assessment. While PreACT Secure can be taken by students at any grade level, testing in 10th grade is recommended to optimize the benefits of testing. Additional users include parents and guardians interested in their child’s performance, teachers interested in helping students identify areas of improvement, high school counselors and academic advisors responsible for helping students with postsecondary planning, and school administrators responsible for evaluating

educational programs. States may use scores as a qualification for dual enrollment programs. PreACT Secure users could also include talent identification programs and other organizations promoting college and career programs. State education agencies may also use PreACT Secure as part of their state's accountability system.

1.3.2 Intended Uses

The primary uses of PreACT Secure include

1. monitoring progress toward college and career readiness,
2. predicting performance on the ACT and ACT WorkKeys tests, and
3. identifying academic gaps and areas for improvement.

Use 1 is supported by the ACT College Readiness Benchmarks and the PreACT Readiness Levels. Students who score at or above the ACT College Readiness Benchmarks demonstrate that they are ready for first-year college courses in the related subject areas. Student achievement is expected to grow between PreACT Secure (typically given in 10th grade) and the ACT test (typically given in 11th and 12th grades). Therefore, students who score below the Benchmarks in 10th grade may still be on target to meet them in 11th or 12th grade. Based on their scores, students are placed at one of three PreACT Readiness Levels: On Target, Close to Target, and In Need of Intervention. Use 1 is also supported through the Progress Toward the ACT WorkKeys National Career Readiness Certificate indicator.

PreACT Secure tests are shorter than the corresponding ACT tests and are vertically linked to predict student performance on the ACT (excluding writing), supporting Use 2. Predicted ACT score ranges are reported for English, math, reading, and the Composite score, as well as science and the STEM score if science was tested. PreACT Secure simulates the ACT testing experience and provides students, parents, and educators with valuable insights while there is still time to gain needed knowledge and skills, which can later be demonstrated on the ACT.

PreACT Secure results can help students and educators identify academic gaps and areas for improvement (Use 3). Within each subject area, reporting category scores let educators see how students performed on each topic aligned to the ACT College and Career Readiness Standards. The PreACT Secure online reporting package includes four early intervention rosters, several summary reports, and data tools to support additional data analysis.

Additional intended uses of PreACT Secure include

4. gauging readiness for advanced high school and college courses,
5. evaluating school and program effectiveness,
6. understanding performance relative to national norms, and
7. satisfying accountability testing and reporting requirements.

Because it is a secure assessment, PreACT Secure may offer advantages over PreACT for uses and interpretations involving higher stakes decisions, such as determinations of readiness for college courses (Use 4) and as an accountability assessment (Use 7). PreACT Secure can also be used in talent search programs and to determine eligibility for scholarships.

1.3.3 Claims

The claims of PreACT Secure are closely related to the intended uses and are supported by other evidence contained in this technical manual. The primary claims include the following:

1. PreACT Secure measures where students fall on an empirically derived college and career readiness trajectory. See Chapter 5 for more details on the ACT College Readiness Benchmarks, PreACT Readiness Benchmarks, and Progress Toward the ACT WorkKeys National Career Readiness Certificate indicator.

2. Because PreACT scores are strong predictors of ACT English, math, reading, science, STEM, and Composite scores, we anticipate that PreACT Secure scores will be as well. See Chapter 6 for more details on how the predictions are derived and see Chapter 7 for additional evidence of how well PreACT scores predict ACT scores.

3. PreACT Secure provides instructionally actionable information to students, parents, and educators. PreACT Secure data can be used to identify students' strengths and weaknesses in content areas at a variety of levels (student, classroom, school).

The secondary claims of PreACT Secure include the following:

4. PreACT Secure scores can be used to identify students who are ready to succeed in advanced high school courses, including AP and dual enrollment courses. See Chapter 7 for evidence of how well PreACT test scores have predicted success on AP exams.

5. PreACT Secure can be used as one component of the evaluation of school, program, and curriculum effectiveness. When PreACT Secure is used in conjunction with the ACT test, growth measures can be used to help evaluate educational programs. See Chapter 8 for more information on how PreACT Secure scores can be used to measure student growth.

6. PreACT Secure allows users to understand how students at the same grade level and semester performed relative to the ACT-tested U.S. population. See Lu and Allen (2019) for details on the PreACT norming studies.

7. PreACT Secure improves test security through shorter testing windows and secure control of test content.

1.3.4 Intended Benefits

- Students are exposed to the types of content featured on the ACT and to the ACT testing experience.

- Students get predicted ACT scores, which help them understand how their performance is related to college and career readiness.
- Students, parents, and educators understand students' relative strengths and weaknesses in four subject areas that are also assessed by the ACT.
- Schools and districts gain important insights about curriculum and program effectiveness.
- Educators gain insights that help them identify students who are ready for advanced high school coursework and college courses.

1.3.5 Intended Outcomes

The measurable outcomes of PreACT Secure include the following:

- improved performance in academic areas identified as relative weaknesses
- higher rates of success in advanced high school courses
- higher ACT scores
- higher enrollment and rates of success in college and career-training programs

Research is conducted on an ongoing basis to evaluate the extent to which the use of the PreACT assessments results in these intended outcomes, and future research will include PreACT Secure.

1.4 *Code of Fair Testing Practices in Education* and *Code of Professional Responsibilities in Educational Measurement*

Since the publication of the original edition in 1988, ACT has endorsed the *Code of Fair Testing Practices in Education* (Joint Committee on Testing Practices, 2004), a statement of the obligations to test takers of those who develop, administer, or use educational tests and test data. The development of the *Code* was sponsored by a joint committee of the American Association for Counseling and Development, the Association for Measurement and Evaluation in Counseling and Development, the American Educational Research Association, the American Psychological Association, the American Speech-Language-Hearing Association, and the National Council on Measurement in Education to advance, in the public interest, the quality of testing practices.

The *Code* sets forth fairness criteria in four areas: developing and selecting appropriate tests, administering and scoring tests, reporting and interpreting test results, and communicating with test takers. Separate standards are provided for test developers and test users in each of these four areas.

ACT's endorsement of the *Code* represents a commitment to vigorously safeguarding the rights of individuals participating in its testing programs. ACT routinely reviews each of its testing programs to ensure it upholds the standards outlined in the *Code* for appropriate test development practice and test use.

Similarly, ACT endorses and is committed to complying with the *Code of Professional Responsibilities in Educational Measurement* (NCME Ad Hoc Committee on the Development of a Code of Ethics, 1995), a statement of professional responsibilities for those who develop assessments; market and sell assessments; select assessments; administer assessments; interpret, use, and communicate assessment results; educate about assessment; evaluate assessment programs; and conduct research on assessments.

A copy of each code may be obtained free of charge from

ACT Customer Services (68)
P.O. Box 1008
Iowa City, Iowa 52243-1008
319.337.1429

1.5 Test Preparation

Awareness of and exposure to an assessment before taking it is important if students are to feel comfortable and confident when testing. ACT offers a variety of free and affordable test preparation solutions for students, parents, and educators. Although some of these resources are designed for the ACT, they are also appropriate for students preparing for PreACT Secure.

- **Preparing for PreACT Secure.** This web page includes a link to an online full-length practice test, test-taking strategies, and information about what to expect on test day. The webpage is also available in pdf format and is free to download.
- **Online Familiarity Assessment.** A full-length PreACT Secure practice test is available in our simulated online testing environment. Students may also access both timed and untimed practice tests for each PreACT Secure section test. Students may access each of the section tests as often as they wish in order to become comfortable with testing.
- **Alternate Assessment Format Samples.** Students who will test with alternate formats of the assessment can prepare by practicing with one of our alternate format samples. Full-length PreACT Secure practice tests are available in braille, large print, audio, and reader's scripts at no cost to the school.
- **ACT Question of the Day.** We post a daily test question to provide students with an opportunity for quick daily practice. Students and teachers can opt to receive a weekly email reviewing the questions posted that week.

Chapter 2:
PreACT Secure Test Development

2.1 Overview

This chapter describes ACT's test development process, including item and form development procedures. It includes brief overviews of the content and bias review processes and of the statistical criteria for form assembly and operational item selection. This chapter also provides a high-level description of PreACT Secure scoring procedures, including descriptions of additional scores and indicators.

2.2 Description of PreACT Secure

PreACT Secure, targeted to students in Grade 10, provides practice for the ACT test and empowers students, their parents, and educators with valuable insights. The experience of taking PreACT Secure, combined with rigorous high school coursework, will help students perform their best when they take the ACT.

The ACT and PreACT Secure have a common purpose—supporting students at key decision points in their academic preparation and planning. These tests provide information helpful to educators guiding students through important educational and career decisions.

The ACT and PreACT Secure English, mathematics, reading, and science tests are designed with developmentally articulated test specifications, ensuring that the content follows a logical developmental sequence across the high school experience. They also share common item formats and follow consistent reporting procedures.

Despite having different score ranges, PreACT Secure (with a range of 1–35) and the ACT (with a range of 1–36) are on the same vertically linked score scale. This allows comparison of a student's scores on the two assessments. An increase in either the Composite score or any test section score between PreACT Secure and the ACT can be interpreted as growth in academic achievement.

Content specifications describing the knowledge and skills to be measured by PreACT Secure were determined through a detailed analysis of common grade-level standards and feedback from current high school and postsecondary teachers via the ACT National Curriculum Survey®, as well as data about student performance on the ACT and in postsecondary courses. These empirical data are used to continually verify that PreACT Secure is grade appropriate, aligns to the ACT and the ACT College and Career Readiness Standards, and measures the knowledge and skills required for students to succeed in college and career.

2.3 The ACT National Curriculum Survey

Every few years, ACT conducts the ACT National Curriculum Survey, which assesses educational practices and college and career readiness expectations. ACT surveys thousands of K–12 teachers and college instructors in English, writing, mathematics, reading, and science,

as well as a national cross-section of workforce supervisors and employees, to determine which skills and knowledge in these subjects are being taught at each grade level and which skills and knowledge are considered essential for college and career readiness.

The survey also includes questions about which skills from the ACT Holistic Framework® are essential to college and career success. The Holistic Framework is a research-based framework that integrates behavioral skills, education and career navigation skills, and dimensions such as core academic skills and cross-cutting capabilities.

ACT uses the results of the National Curriculum Survey to guide the development of ACT assessment solutions, including the ACT test, PreACT assessments, and ACT WorkKeys. ACT conducts the survey to ensure that its assessments measure the knowledge and skills that instructors of credit-bearing first-year college courses identify as important for success in each content area or that workforce supervisors identify as important for job success and readiness for targeted workforce training.

ACT makes the results of each National Curriculum Survey public to help education and workforce stakeholders make more informed decisions about the skills students need to be successful in postsecondary education and the workplace.

2.3.1 The Purpose of the ACT National Curriculum Survey

The ACT National Curriculum Survey is a crucial step in the process of building and regularly updating a suite of ACT assessments that is empirically aligned to college readiness standards. Survey results help address a critical question: Does the test measure knowledge and skills currently relevant to college and career success? Ultimately, the survey data inform the blueprints for the assessments. Subsequently, results from the assessments are used to validate the ACT College and Career Readiness Standards and the ACT College Readiness Benchmarks.

Equally important is predictive validity. Does the test accurately and reliably predict performance? Constant monitoring allows ACT to ensure that the answer is yes.

To maintain relevancy and currency, assessments should be constructed using up-to-date evidence of what matters most. ACT therefore uses findings from the National Curriculum Survey to periodically adjust the test content coverage and blueprints. This process ensures that the assessments measure not only what is being taught in schools around the country but also what demonstrably matters most for college and career readiness.

The science behind ACT's assessments—the evidence base and ongoing research—is critical to answering the key question of what matters most for college and career readiness. The National Curriculum Survey represents ACT's commitment to

- using evidence and research to develop and validate ACT standards, assessments, and benchmarks;
- maintaining a robust research agenda to report on key educational metrics; and

- developing assessments, reports, and interventions that will help individuals navigate their personal path to success along a kindergarten-through-career continuum.

As an educational research organization, ACT uses these principles to drive the development and continuous improvement of ACT's education and workplace solutions, as well as the research agenda associated with them, thereby enabling ACT to fulfill its mission of helping all individuals achieve education and workplace success.

2.3.2 Survey Sample and Process

For the 2020 ACT National Curriculum Survey, ACT recruited participants via various print and electronic methods (e.g., advertisements, email, social media) and invited participation from educators at the elementary school, middle school, high school, and college levels who taught courses in English and writing, mathematics, reading (including English language arts and social studies), and science in public and private institutions across the United States. ACT also invited participation from supervisors and employees at a large variety of businesses. Table 2.1 gives the numbers of survey respondents in each area.

Table 2.1. ACT National Curriculum Survey 2020 Respondents

Area	Number of respondents
Early elementary school	1,214
Late elementary school	1,213
Middle school	1,623
High school	1,619
K–12 administrators	405
College instructors	2,883
Workforce supervisors	405
Workforce employees	406
Total	9,768

Education participants were asked to rate discrete content knowledge and skills with respect to how important each was to student success in the content area. Specifically, K–12 teachers were asked to rate the importance of content knowledge and skills in a given class they taught, while college instructors were asked to rate the importance of content knowledge and skills as prerequisites to success in a given class they taught.

ACT also asked the K–12 teachers to indicate whether they taught particular content knowledge or skills and, if so, whether they taught this material as a standard part of their course or as part of a review of material that should have been learned earlier. Some education participants were also asked other content-related questions, depending on the grade level they taught.

Workforce participants were asked to rate discrete skills with respect to how important each was to entry-level success in the workplace. ACT also asked workforce participants to indicate how often employees in their workplace used each of these skills on the job.

Finally, ACT asked all participants questions relevant to current education policy issues (e.g., assessments, technology, standards, student characteristics, and obstacles to success). These results are discussed in the companion report *ACT National Curriculum Survey 2020*.

Because some content areas were surveyed in larger numbers than others, the values displayed in educational-level totals were averaged across English language arts, mathematics, and science. This ensured that, in these results, no one content area would have more influence than another.

2.4 Test Development Procedures

2.4.1 Review of Test Specifications

Two major types of test specifications are used in developing PreACT Secure tests: content specifications and statistical specifications.

Content Specifications

The content specifications for PreACT Secure were informed by the curricular analysis discussed previously. While ACT takes care to ensure that the basic structure of PreACT Secure tests remains the same from year to year so that the scale scores are comparable, the specific characteristics of the test items used in each reporting category are reviewed regularly. Subject matter experts review the new test forms to verify both their content accuracy and the match between the test content and the content specifications.

Statistical Specifications

Statistical test specifications establish target test difficulty by defining both the desired mean difficulty and the expected distribution of difficulty, as measured by proportion-correct statistics and/or mean IRT *b*-parameter values. The specifications also specify minimum acceptable levels of item discrimination using biserial correlation coefficients and/or minimum IRT *a*-parameter values. In addition, differential item functioning (DIF) is carefully evaluated to identify items that may perform differently across examinee groups after ability is controlled for. Items must satisfy the applicable difficulty, discrimination, and DIF review criteria to be eligible for inclusion in the test.

Items on PreACT Secure tests have a wide distribution of item difficulties so that the tests will effectively differentiate among students who vary widely in their level of achievement, allowing students of all abilities to demonstrate what they know and can do.

2.4.2 Selection of Item Writers

ACT relies primarily on internal content specialists to develop items. Content specialists are subject matter experts, trained in the disciplines for which they write items. Most have experience teaching at various levels, from high school to university, and at a variety of institutions, from small private schools to large public institutions. ACT makes every attempt to include item writers who represent the diversity of the population of the United States with respect to ethnic background, gender, and geographic location.

Each content specialist is familiar with an item writer's guide that is specific to their content area. These guides include example items, test specifications, and ACT's requirements for content and style. They also provide specifications for the fair portrayal of all groups of individuals, including use of gender-neutral language, balanced representation of race and ethnicity, and avoidance of subject matter that may be unfamiliar to members of certain groups. Item development assignments are balanced among content specialists to ensure a diversity of material.

Depending on development needs, ACT may contract with external item writers or use automated item generation. Each contracted item writer produces a small number of items in the content area for which they qualify. The small size of the assignment ensures that a diversity of material is produced and that the security of the testing program is maintained, since each item writer will know only a small proportion of the items produced. Item writers work closely with ACT content specialists, who help them produce high-quality items that meet the test specifications. Automated item generation uses models with interchangeable elements based on items that were administered in the past and exhibited desirable statistical properties (e.g., difficulty and discrimination).

2.4.3 Item Development

Item-writing assignments are driven by the test blueprint and item pool analyses with the goal of attaining a wide range of high-quality items that elicit evidence of the knowledge, skills, and abilities measured in each test. A typical assignment includes the evidence-based item template and focuses on a statement describing a skill the item needs to assess. Included in each template is a set of evidence statements each item must elicit.

Assignments are made available to qualified item writers through the ACT item authoring system. This system also contains item metadata, comments from reviewers, and item quality metrics. The information in the system can be connected to the template through the assignment.

All items must be psychometrically sound and meet the test blueprint. Many items must be constructed because many items, even those written by experienced item writers, fail to meet ACT's standards.

Each item writer submits a set of items, called a unit, in a given content area. All items on the English and reading tests are related to prose passages. All items on the science test are related to passages or other stimulus material, such as graphs and tables. All items on the math test are discrete—that is, not related to a passage.

2.4.4 Review of Items

Each submitted item (and its related passage, if applicable) is reviewed several times by ACT staff to verify that it meets all of ACT's standards. It is edited to meet ACT's specifications for content accuracy, word count, item classification, item format, and language. During the review

and editing process, all test materials are reviewed for fair portrayal and balanced representation of social groups and for gender-neutral language.

After internal item reviews are completed, ACT invites external reviewers with knowledge and experience in those content areas, including practicing teachers at a variety of grade levels, to refine items and verify whether those items sample intended constructs. Every item is independently reviewed by four to six subject matter experts from across the United States, each of whom has extensive experience with students at or around the grade levels at which the test content is typically taught. During the external content review, items are evaluated for content accuracy, item format, and the effectiveness of language in terms of leveling, precision, and fairness.

Bias, Sensitivity, Fairness, and Accessibility Reviews

To verify that all items delivered to students are fair, unbiased, and accessible, ACT conducts external fairness and accessibility reviews before field-testing and for entire test forms before they become operational. In this context, “accessible” means that examinees can access the construct measured by the assessment and accurately demonstrate their construct-relevant knowledge and skills when responding to test items. Avoiding content that is potentially biased is one important aspect of accessibility. Chapter 4 describes ACT’s approach to another aspect: designing tests and providing testing accommodations for English learners and students with disabilities.

The external fairness and accessibility review panel consists of experts in diverse educational areas who have experience working with diverse populations at the appropriate grade levels and in the relevant content areas. The panel reviews items to help verify they are fair, free of bias or insensitivity, and accessible to the testing population. All comments are reviewed, and appropriate changes are made. Because stakeholders count on national representation to maintain the comparability of test forms and scores, ACT selects reviewers in such a way that no one state is overrepresented.

2.4.5 Embedded Field-Tests

Sets of items judged acceptable following the review process are embedded in test forms and field-tested with representative samples of students. Each test section in a test form contains a set of embedded field-test (EFT) items. Different sets of EFT items are spiraled into each test form.

EFT items do not contribute to a student’s total reported test section score but are designed to be indistinguishable from scored items. By juxtaposing EFT items with scored items, ACT expects that students will invest the same level of effort when answering both types of items. The time limit for each test section permits most students to answer all scored and EFT items.

EFT Item Analysis

EFT items are analyzed using classical test theory (CTT) and item response theory (IRT).

When CTT is used for a given set of EFT items, the sample is divided into low-, medium-, and high-performing groups based on the individuals' scores in the same test section. The cutoff scores for the three groups are the 27th and 73rd percentiles in the distribution of those scores. These percentiles maximize the critical ratio of the difference between the mean scores of the upper and lower groups, assuming that the standard error of measurement in each group is the same and that the scores for the entire examinee population are normally distributed (Millman & Greene, 1989). For each group, the proportion of students who correctly answered each EFT item is computed, as well as the proportion of students who chose each of the incorrect answers. The biserial and point-biserial correlation coefficients of each EFT item are also computed.

When IRT is used, EFT items are calibrated using the 3-parameter logistic (3PL) IRT model (Birnbaum, 1968). Three parameters are estimated for each item: the discrimination parameter, the difficulty parameter, and the pseudo-chance parameter. The estimated parameters are then transformed to the same scale as all previously calibrated items using the Stocking–Lord method (Stocking & Lord, 1983).

Item analyses identify statistically effective test items. Items are eliminated or revised for future field-testing if they are too difficult or too easy or if they fail to discriminate between students of high and low educational achievement as measured by their corresponding test scores. The biserial and point-biserial correlation coefficients, as well as the differences between proportions of students answering the item correctly in each of the three groups, are used as indices of the discriminating power of the EFT items when CTT is used.

Differential item functioning (DIF) analysis procedures are also conducted on the EFT items. DIF is a statistically significant difference between the probability of a specific population group (the focal group) answering the item correctly and the probability of a comparison population group (the reference group) answering correctly when the students in the two groups have similar levels of achievement with respect to the content being tested. Items exhibiting large and statistically significant DIF are reviewed by a diverse panel of external fairness reviewers.

Each EFT item is reviewed following the item analysis. To identify possible problems, ACT staff members scrutinize items flagged for statistical reasons. In some cases, items are revised and undergo further review. The review process also provides feedback that helps ACT improve the quality of items in the future.

2.4.6 Assembly of Test Forms

EFT items that are judged acceptable following the item analysis and subsequent review are placed in an item pool. Preliminary versions of PreACT Secure test forms are constructed using items from this pool that match the content and statistical specifications for the tests.

2.4.7 Content, Fairness, and Accessibility Reviews of Test Forms

The preliminary versions of the test forms are subjected to several reviews to ensure that the items are accurate and that the overall test forms are fair and conform to good test-construction

practice. The first review is performed by ACT staff. Items are checked for content accuracy and conformity to ACT style. They are also examined for clues that could allow test-wise students to answer the item correctly even though they lack the required skills or subject-area knowledge.

The preliminary forms are then submitted to content, fairness, and accessibility experts for external review. These experts are different from those consulted for the content, fairness, and accessibility reviews of EFT items but are drawn from the same populations of curriculum and education specialists and perform the same types of reviews described in Section 2.4.4.

Two panels—a content review panel and a fairness and accessibility review panel—review the test forms. The content review panel consists of high school teachers, curriculum specialists, and college and university faculty members. This panel reviews the forms for content accuracy, educational importance, and grade-level appropriateness. The fairness and accessibility review panel consists of experts in diverse areas of education, with a balanced representation of genders and experience working with diverse populations. This panel reviews the forms to help ensure fairness to all examinees.

After the panels complete their reviews, ACT summarizes the results. All comments from the consultants are reviewed by ACT staff members, and appropriate changes are made to the test forms. Whenever significant changes are made, such as items and/or passages being replaced, the test forms are reviewed again by the appropriate consultants and by ACT staff, and a final match-to-specifications check is conducted by the psychometrics team. If no further changes are needed, the test forms are published.

2.5 PreACT Secure Scoring Procedures

The raw score for each PreACT Secure test is equivalent to the number of scored questions answered correctly. It is converted to a scale score, which is discussed further in Chapter 6.

The Composite score is the average of the scale scores of the English, mathematics, and reading sections. The Composite score is rounded to the nearest whole number and has a minimum value of 1 and a maximum of 35. The student also receives a scale score for each section test that was taken (English, mathematics, reading, and science).

2.5.1 Additional Scores and Indicators

Beginning with the September 2015 ACT test, ACT began reporting a STEM (science, technology, engineering, and math) score, a combination of a student's mathematics and science scores. Also introduced at that time was the Progress Toward the ACT WorkKeys National Career Readiness Certificate (NCRC) indicator. These scores are also reported for PreACT 8/9, PreACT 9 Secure, and PreACT.

The STEM Score

The STEM score is the average of the mathematics and science scale scores rounded to the nearest integer (0.5 rounds up). Only students who receive scores for both tests receive a STEM score.

Progress Toward the ACT WorkKeys National Career Readiness Certificate (NCRC) Indicator

The Progress Toward the ACT WorkKeys NCRC indicator is based on students' PreACT Secure Composite scores. It provides an estimate of students' likely performance on the three assessments leading to the ACT WorkKeys National Career Readiness Certificate (NCRC). The NCRC is an assessment-based credential that certifies foundational work skills important for job success across industries and occupations. The NCRC is based on the results of three ACT WorkKeys assessments: Applied Math, Graphic Literacy, and Workplace Documents. Scores on these assessments determine the certificate level an individual can earn—no certificate, Bronze, Silver, Gold, or Platinum. The NCRC gives individuals evidence that they possess the skills employers deem essential to workplace success. More information about the NCRC can be found on ACT's website. More details on ACT test scores and indicators can be found in Chapter 7.

2.6 PreACT Secure Scale Scores

Scale scores are reported for PreACT Secure English, mathematics, reading, and science tests. Scale scores are also reported for the Composite score (calculated by rounding the unweighted average of the English, mathematics, and reading test scores) and the STEM score (calculated by rounding the unweighted average of the mathematics and science scale scores; rounding is to the nearest integer, and 0.5 rounds up). Only students who receive scores on the mathematics and science tests receive a STEM score. The range of all PreACT Secure scale scores is 1 to 35.

PreACT Secure scale scores have a maximum of 35. The rationale for setting the maximum at 35, rather than at 36 as it is for the ACT, is that PreACT Secure is intended to be a shorter and less difficult version of the ACT. Because it is easier to obtain a perfect score on PreACT Secure than it is on the ACT, ACT decided to cap PreACT Secure scores at a lower value.

Chapter 3:
PreACT Secure Test Specifications

3.1 Overview

This chapter describes the content blueprints for each of the four multiple-choice PreACT Secure tests.

3.2 English Test

3.2.1 Description of the English Test

The PreACT Secure English test has 48 items (36 scored items and 12 field-test items) and a 35-minute time limit. The test places the student in the position of a writer who is revising and editing a text and measures a student's understanding of the following: the conventions of Standard written English (grammar, usage, and mechanics), production of writing (topic development, organization, unity, and cohesion), and knowledge of language (word choice, style, and tone). The test consists of several passages, each accompanied by a sequence of multiple-choice items. Different passage types—informational, narrative, and argumentative—are employed to provide a variety of rhetorical situations. Students must use the rich context of the passage to make editorial choices, demonstrating their understanding of writing strategies and conventions. Passage length also varies, with shorter passages featuring 5–7 items and longer passages featuring 11–13 items. Passages are written not only to appropriately assess writing and language skills but also to reflect students' interests and experiences. Spelling and the rote recall of the rules of grammar are not tested.

Cognitive Complexity and Depth of Knowledge (DOK)

Depth of Knowledge (DOK; Webb, 2002) is a rough-grained, judgment-based measure of a test item's cognitive complexity that is used in many educational contexts. The PreACT Secure English test assesses skills across a range of cognitive complexities using items at DOK Levels 1, 2, and 3. All English items are classified by ACT content experts according to the level descriptions in Table 3.1.

Table 3.1. DOK Level Descriptions for English

Depth of Knowledge level	Description
DOK1	Requires the recall of information, such as a fact, term, definition, or simple procedure.
DOK2	Requires mental processing that goes beyond recalling or reproducing an answer. Students must make some decisions about how to approach a problem.
DOK3	Requires planning, thinking, explaining, justifying, using evidence, conjecturing, and postulating.

3.2.2 English Scores and Reporting Categories

Four scores are reported: a total test score based on the 36 scored items, plus three reporting category scores based on specific knowledge and skills. The three reporting categories are Production of Writing, Knowledge of Language, and Conventions of Standard English. A brief description of the reporting categories is given below, followed by a table showing the approximate percentage of total test items in each reporting category.

Production of Writing

Students apply their understanding of the rhetorical purpose and focus of a piece of writing to develop a topic effectively. They use various strategies to achieve logical organization, topical unity, and cohesion.

Knowledge of Language

Students demonstrate effective language use by ensuring precision and concision in word choice and maintaining consistency in style and tone.

Conventions of Standard English

Students apply their understanding of the conventions of Standard English grammar, usage, and mechanics to revise and edit text.

3.2.3 English Test Blueprints

Table 3.2 shows the current target distribution of scored items across reporting categories on each PreACT Secure English test form.

Table 3.2. Specification Ranges by Reporting Category for English

Reporting category	Number of items	Percentage of test
Production of Writing	12–14	33%–39%
Knowledge of Language	5–7	14%–19%
Conventions of Standard English	15–17	42%–47%
Scored total	**36**	**100%**

3.3 Math Test

3.3.1 Description of the Math Test

The PreACT Secure math test has 36 items (32 scored items and 4 field-test items) and a 45-minute time limit. The test considers the whole of a student's mathematical development, covering topics typically taught up through the beginning of Grade 12 in U.S. schools and focusing on the prerequisite knowledge and skills that are important for success in college math courses and career training programs. The PreACT Secure math test weights Grade 8, 9, and 10 skills more heavily than the ACT math test, but students see a wide range of questions like those on the ACT math test.

The math construct requires making sense of problems and context, representing relationships mathematically, accessing appropriate mathematical knowledge from memory, incorporating given information, modeling, performing mathematical computations and manipulations, interpreting, applying reasoning skills, justifying, making decisions based on the math, and appropriately managing the solution process. The test emphasizes quantitative reasoning and application over extensive computation or the memorization of complex formulas. Items focus on what students can do with the math they have learned, which encompasses not only mathematical content but also mathematical practices.

Some degree of computational fluency is required. A calculator is encouraged but not required. Items are designed so that a sophisticated calculator does not provide a significant advantage over a four-function calculator and so that all items can be done without a calculator in a reasonable amount of time.

Each item has four response options, and students are instructed to choose the correct option. The test contains problems ranging from easy to very challenging so that readiness levels can be reliably reported for students with different degrees of preparedness. Extended accessibility supports provide for fair and comparable math scores across a range of circumstances. More information on accessibility can be found in Chapter 4.

Cognitive Complexity and Depth of Knowledge (DOK)

The PreACT Secure math test assesses skills that vary in cognitive complexity using items at DOK Levels 1, 2, and 3. ACT content experts consider how most well-prepared Grade 10 students will approach each item, and they then classify each item according to the level descriptions in Table 3.3.

Table 3.3. DOK Level Descriptions for Math

Depth of Knowledge level	Description
DOK1	Requires the recall of information, such as a fact, term, definition, or simple procedure. Requires students to demonstrate a rote response or perform a simple procedure.
DOK2	Requires mental processing that goes beyond recalling or reproducing an answer. Students must make some decisions about how to approach a problem.
DOK3	Requires planning, thinking, explaining, justifying, using evidence, conjecturing, and postulating. The cognitive demands are complex and abstract.

3.3.2 Math Scores and Reporting Categories

Nine scores are reported for the PreACT Secure math test: a total test score based on the 32 scored items, plus eight reporting category scores based on different domains of mathematical knowledge, skills, and practices. The test is first divided into the Preparing for Higher Math (PHM) and Integrating Essential Skills (IES) reporting categories. The PHM score is then

divided into separate scores for Number & Quantity, Algebra, Functions, Geometry, and Statistics & Probability. A crosscutting reporting category, Modeling, draws upon items from all the other categories to give a measure of producing, interpreting, understanding, evaluating, and improving models. PreACT Secure score reports provide the percentage of correctly answered items in each reporting category.

The total test score is reported on the PreACT Secure math scale, which ranges from 1 to 35. Properties of this scale are given in Chapter 6. The total math score is averaged with the total science score to determine the STEM (science, technology, engineering, and mathematics) score, which is related to success in postsecondary STEM courses.

Preparing for Higher Math

This reporting category captures the math that students have learned more recently. This category is divided into the following five subcategories.

Number & Quantity

Students demonstrate an understanding of and fluency with rational numbers and the four basic operations, and they work with irrational numbers, including approximating irrational numbers with rational numbers. They use properties of the real number system. They show their knowledge of complex numbers, compute in this system, and work with the properties of complex numbers. They use vectors and matrices and view them as number systems with properties, operations, and applications.

Algebra

Students use expressions to solve problems, and they show an understanding of solving equations. They manipulate and evaluate expressions involving integer exponents, square and cube roots, and scientific notation. They solve linear equations and make connections between their graphs and proportional relationships. They use their understanding of linear equations to make sense of other kinds of equations and inequalities: what their graphs look like, how to solve them, and what kinds of applications they have for modeling. They demonstrate extended proficiency with equations by using quadratic, polynomial, exponential, rational, and radical equations as well as systems of equations. They create expressions, equations, and inequalities to represent problems and constraints. They see rational expressions as systems analogous to rational numbers, apply the binomial theorem, and solve simple matrix equations that represent systems of linear equations.

Functions

Students demonstrate an understanding of what a function is and what its characteristics are. They can define functions using two variables or function notation. They use their understanding of the general properties of functions to solve problems using new functions they create. They determine what the characteristics of functions mean in the context of a problem. They work with functions that have no equation and functions that follow the pattern of an equation. They work with particular families of a variety of functions, such as linear, quadratic, polynomial,

radical, exponential, logarithmic, and piecewise, and apply them in modeling situations. They associate changes in the parameters of a function that has a form such as $f(x) + c$ or $f(-ax)$ with transformations of the graph of that function. They compose functions and use inverse functions to solve equations with more than one solution. They connect the trigonometry of right triangles to the unit circle to make trigonometric functions and use them to model periodic behavior. They apply the algebraic properties of trigonometric functions, such as angle addition properties.

Geometry

Students show an understanding of congruence and similarity by using transformations like translations and dilations. They investigate the relationships between the angles formed by parallel lines and a transversal. They model and solve problems with geometric objects. Students find values such as the area of a circle and the volumes of cylinders, pyramids, and cones. They demonstrate an understanding of trigonometric ratios as functions of angles, and they solve right-triangle problems using these ratios and the Pythagorean theorem. In the coordinate plane, they recognize conditions for parallel and perpendicular lines, split a line segment into pieces with a given ratio of lengths, find areas of plane figures, and develop equations for circles and parabolas. They use trigonometry to compute the area of a triangle, and they apply the law of sines and the law of cosines to answer questions about nonright triangles. They derive equations for ellipses and hyperbolas.

Statistics & Probability

Students identify patterns of association between two quantities by analyzing scatterplots and two-way tables. They fit linear models to datasets and use the models to solve problems. They demonstrate their knowledge of the role of randomness in sample surveys, experiments, and observational studies. They analyze data to make inferences and evaluate claims. They demonstrate an understanding of statistical independence. They relate the sample space to events defined in terms of “and,” “or,” and “not,” and they calculate probabilities using empirical results, independence assumptions, and the ideas of conditional probability. They understand the multiplicative rule for conditional probability and apply permutations and combinations as tools for counting. They model a sample space with a random variable by giving a numerical value to each event. They apply expected value and probability to help inform their decisions.

Integrating Essential Skills

This reporting category focuses on whether students can apply their knowledge and skills to solve problems of moderate to high complexity. Topics include rate and percentage; proportional reasoning; units of measure; solving problems with rational numbers; constructing and solving simple equations; scale drawings; cross sections; area, perimeter, circumference, surface area, and volume; simple measures of center and spread; probability; and random sampling.

In addition to learning more content as they progress through their studies, students should also grow in sophistication, accumulating and applying skills in higher-order contexts. Therefore, students should be able to solve problems of increasing complexity, combine skills in longer chains of steps, apply skills in more varied contexts, understand more connections, and

increase fluency. In order to assess whether students have had appropriate growth, the items in this reporting category are at DOK Levels 2 and 3.

Modeling

Modeling uses math to represent, through a model, an analysis of an empirical situation. Models often help us predict or understand the actual. However, sometimes knowledge of the actual helps us understand the model, such as when addition is introduced to students as a model of combining two groups. The Modeling reporting category represents all items that involve producing, interpreting, understanding, evaluating, and improving models. Each modeling item is also counted in the other appropriate reporting categories. Thus, the Modeling reporting category is an overall measure of how well a student uses modeling skills across mathematical topics.

3.3.3 Calculator Policy

Students are encouraged to bring a calculator they are familiar with and can use fluently. Most four-function, scientific, or graphing calculators are permitted. Built-in computer algebra systems are not allowed because they could interfere with the construct, specifically understanding and implementing the solutions to various types of equations and inequalities. Students must remove certain kinds of programs from their calculators. In addition, some calculator features must be turned off for security reasons or to prevent disruptions during testing. The ACT calculator policy is available on the ACT website.

3.3.4 Math Test Blueprints

Table 3.4 shows the current target distribution of scored items across reporting categories on each PreACT Secure math test form. Test construction also takes into account coverage and variety within each of the categories. The test includes PHM items at DOK Levels 1, 2, and 3. By contrast, it includes IES items only at DOK Levels 2 and 3. This is because IES topics are more practiced and familiar and because putting these familiar skills to work in higher-complexity tasks is important for college readiness.

Table 3.4. Specification Ranges by Reporting Category for Math

Reporting category		Number of items	Percentage of test
Preparing for Higher Math	Total	25	78%
	Number & Quantity	3–4	9%–13%
	Algebra	5–7	16%–22%
	Functions	5–7	16%–22%
	Geometry	5–7	16%–22%
	Statistics & Probability	3–4	9%–13%
Integrating Essential Skills		7	22%
Modeling		≥7	≥22%
Scored total		**32**	**100%**

Note. Each item reported in Modeling is also reported in either Preparing for Higher Math (and the appropriate subcategory) or Integrating Essential Skills.

3.4 Reading Test

3.4.1 Description of the Reading Test

The PreACT Secure reading test has 33 items (25 scored items and 8 field-test items) and a 40-minute time limit. It measures a student's ability to read closely, reason about texts using evidence, and integrate information from multiple sources. The test consists of four passage units, each of which includes a passage or a pair of passages accompanied by 8–9 multiple-choice items. (One of the passage units contains the field-test items.) Passages include literary narratives and informational texts from the humanities, natural sciences, and social sciences and are representative of the kinds of texts commonly encountered in high school and first-year college courses. Each passage is preceded by a heading that identifies the passage type (e.g., literary narrative) and names the author; it may also contain important background information that helps in understanding the passage.

Reading items focus on the mutually supportive skills that readers apply when studying written materials across a range of subject areas. Specifically, items ask students to determine main ideas; locate and interpret significant details; understand sequences of events; make comparisons; comprehend cause-effect relationships; determine the meaning of context-dependent words, phrases, and statements; draw generalizations; analyze the author's or narrator's voice or method; analyze claims and evidence in arguments; and integrate information from multiple related texts. Items do not test the rote recall of facts from outside the passage or the rules of formal logic, nor do they contain questions about vocabulary that can be answered without referring to the passage context.

Cognitive Complexity and Depth of Knowledge (DOK)

The PreACT Secure reading test assesses skills across a range of cognitive complexities using items at DOK Levels 1, 2, and 3. All multiple-choice items are classified by ACT content experts according to the level descriptions in Table 3.5.

Table 3.5. DOK Level Descriptions for Reading

Depth of Knowledge level	Description
DOK1	Requires the recall of information, such as a fact, term, definition, or simple procedure. Requires students to demonstrate a rote response or perform a simple procedure.
DOK2	Requires mental processing that goes beyond recalling or reproducing an answer. Students must make some decisions about how to approach a problem.
DOK3	Requires planning, thinking, explaining, justifying, using evidence, conjecturing, and postulating. The cognitive demands are complex and abstract.

3.4.2 Reading Scores and Reporting Categories

Four scores are reported: a total test score based on the 25 scored items, plus three reporting category scores based on specific knowledge and skills. The three reporting categories are Key Ideas & Details, Craft & Structure, and Integration of Knowledge & Ideas. A description of each category is given below, followed by a table showing the approximate percentage of the test devoted to each reporting category.

Key Ideas & Details

Students read texts closely to determine central ideas and themes, summarize information and ideas accurately, understand relationships (including sequential, comparative, and cause-effect), and draw logical inferences and conclusions.

Craft & Structure

Students determine word and phrase meanings, analyze how an author uses word choice to achieve a rhetorical effect, analyze text structure, understand authorial purpose and perspective, and analyze points of view. They interpret the rhetorical effects of authorial decisions and differentiate between various perspectives and sources of information.

Integration of Knowledge & Ideas

Students understand authors' claims, evaluate reasoning and evidence, and differentiate between facts and opinions. They use evidence to make connections between different texts that are related by topic.

3.4.3 Reading Test Blueprints

Table 3.6 shows the current target distribution of scored items across reporting categories on each PreACT reading test form.

Table 3.6. Specification Ranges by Reporting Category for Reading

Reporting category	Number of items	Percentage of test
Key Ideas & Details	12–14	48%–56%
Craft & Structure	7–9	28%–36%
Integration of Knowledge & Ideas	3–5	12%–20%
Scored total	**25**	**100%**

3.5 Science Test

3.5.1 Description of the Science Test

The PreACT Secure science test has 36 items (30 scored items and 6 field-test items) and a 40-minute time limit. The test measures the interpretation, analysis, evaluation, reasoning, and problem-solving skills required in the natural sciences. The content of the science test is drawn from the fields of biology, chemistry, physics, and Earth/space science.

Students are assumed to have, or to be in the process of completing, a minimum of 2 years of introductory science, which the ACT National Curriculum Survey has identified as typically 1 year of biology and 1 year of integrated physical science or Earth science. Thus, it is expected that students have learned the introductory content from biology, physical science, and Earth science; are familiar with the nature of scientific inquiry; and have been exposed to laboratory investigation.

The test presents several passages containing scientific information, each followed by a number of multiple-choice items. The scientific information is conveyed in one of three different formats: data representation (scientific graphs, tables, and diagrams), research summaries (descriptions and results of one or more related experiments), or conflicting viewpoints (two or more brief theoretical models that address the same scientific phenomenon but are inconsistent with one another).

The Nature of the PreACT Secure Science Test: What Does It Measure?

The PreACT Secure science test assesses science knowledge, skills, and practices across three domains: Interpretation of Data, Scientific Investigation, and Evaluating Scientific Arguments and Models with Evidence.

These three domains, and the knowledge and skills encompassed by each domain, were derived from ACT's decades of empirical data and research on college and career readiness in science. The domains and their skills make up the ACT College and Career Readiness Standards for science, which link specific skills and knowledge to quantitatively determined score ranges for the ACT science test and to the College and Career Readiness Benchmark in science, which predicts success in science at the postsecondary level. These three domains are also the reporting categories for the PreACT Secure science test (see Table 3.8). ACT also reviews science benchmarks and standards from state, national, and international standards documents (e.g., the Next Generation Science Standards, the NRC Framework for K–12 Science Education) and monitors the impact of these documents on science curricula to ensure alignment and, when needed, to update the constructs of the test.

All items on the ACT science test are based on authentic scientific scenarios that are built around important scientific concepts, and they are designed to mirror the experiences of students and working scientists engaging in real science. The ACT science test focuses on multidimensional assessment (to measure three-dimensional learning in science) with items that require students to apply multiple domains. Many items focus on two dimensions (science and engineering practices and crosscutting concepts in science). Some of the items are three dimensional, requiring that students apply discipline-specific content knowledge (e.g., knowledge specific to an introductory high school physical science or biology course) along with science process skills. Research conducted by ACT on science curricula and instruction at the high school and postsecondary levels shows that, while having a fundamental understanding of disciplinary science concepts is important, being able to apply science practices and process skills to science content to solve problems is more strongly tied to college and career readiness

in science. The ACT science test focuses on measuring the science skills and knowledge that are empirically tied to college and career readiness.

Cognitive Complexity and Depth of Knowledge (DOK)

The PreACT Secure science test assesses at DOK Levels 1, 2, and 3, with almost all the items at Levels 2 and 3. Below is an example of how items on the PreACT Secure science test are classified by DOK. All multiple-choice items are classified by ACT content experts according to the level descriptions in Table 3.7.

Table 3.7. DOK Level Descriptions for Science

Depth of Knowledge level	Description
DOK1	Requires locating, recalling, and/or reproducing information.
DOK2	Requires processing presented information and applying skills and concepts. Students typically must process one or two cognitive steps.
DOK3	Requires using higher-order thinking, such as analysis and evaluation, and often requires using evidence to justify reasoning. Students must typically process multiple cognitive steps, and the overall tasks tend to be complex and abstract.

3.5.2 Science Scores and Reporting Categories

Four scores are reported: a total test score based on the 30 scored items, plus three reporting category scores based on different domains of scientific knowledge, skills, and practices. The three reporting categories are Interpretation of Data, Scientific Investigation, and Evaluating Scientific Arguments and Models with Evidence. A description of each reporting category is provided below, and the percentage of the test devoted to each reporting category is provided in Table 3.8. The overall test score is reported on the PreACT Secure science scale, which ranges from 1 to 35. This total science score is averaged with the total math score to determine the STEM score.

Interpretation of Data

Students manipulate and analyze scientific data presented in tables, graphs, and diagrams (e.g., by recognizing trends in data, translating tabular data into graphs, interpolating and extrapolating, and reasoning mathematically).

Scientific Investigation

Students understand experimental tools, procedures, and design (e.g., they identify variables and controls) and compare, extend, and modify experiments (e.g., they predict the results of additional trials), as well as constraints, goals, and potential tradeoffs in engineering and design thinking scenarios.

Evaluating Scientific Arguments and Models with Evidence

Students judge the validity of scientific information and formulate conclusions and predictions based on that information (e.g., by determining which explanation for a scientific phenomenon is supported by new findings), as well as success criteria, constraints, and tradeoffs in engineering and design thinking scenarios.

3.5.3 Science Test Blueprints

Table 3.8 shows the current target distribution of scored items across reporting categories on each PreACT Secure science test form.

Table 3.8. Specification Ranges by Reporting Category for Science

Reporting category	Number of items	Percentage of test
Interpretation of Data	6–13	20%–43%
Scientific Investigation	5–12	17%–40%
Evaluating Scientific Arguments and Models with Evidence	6–12	20%–40%
Scored total	**30**	**100%**

Chapter 4: Test Administration, Test Security, Accessibility, Accommodations, and Supports

4.1 Administering PreACT Secure

PreACT Secure can be administered during certain limited windows during the testing year. Implementation webinars and resources provide instruction for scheduling testing and ordering materials.

Participation Procedures

In February, the registration portal opens so districts can enroll for the next school year. Districts enroll between February and the following January, and then in January, they receive guidance on importing students, setting up online testing, and assigning accommodations and English learner (EL) supports. Spring testing occurs in March and April. Fall testing occurs in September and October.

Administration Schedule

PreACT Secure is designed to be administered within a half day during school-supervised sessions. It takes about 3 hours 10 minutes to complete the entire program: approximately 30 minutes for the non-test section and 2 hours 40 minutes for the four test sections. The English, math, and reading sections must be administered in a single session on the designated test day unless a student is approved for multiday testing in their accommodations plan. If testing science, a school may administer it with the other subjects or at a later time as outlined in the Schedule Flexibility Policy. Consult the PreACT Secure Administration Manual for information about makeup testing.

PreACT Secure Support Materials

PreACT Secure includes a coordinated set of support materials to help students, parents, guardians, teachers, counselors, and administrators understand the purposes of the program and the information provided.

- Implementation webinars and resources include links to online information about PreACT Secure and help schools begin planning their administration.
- The PreACT Secure Administration Manual provides test coordinators and testing staff with detailed instructions for planning and administering the non-test section and the test sections.
- The Accessibility and Supports Guide for PreACT Secure helps educational teams select appropriate accessibility supports and accommodations for their students to use during testing.

- Before testing, the test coordinator will designate each student as testing with standard time, with accommodations, or with EL supports. Paper testing is available only for a limited number of accommodations (braille, large print, and human reader's scripts for examinees with or without vision).

- For online testing, all required test materials and tools are included in the TestNav portal. For students testing with accommodations or EL supports, additional tools will be available in the TestNav portal or at the test site.

- For paper testing, schools should order one package of test materials for each student testing with accommodations. Each package includes one standard test booklet, one alternate-format test (braille, large print, or reader's script), answer documents, and instruction booklets. Each shipment will also include necessary return materials.

- Student and school reports are available in ACT's online reporting system. Students will also be able to access their scores directly if they create or have an optional MyACT account.

- Each student who takes PreACT Secure will have access to Using Your PreACT Secure Results, which includes information about interpreting the student report, planning for high school and beyond, exploring career possibilities, and building academic skills.

- Educators will have access to the PreACT Secure Interpretive Guide for Student and Aggregate Reports, which includes information for helping students understand their student reports and for interpreting the school aggregate reports (Student List Report, Educator Report, and Student Data File).

- The ACT Online Reporting User Guide is available to help testing staff use the online reporting system to retrieve score reports, analyze data, and create school-, district-, and state-level reports.

4.2 Test Security

To ensure the validity of PreACT Secure test score interpretations, the examinees, any individuals who have a role in administering the tests, and those who are otherwise involved in facilitating the testing process must strictly observe ACT's standardized testing policies and procedures, which may be supplemented by ACT from time to time with additional communications to testing staff.

Testing staff must protect the confidentiality of PreACT Secure test items and responses before, during, and after testing. Testing staff should be competent to undertake their roles and aware of their responsibilities, which include understanding ACT's test administration policies and procedures as well as acknowledging and avoiding conflicts of interest in their roles as test administrators for PreACT Secure.

Testing staff must be alert to activities that can compromise the fairness of the test and the validity of score interpretations. Such activities include, but are not limited to, the following:

- prohibited test-taking behavior, such as copying answers or using prohibited electronic devices during testing
- accessing questions before or after the test, taking photos, or making copies of test questions or test materials
- posting test questions on the internet
- test proctor or test administrator misconduct, such as providing questions or answers to examinees or permitting them to engage in prohibited conduct during testing

In addition to implementing security-related protocols, ACT may, at its discretion, engage additional test security practices designed to protect PreACT Secure test content and the validity of score interpretations.

4.3 Information Security and Data Privacy

The ACT information security framework is based on the widely recognized National Institute of Standards (NIST) Cybersecurity Framework (CSF). This framework was selected because it covers a range of cybersecurity categories that comprehensively reflect the broad perspective ACT takes in safeguarding information assets. The CSF is a risk-based framework used to improve cybersecurity resilience and reduce risk. It enables ACT to prioritize security initiatives, satisfy compliance requirements, and establish a standard risk management program.

All data stored at ACT are encrypted to meet industry standards for the classification of the information stored. When personal information is transmitted, ACT employs the highest level of encryption possible. This may vary to meet specific customer needs and requirements.

Internal access to systems and data is granted to individual employees based on business need and is restricted to the least privilege required to perform a particular job function. Access is authorized by management and granted by IT security. The ACT Access Management Standard describes the security requirements for password management, account lockouts, screen saver timeouts, and privilege management. Access is revoked immediately upon termination and reviewed when employees transfer to a different position within ACT.

ACT recognizes the importance of protecting learners' personal information. It is important and consistent with ACT's mission to share information with those who can provide educational or career opportunities to learners or who have another legitimate reason to use learner information. However, ACT will not license learner personal information for this purpose without the learner's express consent and will disclose personal information only as set forth in our Privacy Policy.

At ACT, information security and data privacy are everyone's responsibility. ACT requires all employees to enter confidentiality agreements upon hire. Also, employees are required to annually review ACT's Information Security and Data Privacy Corporate Policy and take information security and data privacy training.

4.4 Accessibility, Accommodations, and Supports

ACT makes every effort to design our assessments to be universally accessible to all test takers, recognizing that some students may need specific accommodations and accessibility supports to demonstrate what they know and can do. PreACT Secure permits the use of supports that will honor the skills and knowledge being tested while removing construct-irrelevant barriers to student performance. Although ACT designs the standardized testing experience to be the same for all students, ACT does afford language supports for English learners and accommodations for students with diagnosed, documented disabilities in order to provide equitable access to the test without compromising the validity of the test results.

The four types of accessibility supports available for use with PreACT Secure are as follows:

- universal supports
- designated supports
- accommodations
- English learner supports

Universal Supports

Universal supports are accessibility aids made available to all students to foster greater inclusion in the experience of taking the standardized test. Universal supports are embedded into testing practices and platforms.

Universal supports embedded into PreACT Secure include the following:

- ability to use log-in tickets as scratch paper
- embedded calculator for the math test
- section directions available on demand
- ability to ask for clarification or repetition of verbal instructions
- ability to mark items for review
- highlighter
- ability to adjust color contrast

- magnification device / zoom
- answer eliminator
- answer masking tool

Designated Supports

Designated supports are adjustments to a test that are available to any student with an identified need. Typically, designated supports are adjustments to the testing environment that require advance planning to deliver. It is recommended that a consistent process be used to determine the supports each student needs. Designated supports for PreACT Secure include the following:

- assistive devices/technology
- food, drink, or medication in the test room for examinees with a medical need (does not include cell phones or other smart devices used to monitor medical conditions)
- frequent breaks that do not stop the testing clock
- noise buffers / earplugs
- permission to stand during testing
- personal aide
- service animal
- small group or one-to-one testing

Accommodations

Accommodations are accessibility supports needed by relatively few students. Students who receive accommodations should have a documented disability and a formal educational plan—generally a current Individualized Education Program (IEP) or 504 Plan—that indicates their individual needs. It is recommended that this plan be developed by an educational team that includes relevant school personnel, parents/guardians, and the student. Accommodations decisions are usually based on a formal evaluation of a student and of what the student needs to access instruction and assessments.

Successful and secure delivery of an accommodated standardized assessment often requires additional local individuals with specialized skills and knowledge. ACT recommends that students who will use accommodations on an assessment use those same accommodations regularly in an educational setting in order to become proficient with them.

Examples of accommodations include, but are not limited to, the following:

- timing (e.g., extra testing time, stop-the-clock breaks, multiday administration)
- presentation and formats (e.g., braille, text-to-speech, screen reader software, video American Sign Language)
- response and navigation (e.g., accessible calculator for math, braille response, speech-to-text, scribe)
- setting and location (e.g., medical monitoring devices, background music, fidget device, personalized notification of time remaining)

A complete list of available accommodations is in the Accessibility Supports Guide for PreACT Secure.

English Learner Supports

English learner (EL) supports are available for students who are not proficient in English. Designation as a student with limited English proficiency follows the guidelines set by each individual state department of education. Such a designation is evidence of a need for EL supports. Generally, English language proficiency is measured using an English language proficiency assessment.

Only the following EL supports are available for use on PreACT Secure:

- ACT-authorized bilingual dictionary
- translated test directions, provided by ACT
- one and one-half time, single day
- small-group testing

Testing Students With Accommodations and English Learner Supports

Accommodations and EL supports on PreACT Secure are limited to those that do not invalidate the test construct. Not all accommodations or EL supports provided in the classroom fall into this category.

A student's eligibility to take PreACT Secure with accommodations or EL supports is entirely at the discretion of school personnel. ACT recommends that accommodations and EL supports be selected based on the student's current educational plan, medical plan, or EL status.

Chapter 5:
Scoring and Reporting

This chapter describes the scoring and reporting services of PreACT Secure. Additional information on reporting and data services may be found in the PreACT Secure Interpretative Guide for Student and Aggregate Reports.

PreACT Secure scores support interpretations related to college and career readiness. The scores can be linked to descriptions of the knowledge and skills important for college and career readiness and are also linked to college-readiness performance standards. The ACT College and Career Readiness Standards provide descriptions of the knowledge and skills students at different score levels typically have. The PreACT Readiness Levels indicate whether students are on target to meet the ACT College Readiness Benchmarks. In addition, PreACT Secure scores support "college-ready now" interpretations through their alignment to the ACT score scale (and ACT College Readiness Benchmarks). Together, the empirically derived Standards and Benchmarks support interpretations of college and career readiness as well as the identification of the knowledge and skills that are key to student success.

5.1 Reporting and Data Services

5.1.1 Student Report

The student report includes the following information:

- **PreACT Secure test scores**, including scores for English, math, reading, and the Composite score, as well as science and the STEM score if science is tested. The Composite score is the rounded unweighted average of the English, math and reading scale scores, and the STEM score is the rounded unweighted average of the math and science scale scores (with fractions of 0.5 and higher rounded up).

- **Predicted ACT Composite Score Range**, the range within which the student's ACT Composite score is expected to fall when the student takes the ACT in the spring of 11th grade. Predictions are also provided for the four test section scores and the STEM score. The predicted score ranges were derived using historical PreACT and ACT data, as described in Chapter 6.

- **U.S. Ranks (National Norms)**, which are adopted from PreACT national norms, are the approximate percentages of recent testers at the same grade level and season (fall or spring) whose PreACT scores are less than or equal to the student's scores. For example, a rank of 56 for the student's Composite score indicates that 56% of other tested students earned that Composite score or below.

- **Progress Toward the ACT WorkKeys National Career Readiness Certificate (NCRC)** provides an estimate of students' most likely level on the ACT NCRC given their Composite scores. The NCRC is an assessment-based credential that documents foundational work skills important for job success across industries and occupations.

- **Detailed PreACT Secure Results** describes students' performance on the reporting categories of the four section tests.

5.1.2 Summary Reports

Summary reports provide aggregated data for different groups of students. Results are aggregated by testing year, season (fall or spring), and grade level.

- **My Summary Results** summarizes performance on each section of the test. It reports mean scores (including the Composite and STEM scores) and the percentage of students scoring at each readiness level.

- **How did our students respond to local items?** summarizes responses to each locally administered survey question, providing the number and percentage of students with each response.

- **Average Scores by Ethnicity and Gender** reports mean PreACT Secure test scores by gender and race/ethnicity.

- **Local Quartile** reports the percentage of students scoring within each national quartile (first quartile: national percentile ranks of 1–24; second quartile: national percentile ranks of 25–49; third quartile: national percentile ranks of 50–74; fourth quartile: national percentile ranks of 75–100). It also provides the range of PreACT Secure test scores for each quartile.

5.1.3 Additional Online Reporting Tools

Data Tools provides summary statistics, frequency distributions, cross-tabulations, and scatterplots to support additional data analysis. The **Download Hub** allows users to download the complete student-level data file for additional analysis or integration with other data systems.

5.2 Progress Toward the ACT NCRC Indicator

This indicator provides students with information about their level of career readiness based on their PreACT Secure Composite score. More specifically, this indicator predicts the NCRC level that students are likely to obtain in 12th grade. Using a large sample of students who took a PreACT assessment before taking the WorkKeys assessments, ACT established this prediction by linking students' Composite scores from Grades 8–11 with the NCRC level they earned. Table 5.1 shows the PreACT Secure Composite score ranges that correspond to different predicted NCRC levels. The values are subject to change as updates are made to the predictions. More details on how the predictions were derived are provided in Section 6.3.

Table 5.1. PreACT Secure Composite Score Ranges Corresponding to Predicted NCRC Levels

NCRC level	Grade level and season					ACT Composite score range
	Grade 9		Grade 10		Grade 11	
	Fall	Spring	Fall	Spring	Fall	
Below Bronze	1–9	1–9	1–9	1–9	1–9	1–12
Bronze	10–13	10–13	10–14	10–14	10–14	13–15
Silver	14–18	14–18	15–18	15–19	15–19	16–20
Gold	19–22	19–22	19–23	20–23	20–24	21–26
Platinum	23–35	23–35	24–35	24–35	25–35	27–36

More information on the Progress Toward the ACT NCRC indicator is available here.

5.3 ACT College and Career Readiness Standards

The ACT College and Career Readiness Standards are statements that describe what students who score in various score ranges on the ACT section tests are *likely* to know and be able to do. ACT began developing the Standards in 1997 and continues to refine them as new data become available. The Standards are based on empirical data that include normative data, college admissions criteria, and information obtained through ACT's Course Placement Service. Content specialists wrote the Standards based on their analysis of the skills and knowledge students need to respond successfully to test items that were answered correctly by 80% or more of the examinees who scored within each score range.

A full account of the development of the Standards and a description of the Standards for each test section are given in the *ACT Technical Manual* (ACT, 2026).

5.4 ACT College Readiness Benchmarks

The ACT College Readiness Benchmarks are ACT scores that represent the level of achievement required for a student to have a 50% chance of obtaining a B or higher (or about a 75% chance of obtaining a C or higher) in corresponding credit-bearing first-year college courses at a typical 2-year or 4-year postsecondary institution. These college courses or course areas and the current Benchmarks are given in Table 5.2.

Table 5.2. ACT College Readiness Benchmarks

College courses and course areas	ACT test score	ACT Benchmark
English Composition I	English/writing	18
College algebra	Math	22
American history, other history, psychology, sociology, political science, and economics	Reading	22
Biology	Science	23
Calculus I, biology, chemistry, physics, and engineering	STEM	26
English Composition I, American history, other history, psychology, sociology, political science, and economics	ELA	20

The Benchmarks are empirically derived and based on the actual performance of students in college. Through ACT's postsecondary research services and other research partnerships, ACT assembled an extensive database consisting of course grades and test score data from a large number of first-year students and a wide range of postsecondary institutions. These data provide an overall measure of what it takes to be successful in selected first-year college courses.

The Benchmarks are subject to change over time. Reasons for updating the Benchmarks include changes in college grading standards and changes in college student performance. The Benchmarks for English, math, reading, and science were updated in 2013 with more recent data from 214 institutions and over 230,000 students. The STEM and ELA Benchmarks were established more recently.

Students, parents, and counselors can use the Benchmarks to determine the academic areas in which students are ready for college coursework, as well as areas in which they may need more preparation. Although the Benchmarks are useful predictors of success in first-year college courses, ACT scores above the cutoffs do not guarantee success. Factors other than academic preparedness, such as motivation and good study habits, are also important to success in college (Robbins et al., 2004).

A description of the development of the ACT College Readiness Benchmarks is provided in the *ACT Technical Manual* (ACT, 2026) and various ACT research reports (Allen, 2013; Allen & Sconing, 2005; Mattern et al., 2015; Radunzel et al., 2015; Radunzel et al., 2017).

5.5 PreACT Readiness Levels and Benchmarks

PreACT Secure tests can be used to monitor students' progress toward college and career readiness. PreACT Secure scores are classified into one of three readiness levels:

1. **On Target.** Students scoring in this range are predicted to meet or exceed the ACT College Readiness Benchmark in 11th or 12th grade. The PreACT Readiness Benchmark is the score associated with a 50% chance of meeting the ACT College

Readiness Benchmark in 11th or 12th grade and is the minimum score for the On Target range.

2. **Close to Target.** Students scoring in this range have a 25%–50% chance of meeting the ACT College Readiness Benchmark.

3. **In Need of Intervention.** Students scoring in this range have less than a 25% chance of meeting the ACT College Readiness Benchmark.

PreACT Readiness Levels are specific to grade level (8, 9, 10, or 11), season (fall or spring), and PreACT Secure score (English, math, reading, science, and STEM). For Grade 11, Readiness Levels are available only for fall. Table 5.3 lists the scale score ranges for the PreACT Readiness Levels for Grades 9–11 that were derived in 2024, along with the PreACT Readiness Benchmark and corresponding ACT College Readiness Benchmark. For more details on how the PreACT Readiness Levels were derived, please see Section 6.4.

Table 5.3. Scale Score Ranges for PreACT Readiness Levels

Score	Grade level / season	PreACT Readiness Level			PreACT Readiness Benchmark	ACT Benchmark
		In Need of Intervention	Close to Target	On Target		
English	9, fall	1–8	9–11	12–35	12	18
	9, spring	1–9	10–12	13–35	13	18
	10, fall	1–10	11–13	14–35	14	18
	10, spring	1–11	12–14	15–35	15	18
	11, fall	1–12	13–15	16–35	16	18
Math	9, fall	1–14	15–16	17–35	17	22
	9, spring	1–15	16–17	18–35	18	22
	10, fall	1–16	17–18	19–35	19	22
	10, spring	1–16	17–18	19–35	19	22
	11, fall	1–17	18–19	20–35	20	22
Reading	9, fall	1–14	15–17	18–35	18	22
	9, spring	1–15	16–18	19–35	19	22
	10, fall	1–16	17–19	20–35	20	22
	10, spring	1–17	18–20	21–35	21	22
	11, fall	1–18	19–21	22–35	22	22
Science	9, fall	1–15	16–18	19–35	19	23
	9, spring	1–16	17–18	19–35	19	23
	10, fall	1–17	18–19	20–35	20	23
	10, spring	1–18	19–20	21–35	21	23
	11, fall	1–19	20–21	22–35	22	23
STEM	9, fall	1–18	19–20	21–35	21	26
	9, spring	1–19	20–21	22–35	22	26
	10, fall	1–20	21–22	23–35	23	26
	10, spring	1–20	21–22	23–35	23	26
	11, fall	1–21	22–23	24–35	24	26

Note. The maximum possible scale score is 30 for PreACT 8/9, 32 for PreACT 9 Secure, and 35 for PreACT and PreACT Secure.

Chapter 6:
Scaling, Equating, and Technical Characteristics

Scale scores are reported for PreACT Secure English, mathematics, reading, and science tests. Scale scores are also reported for the PreACT Secure Composite score and the STEM score. The range of all PreACT Secure scale scores is 1 to 35. More background information on the PreACT Secure scale is available in Section 2.6.

This chapter discusses equating methods and characteristics of PreACT Secure tests. Section 6.1 describes the equating procedure of PreACT Secure. Section 6.2 documents how the predicted ACT score ranges are derived. Section 6.3 describes the PreACT Secure score ranges. Section 6.4 presents the summary of the operational test data from students taking PreACT Secure tests in Spring 2026. Section 6.5 describes the PreACT Secure norms. Sections 6.6 to 6.8 present the results of psychometric analyses, including differential item functioning, reliability, measurement error, and classification consistency based on the Spring 2026 operational data.

6.1 Equating of PreACT Secure Tests

Post-equating was conducted to create raw-to-scale score conversion tables for each section of the PreACT Secure tests administered in Spring 2026. It was performed through the following procedure. First, based on the responses of Grade 10 students in the equating sample, operational items on the two main forms were calibrated separately with the Item Response Theory (IRT) Three-Parameter Logistic model. Next, the calibrated item parameters were aligned to the ACT item pool scale with the Stocking-Lord linking procedure. Finally, the IRT true score equating was conducted to establish conversion tables. These derived conversion tables are used to transform raw scores on the new forms to scale scores.

The Composite and STEM scores, which constitute combinations of individual test section scores, are not directly equated. Instead, they are derived from the rounded arithmetic mean of scale scores originating from three or two test sections.

6.2 Predicted ACT Score Ranges

One of the primary intended uses of PreACT Secure scores is to predict how well students will perform on the ACT. Accordingly, PreACT Secure score reports include predicted ACT score ranges. The score predictions can help users interpret their PreACT Secure scores, facilitate high school coursework planning, and give students an indication of how much academic growth is needed to meet their goals for college and career readiness. In this section, we document the samples and methods used to derive the predicted ACT score ranges.

6.2.1 Samples Used to Derive the ACT Score Predictions

The predictions are updated each year, and here we describe the sample used to derive the predictions that were reported during the 2025–2026 academic year. We used longitudinal data, including PreACT, PreACT Secure, and ACT test scores for students tested through Spring 2025.

Students who took the ACT test in spring of Grade 11 from 2023 to 2025 and either the PreACT or PreACT Secure assessment were included in the sample, forming three groups:

- 938,331 students who took PreACT in Grade 10
- 191,896 students who took PreACT Secure in Grade 10
- 82,470 students who took PreACT in Grade 11

We used propensity score weighting (Austin, 2011) to weight each group to be demographically similar to the target population of students who took the ACT and were projected to complete high school in 2024. The procedure used logistic regression to estimate each student's probability of being in each group based on gender, race/ethnicity, geographic region, school type (public or private), school locale (rural, town, suburban, or urban), school percentage of students eligible for free or reduced-price lunch, and school mean ACT Composite score (for the 2024 high school graduating cohort). After weighting, the three groups were combined to form one longitudinal sample.

Table 6.1 summarizes the demographics of the longitudinal sample, as well as the target population. The table reports both the unweighted and weighted percentage of students in each demographic category. Relative to the unweighted sample percentages, the weighted sample percentages more closely match the target population percentages.

Table 6.1. Demographics of Sample Used to Derive Predicted ACT Scores

Characteristic		Sample %	Sample Weighted %	Target Population %
Gender	Female	39.2	46.8	47.2
	Male	38.7	45.6	45.5
	Another Gender	0.4	0.2	0.6
	Missing	21.7	7.4	6.7
Race/ethnicity	Asian	2.8	3.8	4.1
	Black/African American	9.7	11.6	12.0
	Hispanic	12.7	18.2	17.9
	Native American	1.0	1.1	1.0
	Native Hawaiian/OPI	0.2	0.2	0.3
	Two or more races	4.8	4.9	5.0
	White	45.8	49.6	49.9
	Missing	23.0	10.6	9.8
Region	Midwest	34.7	28.4	27.3
	Northeast	1.0	3.5	3.4
	South	55.4	50.6	52.7
	West	8.9	17.5	16.6
School type	Private	10.2	10.9	9.7
	Public	89.8	89.1	90.3
School locale	Rural	20.9	17.8	17.5
	Town	13.5	13.4	13.2
	Suburban	30.9	33.1	33.1
	Urban	27.4	28.5	28.0
	Missing	7.3	7.2	8.1

Note. OPI = Other Pacific Islander. The percentages of each characteristic may not add up to 100% due to rounding.

Table 6.2 summarizes the test scores for the weighted sample. The mean and standard deviation of the PreACT and ACT scores are presented for each subject. In addition, pretest/posttest correlations (r) are presented.

Table 6.2. Test Score Summary Statistics for Samples Used to Derive Predicted ACT Scores

Subject	PreACT		ACT		*r*
	Mean	SD	Mean	SD	
English	15.98	6.13	18.69	6.91	0.83
Mathematics	17.98	4.63	19.16	5.65	0.85
Reading	19.84	6.93	20.10	6.94	0.79
Science	17.87	5.36	19.80	5.73	0.74
STEM	18.17	4.67	19.73	5.42	0.86
Composite	18.04	5.16	19.32	6.05	0.90

Note. *r* = Pearson correlation of pretest and posttest scores; SD = standard deviation.

6.2.2 Statistical Model Used to Derive the ACT Score Predictions

The predictions are derived from a linear regression model where the pretest score (e.g., PreACT Secure score) is used to predict the posttest score (ACT score). For each section test score and each combined score (STEM and Composite), the regression model uses linear and quadratic terms of the pretest score to predict the posttest score. For the section test scores and STEM score, the PreACT Secure Composite score is included as an additional predictor variable to improve prediction accuracy. For the section test scores and STEM score, models are also fit without the Composite score so that predictions can still be reported for examinees who do not have a Composite score. Each regression model includes additional variables so that predictions can be derived under different scenarios, including: number of months between pretest and posttest, the interaction between the number of months between the pretest and posttest and pretest score, and whether the pretest was PreACT or PreACT Secure.

Using the fitted models, a 50% prediction interval forms the lower and upper bound of the predicted score range for each possible combination of variables, including: pretest score, Composite score, number of months between pretest and posttest, and whether the pretest was PreACT or PreACT Secure. The lower and upper bounds are obtained after rounding the prediction interval endpoints to the nearest integer.

The score predictions that are reported assume that students will take the ACT test in the spring of Grade 11. Therefore, the ACT score predictions are based on the following scenarios for number of months between the PreACT Secure and ACT tests: 30 months for PreACT Secure administered in fall Grade 9, 24 months for PreACT Secure administered in spring Grade 9, 18 months for PreACT Secure administered in fall Grade 10, 12 months for PreACT Secure administered in spring Grade 10, and 6 months for PreACT Secure administered in fall Grade 11.

After deriving the predicted score ranges, manual adjustments were made to ensure logical consistency across PreACT Secure scores (1–35) and grade levels (9–11). The logical consistency requirements include:

- For the section test scores and STEM score:
    - For each grade level (9, 10, or 11), season (fall or spring), and Composite score value, ACT score range predictions do not decrease as PreACT Secure scores increase.
    - For each grade level (9, 10, or 11), season (fall or spring), and PreACT Secure score value, ACT score range predictions do not decrease as Composite scores increase.
- For the Composite score:
    - For each grade level (9, 10, or 11) and season (fall or spring), ACT score range predictions do not decrease as PreACT Secure scores increase.

- For the section test scores, STEM score, and Composite score:
    - ACT score range predictions do not decrease with grade level and season. For example, the ACT score predictions for fall Grade 10 should be greater than or equal to the ACT score predictions for spring Grade 9.

6.3 Predictions of ACT National Career Readiness Certificate (NCRC) Level

Another of the primary intended uses of PreACT Secure is to monitor progress toward college and career readiness. To support this use, the Progress Toward Career Readiness Indicator provides students with information about their level of career readiness based on their PreACT Secure Composite score. More specifically, this indicator predicts the ACT National Career Readiness Certificate (NCRC) level that students are likely to obtain, assuming they take the ACT WorkKeys assessments in 12th grade. This prediction was established using a longitudinal sample of students who took a PreACT assessment (PreACT 8/9, PreACT 9 Secure, PreACT, or PreACT Secure) before taking the ACT WorkKeys assessment and attempting to earn an NCRC.

6.3.1 Sample Used to Derive the NCRC Predictions

The sample used to derive the NCRC predictions included 161,303 examinees who took the ACT WorkKeys assessments through March 2024. The sample included 16,319 students who took PreACT 8/9, 144,781 students who took PreACT, and 203 students who took PreACT Secure before taking ACT WorkKeys. The number of months between the PreACT test and the WorkKeys assessments ranged from 0 to 53, with a mean of 23.7 and standard deviation of 5.3.

The sample was weighted to represent the target population of all public high school students in the South and Midwest regions of the United States. The target population was derived as students from public high schools that administered the ACT test during the school day to at least 50% of their 11th-grade students in Spring 2022. We used propensity score weighting (Austin, 2011) to weight the sample to be like the target population. The procedure used logistic regression to estimate each student's probability of being in the sample based on gender, race/ethnicity, geographic region (South or Midwest only), school locale (rural, town, suburban, or urban), school percentage of students eligible for free or reduced-price lunch, and school mean ACT Composite score (for the 2022 school-day tested cohort). Table 6.3 summarizes the sample's demographics and compares the sample to the target population before and after sample weighting.

Table 6.3. Demographics of Sample Used to Derive Predicted NCRC Levels

Characteristic		Sample		Target population %
		%	Wt. %	
Gender	Female	45.3	48.0	47.5
	Male	46.8	47.3	46.3
	Another gender	1.3	1.1	0.8
	Missing	6.6	3.6	5.4
Race/ethnicity	Asian	2.5	2.4	2.9
	Black/African American	23.0	15.5	15.8
	Hispanic	14.2	16.1	14.9
	Native American	1.1	1.1	1.0
	Native Hawaiian/OPI	0.1	0.2	0.2
	Two or more races	4.9	5.6	5.1
	White	50.3	49.5	50.9
	Missing	3.9	9.8	9.2
Region	Midwest	9.0	29.3	31.0
	Northeast	0.0	0.0	0.0
	South	91.0	70.7	69.0
	West	0.0	0.0	0.0
School type	Public	100.0	100.0	100.0
School locale	Rural	32.2	26.4	24.3
	Town	12.7	18.9	16.4
	Suburban	21.5	24.1	28.5
	Urban	24.8	24.9	25.1
	Missing	8.9	5.7	5.8
High school graduation year	2021	<0.1	<0.1	0.0
	2022	23.6	19.2	0.0
	2023	40.8	37.6	100.0
	2024	29.6	32.6	0.0
	2025	5.9	10.5	0.0
	2026	0.1	0.1	0.0

Note. OPI = Other Pacific Islander. The percentages of each characteristic may not add up to 100% due to rounding.

6.3.2 Statistical Model Used to Derive the NCRC Level Predictions

Among students in the sample, 12.3% earned a Platinum NCRC, 19.2% earned a Gold NCRC, 30.4% earned a Silver NCRC, 25.6% earned a Bronze NCRC, and 12.5% did not qualify for the NCRC. Using the weighted sample, logistic regression was used to find the PreACT Suite Composite scores associated with a 50% chance of obtaining each NCRC level or higher. The model included the number of months between pretest and posttest as a covariate, as well as an indicator for whether the onset of the COVID-19 pandemic (March 2020) occurred between the tests. The logistic regression model estimates are provided in Table 6.4.

Table 6.4. Logistic Regression Parameter Estimates Used to Derive Progress Toward Career Readiness Cut Scores

NCRC level	Predictor	Estimate	SE
Non-Qualifier	Intercept	−4.172	0.059
	Composite score	0.413	0.003
	Number of months between tests	0.006	0.002
	Pandemic disruption	−0.398	0.021
Silver	Intercept	−6.664	0.047
	Composite score	0.447	0.002
	Number of months between tests	0.007	0.001
	Pandemic disruption	−0.330	0.017
Gold	Intercept	−9.400	0.056
	Composite score	0.456	0.002
	Number of months between tests	0.026	0.001
	Pandemic disruption	−0.288	0.019
Platinum	Intercept	−11.806	0.083
	Composite score	0.456	0.003
	Number of months between tests	0.041	0.002
	Pandemic disruption	−0.288	0.026

Note. SE = standard error.

The logistic regression results were then used to find the PreACT Suite Composite scores associated with a 50% chance of scoring at or above each NCRC level, under the assumption that the onset of the COVID-19 pandemic did not occur between the tests. Estimates were obtained for different values of the number of months between the PreACT Suite test and WorkKeys assessments: 48 (for fall Grade 8), 42 (for spring Grade 8), 36 (for fall Grade 9), 30 (for spring Grade 9), 24 (for fall Grade 10), 18 (for spring Grade 10), and 12 (for fall Grade 11). These values assume that students will take the ACT WorkKeys assessments in fall of 12th grade. The cut score estimates were obtained by rounding to the nearest integer, resulting in the score ranges presented in Table 5.1 for each NCRC level, grade level, and season.

6.4 Derivation of PreACT Readiness Levels

A study was conducted in 2024 to update the Readiness Levels for PreACT 8/9, PreACT, and PreACT Secure. We used longitudinal data, including PreACT 8/9, PreACT, and ACT test scores for students tested through February 2024. Students' PreACT 8/9 and PreACT records were linked to their ACT scores obtained in spring or summer of 11th grade and/or fall, spring, or summer of 12th grade. Five samples were created:

Grade 8 PreACT 8/9: 11,397 students who took PreACT 8/9 in 8th grade during the 2019–2020 academic year and took the ACT in 11th and/or 12th grade

Grade 9 PreACT 8/9: 58,870 students who took PreACT 8/9 in 9th grade during the 2019–2020 or 2020–2021 academic years and took the ACT in 11th and/or 12th grade

Grade 9 PreACT: 119,060 students who took PreACT in 9th grade during the 2016–2017 through 2020–2021 academic years and took the ACT in 11th and/or 12th grade

Grade 10 PreACT: 768,071 students who took PreACT in 10th grade during the 2019–2020 through 2021–2022 academic years and took the ACT in 11th and/or 12th grade

Fall Grade 11 PreACT: 52,399 students who took PreACT in the fall of 11th grade during the 2020–2021 through 2022–2023 academic years and took the ACT in 11th and/or 12th grade

Each sample was weighted to approximately match a target population: the 2023 cohort of ACT-tested high school graduates. To determine the weights, logistic regression was used to estimate propensity score weights (Austin, 2011). The weighting variables included gender, race/ethnicity, school type (public or private), school percentage eligible for free or reduced-price lunch, school locale (rural, town, suburban, or urban), geographic region, and school mean ACT Composite score. School percentage eligible for free or reduced-price lunch data were available for most public schools. For schools that did not have these data available, a missing data indicator was used in the logistic regression model used to estimate propensity score weights. School mean ACT Composite score was only calculated for schools with state or district ACT testing programs. For schools that did not participate in State and District ACT testing programs, a missing data indicator was used in the logistic regression model used to estimate propensity score weights.

After weighting, each sample approximately matched the target population. The five samples were then combined to form the total sample. Some students were included in multiple samples because they took multiple PreACT 8/9 and/or PreACT tests; the total sample included 927,647 students. Table 6.5 provides the distribution of background variables for the total sample, before and after weighting. After weighting, the sample percentages are very close to the population percentages.

Table 6.5. Background Characteristics of Total Sample

Characteristic		Sample %		Population (%)
		Raw	Weighted	
Gender	Female	46.5	48.7	48.7
	Male	44.8	46.7	46.4
	Another gender	0.6	0.5	0.7
	Prefer not to respond	1.8	1.3	1.9
	Missing	6.3	2.8	2.3
Race/ ethnicity	Asian	3.2	4.0	4.2
	Black/African American	11.7	11.7	12.4
	Hispanic	12.5	15.9	16.9
	Native American	1.1	1.0	1.0
	Native Hawaiian/OPI	0.3	0.3	0.3
	Two or more races	5.4	5.0	4.9
	White	53.3	54.3	52.2
	Prefer not to respond	2.7	2.4	3.3
	Missing	9.9	5.4	4.9
Grade level last ACT	11	76.0	71.7	68.6
	12	24.0	28.3	30.3
	Other	0.0	0.0	1.1
School type	Nonpublic	15.3	13.0	10.1
	Public	84.7	87.0	89.9
School locale	Rural	22.3	17.9	17.6
	Town	13.6	13.7	13.2
	Suburban	29.5	33.5	33.1
	Urban	28.3	28.5	28.4
	Missing	6.3	6.3	7.8
Region	Midwest	29.4	30.2	27.8
	Northeast	1.4	3.5	3.6
	South	60.9	47.6	52.2
	West	8.4	18.7	16.4
School FRL %	% Missing	25.2	36.7	32.2
	Mean	39.2	42.1	42.0
School mean ACT	% Missing	8.0	20.9	23.8
	Mean	18.8	18.7	18.5

Note. OPI = Other Pacific Islander; FRL = free or reduced-price lunch.

Students' best ACT test scores in each section were used to determine whether students met the ACT College Readiness Benchmark. (When students tested more than once, their highest mathematics and science scores were used to calculate their STEM score, also known as an ACT Superscore.) Table 6.6 provides test score summary statistics for each test section and grade level included in the total sample.

Table 6.6. Weighted Summary Statistics for PreACT 8/9 or PreACT Scores and Best ACT Scores

Test section	Grade level	*N*	PreACT 8/9 or PreACT		ACT		
			Mean	SD	Mean	SD	% Meeting Benchmark
English	8	11,397	15.6	4.7	19.4	6.4	55.2
	9	177,930	15.9	5.5	19.8	6.8	58.4
	10	768,071	16.2	6.2	19.4	7.0	55.9
	11	52,399	17.2	6.5	19.4	7.0	55.8
Math	8	11,397	17.5	3.9	19.6	5.2	32.3
	9	177,930	17.8	4.0	19.9	5.4	35.4
	10	768,071	18.3	4.5	19.8	5.6	34.8
	11	52,399	18.7	4.8	19.5	5.4	33.3
Reading	8	11,397	18.4	5.7	21.3	6.6	44.9
	9	177,930	19.3	6.2	21.3	6.9	46.3
	10	768,071	20.5	6.7	21.1	7.1	45.1
	11	52,399	21.0	6.9	20.9	7.1	44.1
Science	8	11,397	16.8	4.2	20.6	5.5	35.5
	9	177,930	17.5	4.6	20.7	5.6	37.0
	10	768,071	18.6	5.2	20.5	5.8	36.2
	11	52,399	19.0	5.5	20.4	5.8	36.2
STEM	8	11,397	17.4	3.8	20.3	5.2	18.8
	9	177,930	17.9	4.0	20.5	5.3	18.9
	10	768,071	18.7	4.5	20.4	5.5	18.9
	11	52,399	19.1	4.8	20.2	5.3	18.3

Note. SD = standard deviation.

For each test section, logistic regression was used to model the probability of meeting the ACT College Readiness Benchmark as a function of PreACT 8/9 or PreACT test score (linear and quadratic effects), number of months between PreACT 8/9 or PreACT test and last ACT test, the interactions of PreACT 8/9 or PreACT test score effects and number of months between tests, and an indicator variable for whether the onset of the COVID-19 pandemic (March 2020) occurred between the tests.

The logistic regression models produced estimated probabilities of meeting the ACT Benchmark for each combination of test section, PreACT 8/9 or PreACT score, number of months between tests, and whether the onset of the pandemic occurred between the tests. To derive the Readiness Level cut scores, we used estimates obtained for specific values of number of months between tests, including the following:

- 45 months between tests for the fall Grade 8 Readiness Levels
- 39 months between tests for the spring Grade 8 Readiness Levels

- 33 months between tests for the fall Grade 9 Readiness Levels
- 27 months between tests for the spring Grade 9 Readiness Levels
- 21 months between tests for the fall Grade 10 Readiness Levels
- 15 months between tests for the spring Grade 10 Readiness Levels
- 9 months between tests for the fall Grade 11 Readiness Levels

Note that the estimates also assume that the onset of the pandemic did not occur between tests; therefore, the Readiness Levels assume that student growth was not disrupted by the onset of the pandemic. Table 6.7 shows the cut score point estimates produced by the logistic regression models, as well as the cut scores that were chosen for the Readiness Levels.

Generally, the cut scores for the On Target Readiness Level were chosen as the scores closest to having a 0.50 probability of meeting the ACT College Readiness Benchmark. Similarly, the cut scores for the Close to Target Readiness Level were chosen as the scores closest to having a 0.25 probability of meeting the ACT College Readiness Benchmark. In some cases, cut scores that deviated slightly from those rules were selected to achieve greater continuity across grade levels. Further, some of the cut scores for the Close to Target Readiness Level were modified to ensure that the cut score was at least 2 score points below the cut score for the On Target Readiness Level. For Grade 8 English, the cut scores for Close to Target were set at 8, despite the estimates being lower. This was done to ensure that the cut scores were not set too low (e.g., approaching scores that students could achieve by guessing).

Table 6.7. Cut Score Point Estimates (and Selected Cut Score) for Readiness Levels

Readiness level	Grade level	Season	Cut score				
			English	Math	Reading	Science	STEM
Close to target	8	Fall	4.91 (8)	14.91 (14)	11.04 (13)	13.84 (14)	17.70 (17)
	8	Spring	7.21 (8)	15.39 (15)	12.92 (14)	14.95 (15)	18.53 (18)
	9	Fall	8.73 (9)	15.91 (15)	14.49 (15)	15.99 (16)	19.37 (19)
	9	Spring	9.95 (10)	16.47 (16)	15.87 (16)	16.99 (17)	20.21 (20)
	10	Fall	11.01 (11)	17.05 (17)	17.14 (17)	17.95 (18)	21.04 (21)
	10	Spring	11.98 (12)	17.67 (17)	18.35 (18)	18.89 (19)	21.85 (21)
	11	Fall	12.91 (13)	18.30 (18)	19.53 (19)	19.81 (20)	22.63 (22)
On target	8	Fall	9.56 (10)	16.16 (16)	15.58 (16)	16.67 (17)	19.19 (19)
	8	Spring	10.77 (11)	16.71 (17)	16.94 (17)	17.61 (18)	20.06 (20)
	9	Fall	11.82 (12)	17.31 (17)	18.19 (18)	18.52 (19)	20.93 (21)
	9	Spring	12.77 (13)	17.93 (18)	19.38 (19)	19.41 (19)	21.78 (22)
	10	Fall	13.67 (14)	18.59 (19)	20.52 (20)	20.29 (20)	22.61 (23)
	10	Spring	14.55 (15)	19.26 (19)	21.66 (21)	21.15 (21)	23.41 (23)
	11	Fall	15.43 (16)	19.93 (20)	22.81 (22)	22.01 (22)	24.16 (24)

6.5 PreACT Secure Score Ranges

Measurement precision on the PreACT Secure student score reports is represented by ±1 CSEM (conditional standard error of measurement) from the student's scale score. CSEM values were computed for each form following the IRT-based procedure described by Kolen and Brennan (2004, p. 301–302) with simulated θ values from −8 to 8. The specific steps and formula for computing the CSEM values are as follows:

Step 1. For a given specific θ_i point, the recursive formula by Lord and Wingersky (1984) was used to find the conditional distribution of observed raw scores, which is symbolized as $f(X|\theta_i)$. Based on the raw-to-scale conversion table obtained using the IRT true score equating method, $f(X|\theta_i)$ was transformed to the conditional distribution of possible scale-score points for a certain examinee with a specific ability of θ_i.

Step 2. The expected mean of the conditional distribution of scale scores given θ_i is

$$\xi(\theta_i) = \sum_{j=0}^{K} sc(j) f(X = j|\, \theta_i),$$

where $sc(j)$ represents the corresponding scale score for a raw score point j based on the raw-to-scale score conversion on a test with *K* items.

Step 3. Conditional measurement error variance of scale scores given θ_i is

$$var[sc(j)|\theta_i] = \sum_{j=0}^{K}[sc(j) - \xi(\theta_i)]^2 f(X = j|\theta_i).$$

The square root of the above error variance represents the CSEM of scale scores at a given θ_i. For each scale score from 1 to 35, the corresponding raw score and θ were located. The CSEM values were calculated through the formula above and were rounded to integers. The final scale-score CSEM values were derived from the forms administered in Spring 2026. These values will be monitored continuously and updated if significant deviations are identified. CSEM values for all PreACT Secure scale scores are presented in Table 6.8.

Table 6.8. PreACT Secure CSEM Values

PreACT Secure scale score	English CSEM	Math CSEM	Reading CSEM	Science CSEM	Composite CSEM	STEM CSEM
1	1	1	2	2	1	1
2	1	1	2	2	1	1
3	1	1	2	2	1	1
4	1	1	2	2	1	1
5	1	1	2	2	1	1
6	1	1	2	2	1	1
7	1	1	2	2	1	1
8	1	1	2	2	1	1
9	1	1	2	2	1	1
10	2	1	2	2	1	1
11	2	1	2	2	1	1
12	2	1	2	2	1	1
13	2	1	2	2	1	1
14	2	1	2	2	1	1
15	2	1	2	2	1	1
16	2	1	2	2	1	1
17	2	2	2	2	1	1
18	3	2	2	2	1	1
19	3	3	3	2	1	2
20	3	3	3	2	1	2
21	3	3	3	2	1	2
22	3	3	3	2	1	2
23	3	3	3	2	1	2
24	3	3	3	3	1	2
25	3	3	3	3	2	2
26	3	2	3	3	2	2
27	3	2	3	3	2	2
28	3	2	3	3	2	2
29	3	2	3	3	2	2
30	3	2	3	3	1	2
31	3	2	3	3	1	2
32	3	2	2	3	1	2
33	2	2	2	2	1	2
34	2	1	1	2	1	1
35	1	1	1	2	1	1

6.6 PreACT Secure Spring 2026 Operational Test Data

Over 263,000 examinees took the PreACT Secure tests in Spring 2026. Tables 6.9 and 6.10 show the distributions of data for students in 9th grade and 10th grade, respectively, based on gender and ethnicity. Considering the relatively small sample size and concerns over privacy, data for other grades are not included in the report.

Table 6.9. PreACT Secure Spring 2026 Operational Test Data Distribution by Gender and Grade

Gender	Grade 9	Grade 10
Female	28,839	97,525
Male	29,752	100,968
Other*	1,412	4,621

Note. * Other category includes 'Another gender,' 'Prefer not to respond,' and missing.

Table 6.10. PreACT Secure Spring 2026 Operational Test Data Distribution by Ethnicity and Grade

Race/Ethnicity	Grade 9	Grade 10
Black/African American	4,068	17,765
American Indian/Alaskan Native	577	1,367
White	33,911	83,071
Hispanic/Latino	628	4,538
Asian	1,928	8,088
Native Hawaiian/Other Pacific Islander	62	189
Two or more races	6,293	23,753
Prefer not to respond	5,572	29,217
Missing	6,964	35,126

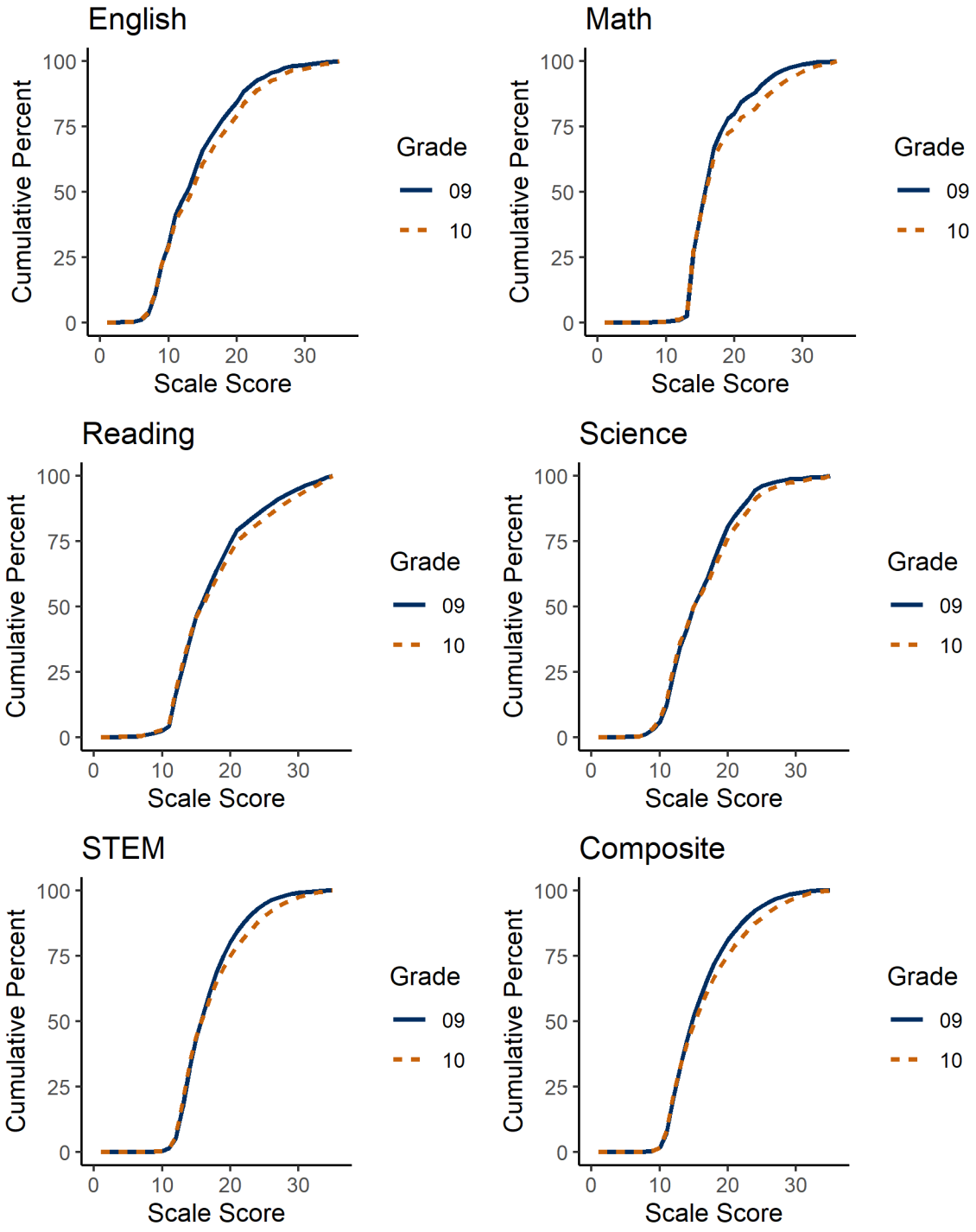
6.6.1 Scale Score Statistics for the PreACT Secure Spring 2026 Test Sample

Table 6.11 shows the scale-score summary statistics for students in 9th and 10th grade in the PreACT Secure Spring 2026 sample. Figure 6.1 shows how the scale scores are distributed for the two grades.

Table 6.11. Scale Score Summary Statistics for 9th and 10th Graders

Grade	Test section	Mean	SD	Skewness	Kurtosis
9	English	14.33	5.68	1.00	0.76
	Mathematics	17.50	4.22	1.46	2.01
	Reading	17.77	5.93	1.02	0.47
	Science	16.46	4.90	0.79	0.66
	STEM	17.23	4.23	1.11	1.16
	Composite	16.53	4.72	1.05	0.68
10	English	15.11	6.41	0.91	0.32
	Mathematics	18.27	5.25	1.31	0.97
	Reading	18.27	6.56	0.90	-0.06
	Science	16.82	5.56	0.84	0.45
	STEM	17.80	5.09	1.10	0.67
	Composite	17.22	5.54	0.98	0.24

Figure 6.1. Scale Score Distribution Comparisons for Grades



6.6.2 *Effective Weights*

As with the ACT, the PreACT Secure Composite score is the rounded average of the scale scores of the English, mathematics, and reading test sections. This score evaluates students' general educational development over the three areas. Therefore, it is necessary to report the contributions of individual test section scores to a combined score, which is represented by effective weight. According to Wang and Stanley (1970), effective weight is defined as the statistical contribution of the test to the variance of the Composite. The effective weights are calculated based on the variance-covariance matrix between the scale scores. Since the scale scores from the three test sections were equally weighted to compute the Composite score, effective weights, ew_i, were calculated as

$$ew_i = \frac{\sigma_i^2 + \sum_{j \neq 1} \sigma_{ij}}{\sum_i [\sigma_i^2 + \sum_{j \neq 1} \sigma_{ij}]},$$

where σ_i^2 is the variance of scale scores on test section *i* and σ_{ij} is the covariance between scale scores on test sections *i* and *j*.

Table 6.12 contains the variance-covariance matrix of the scale scores of one operational form for effective weights calculation based on Spring 2026 operational data. For example, the effective weight for English was computed by adding the three numbers in the first row (39.17, 22.18, and 32.40). This sum was then divided by the sum of all the elements in the variance-covariance matrix. Since both variance and covariance are included in the numerator, a greater variance or covariance with other test sections could lead to a greater effective weight.

Tables 6.13 and 6.14 contain the effective weight for each test section score contributing to the variances of the Composite and STEM scores separately based on the two operational forms. Regarding these scores, the effective weights remain consistent across forms. The effective weights for typical ACT forms from the most recent ACT technical manual (ACT, 2026) are provided as references. Note that the summation of some proportions in Table 6.13 may not equal one due to rounding.

Table 6.12. Scale Score Variance-Covariances from one PreACT Secure Test Form

Test	Test section	English	Math	Reading
PreACT Secure	English	39.17	22.18	32.40
	Mathematics	22.18	25.48	21.99
	Reading	32.40	21.99	41.32

Table 6.13. Effective Weights of Composite Score for the PreACT Secure and ACT Tests

Test	Test section	Number of items	Proportion of total	Effective weight
PreACT Secure	English	36	0.39	0.34–0.37
	Mathematics	32	0.34	0.27–0.28
	Reading	25	0.27	0.36–0.38
ACT	English	40	0.37	0.35–0.36
	Mathematics	41	0.38	0.28–0.30
	Reading	27	0.25	0.34–0.36

Table 6.14. Effective Weights of STEM Score for the PreACT Secure and ACT Tests

Test	Test section	Number of items	Proportion of total	Effective weight
PreACT Secure	Mathematics	32	0.52	0.47–0.49
	Science	30	0.48	0.51–0.53
ACT	Mathematics	41	0.55	0.50–0.54
	Science	34	0.45	0.46–0.50

6.6.3 Correlations

The correlations of scale scores were computed based on the Spring 2026 PreACT Secure data and compared with the scale-score correlations from the most recent ACT technical manual (ACT, 2026), as shown in Table 6.15.

Table 6.15. Correlations Among the PreACT Secure Scores and ACT Test Scores

Test	Test section	English	Math	Reading	Science	Composite	STEM
PreACT Secure	English	1.00	0.70	0.81	0.75	0.93	0.77
	Math	—	1.00	0.68	0.76	0.86	0.93
	Reading	—	—	1.00	0.77	0.92	0.77
	Science	—	—	—	1.00	0.83	0.94
	Composite	—	—	—	—	1.00	0.90
	STEM	—	—	—	—	—	1.00
ACT	English	1.00	0.72	0.77	0.73	0.93	0.77
	Math	—	1.00	0.64	0.77	0.86	0.94
	Reading	—	—	1.00	0.70	0.90	0.71
	Science	—	—	—	1.00	0.82	0.94
	Composite	—	—	—	—	1.00	0.89
	STEM	—	—	—	—	—	1.00

6.7 PreACT Secure Norms

One of the intended uses of PreACT Secure test scores is to understand student performance relative to national norms. PreACT Secure score reports provide percentile ranks for English, mathematics, reading, science, STEM, and Composite scores. A PreACT norming study is typically conducted each year, and the results are used to assign percentile ranks to scores.

The goal of the norming study is to estimate norms (including percentile ranks) that are representative of examinees across the country who take the ACT test. Norms are estimated for fall Grade 9, spring Grade 9, fall Grade 10, spring Grade 10, and fall Grade 11, respectively. Sample selection and weighting procedures are used to ensure that each sample is representative of the ACT-tested population with respect to gender, race/ethnicity, geographic region, and school category (defined by public/nonpublic status and percentage of students eligible for free and reduced-price lunch). Through this design, student performance on the PreACT can be understood for each grade level and season, relative to the population of students who go on to take the ACT test. Detailed descriptions of the PreACT norming studies, including norming samples, weighting methodology, estimation procedures, and analyses results, are documented in separate reports (Lu & Allen, 2019). The most recent norm tables can be found at https://success.act.org/s/article/PreACT-and-PreACT-89-US-Ranks.

The percentile ranks reported for PreACT Secure are based on the most recent PreACT norming study. However, future studies will examine whether different norms are needed for PreACT and PreACT Secure.

6.8 Differential Item Functioning

Differential item functioning (DIF) can be described as a statistical difference between the probability of the specific population subgroup (the “focal” group) getting the item right and the comparison population subgroup (the “base” group) getting the item right given that both groups have the same level of expertise with respect to the content being tested. DIF analyses of the PreACT Secure tests were conducted separately for Grades 9 and 10 and each operational form. The procedures currently used for the PreACT Secure DIF analyses include the standardized difference in proportion correct (STD) procedure and the Mantel-Haenszel common odds-ratio (MH) procedure (Holland & Thayer, 1988). Detailed descriptions of these statistics and their performance in detecting DIF is documented in the ACT Research Report entitled *Performance of Three Conditional DIF Statistics in Detecting Differential Item Functioning on Simulated Tests* (Spray, 1989).

Both the STD and MH techniques are designed for use with multiple-choice items, and both require data from a significant number of students to provide reliable results. Testing industry standards require a minimum of 300 students for the focal group and 700 students overall (Zwick, 2012). DIF analyses of PreACT Secure tests were conducted on each multiple-choice item for the four group comparisons, as shown in Table 6.16 below.

Table 6.16. Group Comparison for DIF Analyses

Focal group	Reference group
Female	Male
Black/African American	White
Hispanic	White
Asian	White

Using pre-established criteria, any items in the two operational forms administered during Spring 2026 with STD or MH values exceeding the tolerance level were flagged. The flagging criteria for the STD procedure is to flag items when the absolute value of STD is greater than 0.10. Based on the STD procedure, for English, only one item demonstrated DIF in the Hispanic/White comparison group. For mathematics, DIF was observed across two comparison groups: four items for the Black/White comparison, and three items for the Hispanic/White comparison. For Reading, one item demonstrated DIF in the Hispanic/White comparison; no item manifested DIF for Science. Table 6.17 shows the criteria for flagging DIF in multiple-choice items related to the MH procedure. In this table, MH-CHISQ denotes the *p*-value of the MH Chi-square statistic and MH-D signifies the delta-scaled MH alpha. Table 6.18 presents the items flagged according to the MH procedure. Following the MH procedure, mathematics has a relatively higher count of items flagged with DIF, while English, reading and science have fewer. The content experts reviewed all the flagged items and found no evidence of bias towards any specific group.

Table 6.17. Criteria for the A, B, and C DIF Categories on MH Procedure

Category	Description	Criterion
A	Negligible DIF	Nonsignificant MH-CHISQ ($p > 0.05$) or $\lvert MH\text{-}D \rvert < 1.0$
B	Moderate DIF	Significant MH-CHISQ ($p \leq 0.05$) and $1.0 \leq \lvert MH\text{-}D \rvert < 1.5$
C	Large DIF	Significant MH-CHISQ ($p \leq 0.05$) and $\lvert MH\text{-}D \rvert \geq 1.5$

Table 6.18. Summary of DIF Analysis according to MH Procedure

Test section	DIF group	A	B	C	Total number of items
English	Female/Male	71	1	0	72
	Black/White	71	1	0	72
	Hispanic/White	71	0	1	72
	Asian/White	70	2	0	72
Mathematics	Female/Male	64	0	0	64
	Black/White	59	2	3	64
	Hispanic/White	60	1	3	64
	Asian/White	59	3	2	64
Reading	Female/Male	49	1	0	50
	Black/White	50	0	0	50
	Hispanic/White	47	3	0	50
	Asian/White	49	1	0	50
Science	Female/Male	60	0	0	60
	Black/White	60	0	0	60
	Hispanic/White	60	0	0	60
	Asian/White	60	0	0	60

6.9 Reliability and Measurement Error

Reliability quantifies the level of consistency in test scores across repeated test administrations and is usually estimated based on a single test administration. Coefficient alpha is one of the most widely used measures of reliability, and it provides reliability estimates for number correct scores. Table 6.19 shows the coefficient alpha reliability estimates for the raw scores of the two PreACT Secure operational forms administered in Spring 2026.

Table 6.19. Coefficient Alpha Reliability Estimates for Raw Scores

Form	English	Mathematics	Reading	Science
A	0.88	0.84	0.84	0.86
B	0.87	0.85	0.86	0.85

Under the framework of item response theory, scale-score reliability estimates were calculated using the formula by Kolen et al. (1996). The specific formula for scale-score reliability is

$$SEM_t^2 = \int_\theta var[sc(j)|\theta]g(\theta)d\theta$$

$$REL_t = 1 - \frac{SEM_t^2}{s_t^2},$$

where SEM_t^2 is the estimated error variance of the measurement for test section *t*, and s_t^2 is the sample variance of the observed scale score for the section. In addition, $var[sc(j)|\theta]$ is the

conditional measurement error variance of scale scores for a given θ, and $g(\theta)$ is the posterior distribution of θ obtained from the empirical data.

The SEM values for each test section (English, mathematics, reading, and science) were then used to calculate the reliabilities of the STEM and Composite scale scores. The estimated standard error of measurement for the Composite score (SEM_c) is calculated as

$$SEM_c = \frac{\sqrt{\sum_{t=1}^{4} SEM_t^2}}{3},$$

where the summation is over SEM^2 of the three test sections. The estimated reliability of the Composite score (REL_c) is calculated as

$$REL_c = 1 - \frac{SEM_c^2}{s_c^2},$$

where s_c^2 is the observed scale-score variance for the Composite score.

Similarly, the estimated standard error of measurement for the STEM score (SEM_{stem}) is calculated based on the summation over the SEM^2 values from the mathematics and science scale scores:

$$SEM_{stem} = \frac{\sqrt{SEM_{math}^2 + SEM_{science}^2}}{2}.$$

The estimated reliability of the STEM score (REL_{stem}) is calculated as

$$REL_{stem} = 1 - \frac{SEM_{stem}^2}{s_{stem}^2},$$

where s_{stem}^2 is the observed scale-score variance for the STEM.

Table 6.20 exhibits the ranges of scale-score reliability estimates and the standard error of measurement (SEM) for the two operational forms based on Spring 2026 operational data. The estimated reliability and SEM ranges for the recent ACT forms (ACT, 2026) are provided as well for the purpose of comparison.

Table 6.20. Estimated Scale Score Reliabilities and Standard Error of Measurement

Test	Form	Statistic	English	Mathematics	Reading	Science	Composite	STEM
PreACT Secure	A	Reliability	0.86	0.84	0.81	0.83	0.94	0.92
		SEM	2.31	1.99	2.57	2.1	1.33	1.45
	B	Reliability	0.86	0.85	0.83	0.8	0.94	0.92
		SEM	2.17	1.84	2.46	2.09	1.25	1.39
ACT	—	Reliability	0.87–0.90	0.87–0.89	0.81–0.85	0.82–0.86	0.94–0.95	0.92–0.94
		SEM	2.14–2.31	1.89–2.06	2.63–2.94	2.10–2.35	1.32–1.41	1.45–1.54

6.10 Classification Consistency

PreACT Secure examinees are classified into three college Readiness Levels based on their scale scores and PreACT Readiness Levels.[1] The classification consistency reflects the percentages of examinees who would be consistently classified into the same achievement levels on two equivalent administrations of the test. However, since the test (or parallel forms of the test) is not often administered twice to the same sample, it is necessary to estimate classification consistency with a single test administration using psychometric methods. Two classification consistency indices, agreement rate (Livingston & Lewis, 1993) and Kappa index (Cohen, 1960; Swaminathan et al., 1974), are used to quantify the reliability of categorizing examinees into different readiness levels.

Table 6.21 presents a summary of classification consistency indices—the agreement rate (percentage consistently classified) and Kappa index. “Two levels” refers to On Target/Not on Target decisions, and “Three levels” refers to classification using all three Readiness Levels (i.e., In Need, Close to Target, and On Target). As can be observed from this table, agreement rates were high with two levels and moderate with three levels for all scores.

Table 6.21. Classification Consistency

Form	Test section	Two levels		Three levels	
		Agreement	Kappa	Agreement	Kappa
A	English	0.85	0.69	0.71	0.53
	Mathematics	0.86	0.66	0.64	0.41
	Reading	0.88	0.72	0.71	0.50
	Science	0.9	0.73	0.79	0.59
	STEM	0.95	0.83	0.90	0.74
B	English	0.85	0.69	0.68	0.50
	Mathematics	0.87	0.69	0.67	0.46
	Reading	0.91	0.77	0.76	0.57
	Science	0.90	0.69	0.80	0.57
	STEM	0.96	0.83	0.90	0.74

[1] Refer to Sections 5.5 and 6.4 for more information about the PreACT Readiness Levels.

Chapter 7:
Validity Evidence

According to the *Standards for Educational and Psychological Testing*, “validity refers to the degree to which evidence and theory support the interpretations of test scores for proposed uses of tests” (American Educational Research Association [AERA] et al., 2014, p.11). Validation is the process of justifying intended interpretations and uses and may involve logical, empirical, or theoretical components.

This chapter describes evidence of the validity of PreACT Secure scores with respect to five areas: 1) test content, 2) response processes, 3) internal structure, 4) relationships to other variables, and 5) consequences of testing.

As discussed in Chapter 1, the primary uses of PreACT Secure include:

- monitoring progress toward college and career readiness,
- predicting performance on the ACT test and ACT WorkKeys assessments, and
- identifying academic gaps and areas for improvement.

Secondary uses of PreACT Secure include:

- gauging readiness for advanced high school courses,
- evaluating school and program effectiveness,
- facilitating college and career exploration and planning, and
- understanding performance relative to national norms.

The collection of evidence presented in this technical manual (and other PreACT Secure test documentation) supports the intended uses of PreACT Secure. Test users may develop particular interpretations and additional uses that are not covered in this chapter or this technical manual. Each use needs to be justified by a validity argument, and evidence will continue to be gathered and evaluated as the uses of PreACT Secure evolve.

7.1 Evidence Based on Test Content

PreACT Secure helps students prepare for the ACT and lets students and educators monitor progress toward college and career readiness. One of the intended uses of PreACT Secure is to predict student performance on the ACT, which helps facilitate education and career planning. Based on this intended use, content-related evidence is provided through the evaluation of the connections between PreACT Secure and the ACT with respect to the content domain, the knowledge and skills implied by the PreACT Secure specifications, the characteristics of the items, and the development of test forms.

As described in Chapters 2 and 3, PreACT Secure contains four content domains (English, mathematics, reading, and science). PreACT Secure is designed with developmentally articulated test specifications, ensuring that the content measured follows a logical developmental sequence across the high school experience from Grades 8 and 9 (PreACT 8/9) to Grade 10 (PreACT or PreACT Secure) to Grades 11 and 12 (the ACT test). The programs also share item formats and follow consistent reporting procedures. PreACT Secure is reviewed every year by subject matter experts to ensure that its basic structure matches that of the ACT test and that the two tests' scale scores are comparable.

In addition, ACT periodically conducts academic research and surveys, including the ACT National Curriculum Survey, to ensure the continued appropriateness of the content on PreACT Secure and the ACT. The results of these surveys and research inform the ACT College and Career Readiness Standards, which are statements of what students should know and be capable of doing to be college and career ready (or on the way to becoming so) in English, mathematics, reading, and science at each grade level. The knowledge and skills (and areas for improvement) a student currently has can be identified by examining the student's PreACT Secure or ACT test scores with respect to ACT's readiness standards. These standards are consistent with many states' standards focusing on college and career readiness. Additionally, for the enhanced ACT project, each domain held external content panels to validate changes to the construct for the ACT. These experts provided feedback that shaped design decisions for the enhanced ACT that have also been implemented in PreACT 9 Secure (e.g., stems for all English items, inclusion of engineering and design thinking on all science forms, and mathematics items with four foils). For more information, refer to the *Design Framework for the ACT Enhancements*, Chapters 2 and 6.

In light of the curriculum survey and expert panel results, ACT subject matter experts determined the PreACT Secure test content specifications (the number and types of items to be included in each test section and the depth of knowledge [DOK] level of each item). The experts then reviewed the specific characteristics of the test items in each specification category to determine the accuracy and appropriateness of the collection of items. Subject matter experts also review new test forms to verify their content accuracy and confirm that the test content matches the content specifications. Items that meet the content specifications are also reviewed for content accuracy, word count, item classification, item format, and language. Additionally, external content experts review items before field testing and forms before operational use to ensure that all items assess appropriate content, align to an ACT reporting category, and that the form adequately measures the depth and breadth of the test domain.

Items selected to be administered on PreACT Secure have a wide distribution of item difficulties so that the tests will effectively allow all students to demonstrate what they know and can do. However, since PreACT Secure is designed to be administered before the ACT, its statistical specifications are carefully reviewed to ensure that it has an overall mean item difficulty that is somewhat easier than that of a typical ACT form.

As part of the principled assessment design approach to the enhanced ACT, expert panels were held for all four domains. A separate expert panel was also held for Universal Design. Each

content panel was presented with information about the legacy ACT, the need for periodic revision, the constraints and goals associated with the redesign process, content domain maps, test blueprints, domain sampling plans, links between PreACT and ACT assessments, and sample items and forms. They were supportive of the proposed changes with some minor alterations (see the *Design Framework for the ACT Enhancements*). The universal design panel also evaluated ACT and PreACT practices and found that the current practices and planned alterations (e.g., adding stems to English items, increasing time per item, reducing mathematics from 5 to 4 answer options) would help to minimize construct irrelevant variance in the assessments. These panels provide additional content validity evidence that the PreACT and ACT assessments measure appropriate content to both predict college readiness and the achievement of meeting common high school standards in ELA, mathematics, and science. After finalizing enhancements to the ACT, adjustments were made to the PreACT suite of assessments to ensure comparability of scores and construct coherence.

7.2 Evidence Based on Response Processes

According to the *Standards*, some intended interpretations of test scores are based on the assumption that a particular psychological process or cognitive operation is used by test takers. “Theoretical and empirical analyses of the response processes of test takers can provide evidence concerning the fit between the construct and the detailed nature of the performance or response actually engaged in by test takers” (AERA et al., 2014, p. 15). Procedures like think-alouds and cognitive labs are commonly used to provide this type of validity evidence.

As mentioned previously, PreACT Secure, like the ACT, was developed using a theory of action. The theory of action helps answer questions related to the purpose of the assessment—intended users, uses, benefits, interpretations, and assessment outcomes. The answers to these questions provide information needed to identify high-value skill targets in each subject area, providing focal points for the development of test items and forms. The process set forth by the theory of action also gives rise to potential ways of bringing about the intended goals of the assessment.

As detailed in the *Design Framework for the ACT Enhancements*, ACT has conducted multiple cognitive labs to elicit evidence of the cognitive response processes that test takers engage in while answering questions. Some studies involved PreACT-age students (e.g., the 2024 Enhanced ACT Cog Lab) while others involved the same skills with other testing populations. Since the cognitive labs involving think-alouds or eye-tracking have found similar cognitive processes in test takers ranging from Grade 10 to adults, it is appropriate to generalize these findings. Additional think-aloud studies of PreACT materials with students in Grades 9 and 10 are scheduled. A brief overview of findings is presented here; however, a more complete analysis of these activities can be found in Chapter 3 of the *Design Framework for the ACT Enhancements*.

The reading rate study (2019–2020) found that students read at approximately the same rate as they had in other studies (approximately 225–250 standard words per minute for Grade 11) when engaging in adaptive reading behaviors. However, when students realized that they were

behind schedule based on the countdown timer, they engaged in maladaptive skimming or skipping of the passage. That study found that although students read the passages at the same rate that the legacy ACT expected (for both timed and untimed passages), the students took much more time per item than was allotted in the legacy ACT. Consequently, both the enhanced ACT and the PreACT Secure increased time per item based on this cognitive process evidence.

The 2023 think-aloud and interview study involved students in Grades 10 through 12. For each item, subject matter experts proposed the optimal solution path (the path that would require the fewest steps or time to determine the correct answer), a sub-optimal solution path (a less efficient method to determine the correct answer), and one or more maladaptive paths that students might use to arrive at a wrong answer. These targeted skills were placed in a q-matrix for each item and evaluated in real time by the study proctor, then coded by a subject matter expert working from the video recording. Students who demonstrate evidence of one or more of the targeted skills should answer the questions at much higher rates than students who do not demonstrate evidence of those cognitive skills and processes. Across all parts of the ACT, students who used one or more of the targeted skills answered correctly much more frequently than did students who used maladaptive skills. As Table 7.1 shows, students who used only targeted skills answered items correctly over 80% of the time in both the ELA and STEM domains.

Table 7.1. Use of Targeted Skills Across Domains

Domain	Used one or more targeted skills correct	Used maladaptive skill correct	Difference between targeted skill and maladaptive skills	Used only adaptive percent correct	Difference between only adaptive and maladaptive skills	Overall average correct
English	70.3%	13.2%	57.1%	88.0%	74.8%	67.5%
Mathematics	73.2%	19.8%	53.4%	84.0%	64.2%	54.8%
Reading	70.4%	18.6%	51.8%	81.0%	62.3%	68.0%
Science	73.4%	21.8%	51.7%	94.6%	72.8%	67.7%
ELA	70.4%	15.9%	54.4%	84.5%	68.6%	67.8%
STEM	73.3%	20.8%	52.6%	89.3%	68.5%	61.2%

For each subject test, participants were asked whether they understood what the question was asking them to do, even if they did not know how to correctly answer the question (Table 7.2). They were also asked whether they were able to show what they know and can do on each section of the test (Table 7.3). For all subjects, more than 85% of students responded that they understood what the question was asking them to do. Over 70% of students agreed that they were able to show what they knew and could do on each section of the test (Table 7.3).

Table 7.2. Student Ability to Understand What the Question Was Asking by Test Section

I was able to understand what the question was asking me to do, even if I did not know how to answer the specific question on the ____ test.

Section	% Strongly Disagree	% Disagree	% Agree	% Strongly Agree
English	0.00	0.00	44.44	55.56
Mathematics	0.00	14.81	44.44	40.74
Reading	0.00	3.70	51.85	44.44
Science	3.70	7.41	48.15	40.74

Table 7.3. Students' Rating of Their Ability to Show What They Know and Can Do by Test Section

I was able to show what I know and can do in the subject on the ____ test.

Section	% Strongly Disagree	% Disagree	% Agree	% Strongly Agree
English	0.00	11.11	25.93	62.96
Mathematics	3.70	25.93	33.33	37.04
Reading	0.00	11.11	29.63	59.26
Science	0.00	25.93	29.63	44.44

The lower, although still acceptable, results of students' beliefs that they were able to show what they know and can do in mathematics and science were impacted by grade level. The sample of items tended to include a higher percentage of advanced topics compared to a full test battery, which impacted students' perceptions, particularly those of students in Grade 10. This will be addressed with the planned cognitive lab for PreACT students, with items targeted for grade appropriateness. This does provide additional response validity evidence that the different skill and complexity targets for the PreACT Secure support claims about what students know and can do.

7.3 Evidence Based on Internal Structure

As indicated by the *Standards* (AERA et al., 2014), analyzing internal structure includes evaluating intended score interpretations from the perspective of expected relationships among test items or parts of the test. Therefore, the internal structure of PreACT Secure can be evaluated via an analysis of dimensionality.

Exploratory factor analyses were conducted on data from two PreACT Secure operational forms administered in Spring 2026 to explore the dimensionality of the constructs measured by PreACT Secure. PreACT Secure measures student development in English, mathematics, reading, and science. While category scores are also reported to describe performance on skill areas within each subject, we expect to find one dominant dimension in an empirical analysis of dimensionality. In the exploratory factor analyses, ACT examined scree plots of eigenvalues, model fit, and factor loadings to provide validity evidence of internal structure.

A scree plot shows the relationship between eigenvalues and the number of extracted factors and is typically evaluated by identifying the “elbow” in the plot, which indicates the number of dimensions to retain (Cattell, 1966). Figure 7.1 shows the scree plots of one operational form for the English, mathematics, reading, and science tests. (The scree plots for the other operational forms closely mirror these, so only one set of plots is presented.) As shown in this figure, the elbow appears after the first eigenvalue, which is evidence for a single dimension. Tables 7.4 through 7.7 show the proportion of variance accounted for by the first 10 factors for the English, mathematics, reading, and science tests (respectively) for the two operational forms. Since the proportions of variance accounted for by the factors after the tenth are trivial, the tables present overall proportions for the remaining factors. As shown in these tables, for each test section, the percentage of variance accounted for by the second factor was smaller than 10%. According to Hatcher (1994), factors that account for less than 10% of the variance should not be retained. As a result of that, it is reasonable to believe that PreACT Secure should be represented by a unidimensional model.

Model fit was evaluated by comparing the model fit index between one- and two-factor models, as shown by the fit statistics given in Tables 7.8 through 7.9. The fit statistics include the widely used chi-square test, plus other fit statistics—the comparative fit index (CFI), the Tucker–Lewis index (TLI), the root mean square error of approximation (RMSEA), and the standardized root mean square residual (SRMR)—to supplement the chi-square index due to its sensitivity to large sample sizes (Bollen, 1989; Hu & Bentler, 2009). Fit indices were flagged with an asterisk in these two tables if they showed inadequate fit. Tables 7.8 through 7.9 also show the differences in the fit statistics (DIFF) between the one- and two-factor models. The interfactor correlation (CORR) between Factors 1 and 2 in the tables was used to evaluate how well the two factors could be distinguished from each other in the model. All these statistical indices were simultaneously evaluated to compare the goodness of fit of the one- and two-factor models. Fit statistics for the English, mathematics, reading, and science tests showed evidence supporting the one-factor model in most cases. Although the chi-square tests were statistically significant for all tests, this was likely due to the sensitivity of chi-square statistics to large sample sizes. Compared with the use of the one-factor model, the use of the two-factor model did not substantially improve the model fit.

Figure 7.1. Scree Plots of PreACT Secure Tests for English, Mathematics, Reading, and Science

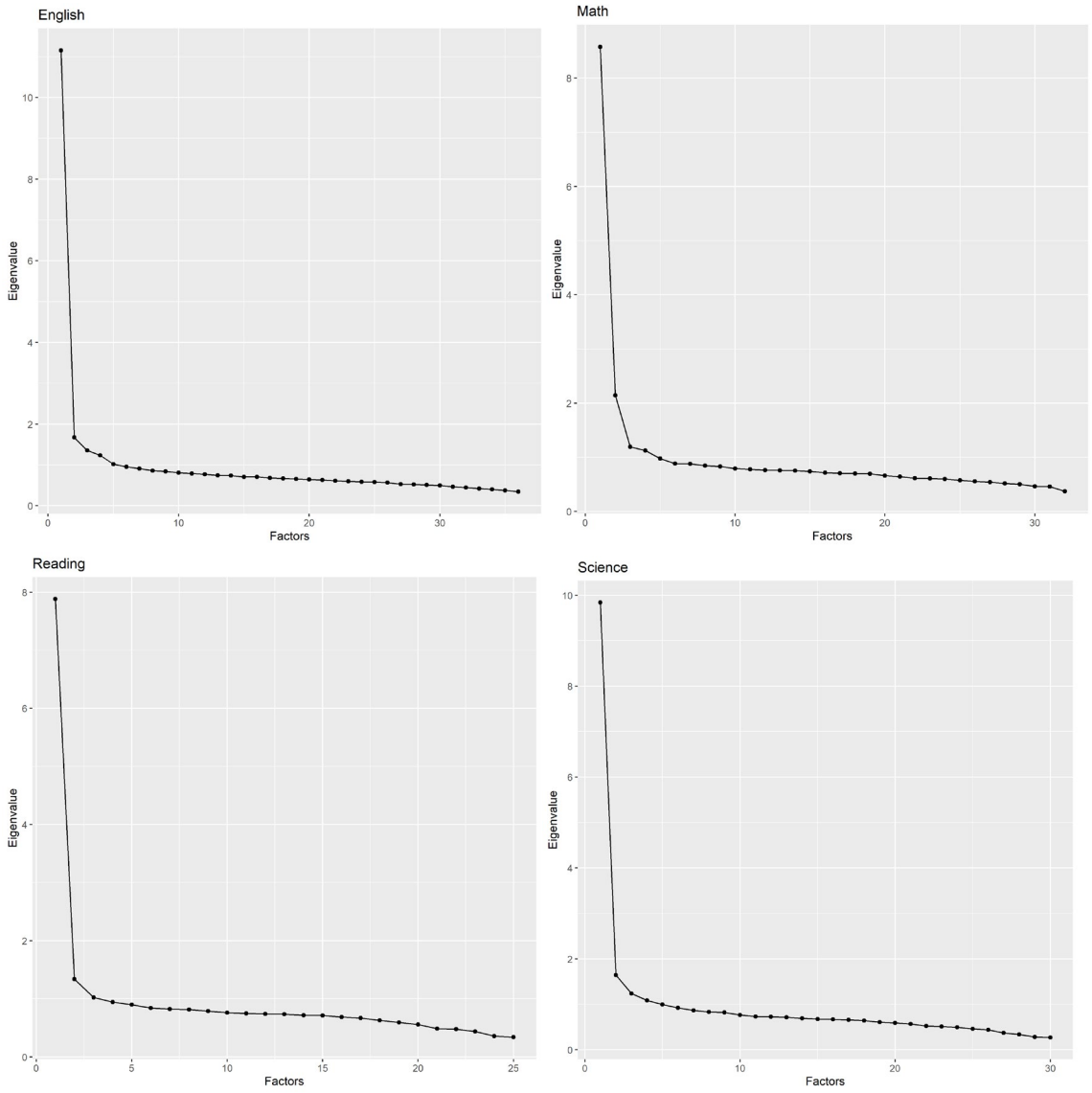


Table 7.4. Percentage of Variance Explained by Factors for the Two PreACT Secure Operational Forms: English

Factor	Form A %	Form B %
1	31.0	28.7
2	4.6	4.7
3	3.8	4.1
4	3.4	3.1
5	2.8	2.9
6	2.7	2.7
7	2.5	2.6
8	2.4	2.5
9	2.3	2.4
10	2.3	2.3
11–36	42.2	44.1

Table 7.5. Percentage of Variance Explained by Factors for the Two PreACT Secure Operational Forms: Mathematics

Factor	Form A %	Form B %
1	26.8	28.4
2	6.7	7.0
3	3.7	3.6
4	3.5	3.3
5	3.0	3.2
6	2.8	2.9
7	2.7	2.6
8	2.6	2.5
9	2.6	2.5
10	2.5	2.4
11–32	43.0	41.5

Table 7.6. Percentage of Variance Explained by Factors for the Two PreACT Secure Operational Forms: Reading

Factor	Form A %	Form B %
1	31.5	35.2
2	5.4	4.2
3	4.1	4.1
4	3.8	3.5
5	3.6	3.5
6	3.4	3.3
7	3.3	3.1
8	3.3	2.9
9	3.2	2.9
10	3.0	2.8
11–25	35.5	34.4

Table 7.7. Percentage of Variance Explained by Factors for the Two PreACT Secure Operational Forms: Science

Factor	Form A %	Form B %
1	32.8	29.0
2	5.5	4.8
3	4.1	4.3
4	3.6	3.8
5	3.3	3.1
6	3.1	3.0
7	2.9	2.9
8	2.8	2.9
9	2.7	2.8
10	2.6	2.7
11–30	36.6	40.6

Table 7.8. Model Fit Comparison Between One- and Two-Factor Models for PreACT Secure Operational Form A

Statistic	English			Mathematics			Reading			Science		
	1	2	DIFF	1	2	DIFF	1	2	DIFF	1	2	DIFF
Chi-square	76534.75	44204.87	21317.34	63363.81	15857.94	29609.68	24734.46	10610.91	10669.48	64873.29	27875.87	24263.83
DF	594	559	35	464	433	31	275	251	24	405	376	29
***p*-value**	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*
CFI	0.96	0.98	0.02	0.94	0.99	0.05	0.98	0.99	0.01	0.96	0.98	0.02
TLI	0.96	0.97	0.02	0.93	0.98	0.05	0.97	0.99	0.01	0.96	0.98	0.02
RMSEA	0.03	0.02	0.01	0.03	0.02	0.02	0.03	0.02	0.01	0.04	0.02	0.01
SRMR	0.04	0.03	0.01	0.05	0.02	0.03	0.03	0.02	0.01	0.04	0.03	0.02
CORR	—	0.06	—	—	0.53	—	—	0.14	—	—	0.72	—

Table 7.9. Model Fit Comparison Between One- and Two-Factor Models for PreACT Secure Operational Form B

Statistic	English			Mathematics			Reading			Science		
	1	2	DIFF	1	2	DIFF	1	2	DIFF	1	2	DIFF
Chi-square	77337.94	46960.46	20703.94	85148.05	19801.02	37829.60	15086.43	10400.52	4015.46	44495.25	25958.24	14035.78
DF	594	559	35	464	433	31	275	251	24	405	376	29
***p*-value**	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*
CFI	0.95	0.97	0.02	0.92	0.98	0.06	0.99	0.99	0.00	0.96	0.98	0.02
TLI	0.94	0.96	0.02	0.92	0.98	0.06	0.99	0.99	0.00	0.96	0.97	0.02
RMSEA	0.03	0.03	0.01	0.04	0.02	0.02	0.02	0.02	0.00	0.03	0.02	0.01
SRMR	0.04	0.03	0.01	0.05	0.02	0.03	0.02	0.02	0.00	0.04	0.03	0.01
CORR	—	0.72	—	—	0.39	—	—	0.71	—	—	0.72	—

Note. *p < .001; DF is the degree of freedom; CFI is the comparative fit index; TLI is the Tucker–Lewis index; RMSEA is the root mean square error of approximation; SRMR is the standardized root mean square residual; and CORR is the correlation between Factor 1 and Factor 2 loadings. Flag criteria included CFI < 0.95, TLI < 0.95, RMSEA > 0.06, SRMR > 0.08, |DIFF CFI| > 0.1, |DIFF TLI| > 0.1, |DIFF RMSEA| > 0.05, and |DIFF SRMR| > 0.05. |DIFF| represents the absolute difference for an index (Hu & Bentler, 2009).

7.4 Evidence Based on Relationships to Other Variables

Intended uses of PreACT Secure include monitoring progress toward college and career readiness and predicting performance on the ACT. PreACT Secure measures academic achievement related to major curriculum areas. These intended interpretations and uses of PreACT Secure test scores imply that scores should be both predictive of ACT test scores and related to academic performance in high school. Studies were conducted to evaluate the relationships between PreACT Secure test scores and the following outcomes: ACT test scores, high school coursework and grades, and success in advanced high school courses. We also document evidence of the relationships of PreACT test scores with success on Advanced Placement (AP) exams.

7.4.1 Relationship with ACT Test Scores

Using PreACT Secure scores from the 2023–2024 and 2024–2025 academic years and 11th-grade ACT scores from the 2025–2026 academic year, ACT examined correlations of PreACT Secure and ACT scores. This analysis was based on two groups of students:

- 9th-grade PreACT Secure sample: 60,047 students who took PreACT Secure in 9th grade and took the ACT in 11th grade
- 10th-grade PreACT Secure sample: 242,851 students who took PreACT Secure in 10th grade and took the ACT in 11th grade

Table 7.10 presents summary statistics and correlations of PreACT Secure and ACT scores. In addition to Pearson correlations (r), disattenuated correlations (r_{dis}) are also presented. Disattenuated correlations are estimates of what the correlations would be if the PreACT Secure and ACT tests measured achievement without error (e.g., had reliabilities of 1.0).

The correlation ranged from .71 (Grade 9 science) to .90 (Grade 10 Composite). Most of the disattenuated correlations are greater than .90, suggesting that the PreACT Secure and ACT tests measure similar constructs. Because the correlation coefficients are large, the findings indicate that PreACT Secure scores are strong predictors of ACT scores, supporting the use of PreACT Secure scores as predictors of ACT scores.

Table 7.10. Correlations of PreACT Secure and 11th-Grade ACT Scores

PreACT Secure grade	Test section	PreACT Secure		ACT		*r*	r_{dis}
		Mean	*SD*	Mean	*SD*		
9	English	14.6	5.5	18.8	6.3	0.80	0.89
	Mathematics	17.3	3.9	19.6	5.6	0.81	0.91
	Reading	17.8	5.9	20.3	6.5	0.74	0.88
	Science	16.6	4.9	20.2	5.5	0.71	0.86
	STEM	17.2	4.1	20.1	5.2	0.84	0.90
	Composite	16.6	4.6	19.6	5.6	0.88	0.91
10	English	15.0	6.3	18.2	6.5	0.83	0.93
	Mathematics	17.7	4.6	19.1	5.6	0.85	0.95
	Reading	18.5	6.6	19.6	6.6	0.78	0.92
	Science	16.6	5.5	19.4	5.6	0.75	0.91
	STEM	17.4	4.7	19.5	5.3	0.87	0.94
	Composite	17.1	5.3	19.0	5.7	0.90	0.94

7.4.2 Relationship with High School Coursework and Grades

Because PreACT Secure measures skills that are taught in school and related to major curriculum areas, students who perform better in high school courses should generally perform better on PreACT Secure. Further, performance on PreACT Secure should be an indicator of readiness for advanced high school coursework. To test these propositions, we examined data from students who took PreACT Secure in 10th grade and who reported their high school grades and coursework when they took the ACT in 11th grade. Among the 242,851 students in the 10th grade sample used for the ACT score correlation analysis (Table 7.10), 88,688 reported their high school coursework and grades.

Table 7.11 presents correlations between PreACT Secure test scores and high school grade averages. Overall high school grade point average (GPA) was calculated based on students' self-reported grades in core subject areas (English, mathematics, social studies, and natural science). Subject-area GPAs were calculated using the courses within each of the four core subject areas. Correlations between GPAs and test scores from the same subject area were examined (PreACT Secure reading scores were used for social studies courses).

The correlations are presented for the total group ("All students") and for student groups defined by gender, race/ethnicity, and English language learner status. The information in Table 7.11 is summarized as follows:

- PreACT Secure Composite score and overall HSGPA as of Grade 11 are highly correlated (r = .54).
- PreACT Secure Composite score and overall HSGPA correlations are similar across gender, racial/ethnic, and English language learner groups.

- Correlations between PreACT Secure scores and high school grade averages are the highest in mathematics, followed by English and science, and then reading.

Table 7.11. Correlations of PreACT Secure Scores with High School Grade Averages (HSGPA and Subject-Specific GPAs), by Student Group

Student Group		*N*	High school subject area / PreACT Secure test score				
			Overall / Composite	English / English	Math / math	Social studies / reading	Natural science / science
All Students		88,688	0.54	0.44	0.47	0.39	0.45
Gender	Female	46,719	0.52	0.43	0.45	0.38	0.44
	Male	41,469	0.56	0.46	0.51	0.40	0.48
Race/ ethnicity	Asian	3,849	0.56	0.44	0.51	0.39	0.49
	Black	10,587	0.42	0.36	0.32	0.29	0.29
	Hispanic	15,596	0.49	0.39	0.42	0.36	0.40
	Native American	555	0.46	0.35	0.37	0.31	0.32
	Native Hawaiian/OPI	89	0.57	0.55	0.54	0.38	0.44
	Two or more races	4,407	0.52	0.43	0.46	0.38	0.43
	White	51,990	0.53	0.43	0.47	0.38	0.45
English Learner		4,421	0.44	0.35	0.37	0.30	0.33

Note. OPI = Other Pacific Islander.

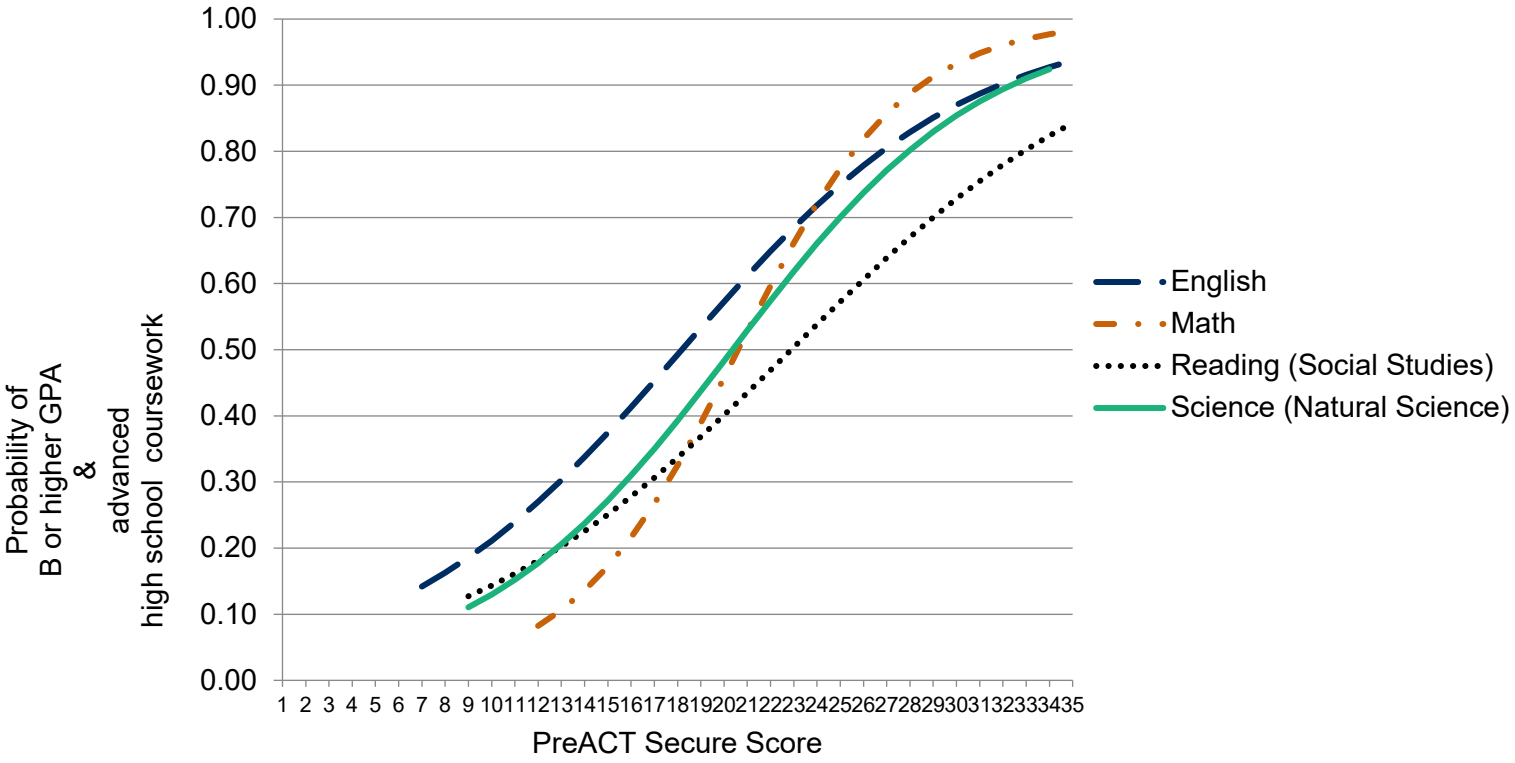
When students register for the ACT or access their MyACT account, they may participate in a survey that asks whether they are enrolled in advanced placement, accelerated, or honors courses in each core subject area. Students who perform well in advanced high school courses tend to perform better on the ACT and in college. We examined the relationship between PreACT Secure test scores and success in advanced high school courses. For this analysis, the criterion variable was conjunctive: Students who earned a B or higher subject-area GPA (3.00 or higher) and enrolled in at least one advanced course in the same subject area achieved "successful advanced course-taking."

The probabilities of successful advanced course-taking are graphed in Figure 7.2. The probabilities were estimated using logistic regression and are provided for each core subject area (English, mathematics, social studies, and natural science). Successful advanced course-taking and test scores from the same subject area were examined (PreACT Secure reading scores were used for social studies courses). The probabilities were estimated using data collected for a sample of approximately 86,000 students who took PreACT Secure in 10th grade and the ACT in 11th grade.

From Figure 7.2, we see that the probability of successful advanced course-taking increases sharply as PreACT Secure scores increase. The relationship is strongest in mathematics, followed by natural science, English, and social studies. The PreACT Secure test scores associated with a 50% chance of successful advanced course-taking are 18 (English), 21

(mathematics), 23 (reading), and 21 (science). This evidence supports the use of PreACT Secure scores to gauge readiness for advanced high school courses.

Figure 7.2. Relationship of Grade 10 PreACT Secure Scores and Successful Advanced Course-Taking



Note. Values are plotted for PreACT Secure scores between the 1st and 99th percentiles in the sample.

7.4.3 Relationship with AP Exam Success

Radunzel and Allen (2020) found that PreACT scores are good predictors of success on AP exams and estimated the PreACT cut scores associated with AP exam success. Data for the study were available for 49,220 students from 318 high schools who had taken at least one AP exam between May of 2015 and May of 2019 and had previously taken ACT® Aspire®, PreACT, or the ACT. A concordance of PreACT/ACT scores with ACT Aspire scores was used to combine data across assessments. Full details of the study are documented in an ACT research report (see Radunzel & Allen, 2020).

The study defined success in AP courses in two ways—receiving an exam score of 3 or higher and receiving an exam score of 4 or higher—and found that PreACT, ACT, and ACT Aspire scores are positively related to AP exam scores and are good predictors of success in future AP courses. The researchers strengthened the prediction by using combined PreACT scores that were aligned to the content of the AP courses. The sum of the English and reading scores (denoted E+R) was used for ELA-related AP courses, and the STEM score (the average of the mathematics and science scores) was used for STEM-related courses. As a result, the

recommended links to AP exam success were developed in relation to content-relevant scores for most courses (shown in Table 7.12).

For each course and outcome, two cut scores are provided—one for fall testing and one for spring—depending on when students take PreACT or PreACT Secure. For example, the first row of results within the table indicates that students who test in the fall and achieve a PreACT or PreACT Secure E+R score of 42 or higher are likely academically ready to take AP English Language and Composition in the subsequent academic year, as they have a 50% or greater chance of earning a 3 or higher on the corresponding AP exam. Those with a PreACT or PreACT Secure E+R score of 54 or higher have a 50% or greater chance of earning a 4 or higher. The AP-ready cut scores derived from spring testing are slightly higher at 45 (for 3 or higher) and 56 (for 4 or higher) to account for the reduced time between PreACT testing and taking the AP exam. Table 7.12 also reports the correlations (*r*) between test scores (PreACT, ACT, or ACT Aspire) and AP exam scores.

For a holistic view of student readiness for AP courses, we recommend using PreACT Secure scores in combination with other readiness measures (e.g., high school coursework taken, high school grades, motivation, and interest).

Table 7.12. PreACT Scores Associated with Approximately a 50% Chance of Success on AP Exams

AP course		*N*	PreACT score	*r*	3 or higher		4 or higher	
					Fall	Spring	Fall	Spring
ELA-related	English Lang. and Composition	22,044	E+R	.71	42	45	54	56
	English Lit. and Composition	21,227	E+R	.73	49	51	61	62
	European History	1,025	E+R	.66	45	49	57	60
	Human Geography	3,245	E+R	.57	41	41	52	52
	Psychology	6,813	E+R	.65	39	42	46	49
	U.S. Govt. and Politics	5,050	E+R	.60	47	50	59	61
	U.S. History	15,669	E+R	.61	44	47	55	57
	World History	8,675	E+R	.62	39	43	51	55
STEM-related	Biology	8,478	STEM	.73	22	23	26	27
	Calculus AB*	3,983	STEM	.61	25	25	28	28
	Chemistry	5,157	STEM	.66	24	25	28	29
	Computer Science A	1,091	STEM	.67	24	24	28	28
	Environmental Science	3,643	STEM	.71	23	24	—	25
	Macroeconomics	978	STEM	.60	24	26	—	27
	Microeconomics	911	STEM	.61	23	25	—	25
	Physics 1**	3,628	STEM	.69	27	27	—	30
	Physics C: E and M	100	STEM	.62	26	28	—	28
	Physics C: Mechanics	413	STEM	.59	25	25	—	28
	Statistics	6,002	STEM	.72	23	24	—	27
Other	Art History	734	Comp.	.50	22	22	—	28
	Music Theory	1,078	Comp.	.56	21	22	—	25
PSAT / SAT-derived	Comparative Govt. and Politics	—	Comp.	—	22	22	—	25
	Computer Science Principles	—	Comp.	—	18	18	—	25

Note. E+R = English + reading score. Comp. = Composite score.

*Cut scores are not reported for AP Calculus BC. As recommended by College Board as part of AP Potential, students who meet the AP Calculus AB cut scores and perform well in courses leading up to Calculus may consider taking AP Calculus BC.

**Cut scores are not reported for AP Physics 2. As recommended by College Board as part of AP Potential, students who meet the AP Physics 1 cut scores and perform well in prerequisite courses for AP Physics 2 may consider taking AP Physics 2.

7.5 Evidence Related to Consequences of Testing

Consequences of testing include (a) interpretations and uses of test scores intended by the test developer, (b) claims made about the test that are not directly based on test score, and (c) unintended consequences (AERA et al., 2014). In this section, we discuss intended consequences of PreACT Secure testing and discuss research that examined the effects of PreACT adoption on college readiness outcomes.

7.5.1 Intended Consequences of PreACT Secure Testing

As described in Chapter 1, the intended benefits of PreACT Secure are closely related to its intended uses and include the following:

1. Students gain exposure to the types of content featured on the ACT and to the ACT testing experience.
2. Predicted ACT scores improve understanding of student performance relative to college and career readiness.
3. Students, parents, and educators understand relative strengths and weaknesses in four subjects that are also assessed by the ACT.
4. Schools and districts gain important insights about curriculum and program effectiveness.
5. Educators can identify students who are ready for advanced high school coursework and college courses.
6. Students engage in effective college and career exploration and planning.
7. Students can better prepare for the ACT (and, more generally, for college and careers).

7.5.2 Effects of PreACT Adoption on College Readiness Outcomes

A study conducted in 2018 used quasi-experimental methods to examine the effects of schoolwide PreACT adoption on ACT test scores, participation in challenging high school courses, interest–major fit, and college score sending behavior (Allen, 2018). The study found that schoolwide adoption of PreACT led to an increase in ACT Composite score of 0.23 score points, which is comparable to one month of instruction. This effect could be due to exposure to test content and items that mimic those on the ACT (benefit #1), feedback students receive from taking PreACT (benefit #3), changes in instruction or school programming (benefit #4), or improvements in ACT test preparation (benefit #7).

The study also provided evidence of small effects of PreACT adoption on interest–major fit and out-of-state college score sending (benefit #6). Schools that adopted PreACT had students with greater fit between their planned college major and their vocational interests, as well as more students sending their ACT scores to out-of-state colleges.

Further, within schools that adopted PreACT, students who participated in the PreACT Educational Opportunity Service (now called ACT Recruit Me) were more likely to send their ACT scores to at least four colleges and at least one out-of-state college. Students who completed the PreACT Interest Inventory had a slightly higher fit between their interests and planned major when they took the ACT. The study did not provide evidence of PreACT effects on outcomes related to taking challenging high school courses. Students from schools that adopted PreACT were no more likely to take accelerated/AP/honors courses or upper-level elective courses in mathematics or science.

As the PreACT Secure assessment program matures, additional research will be needed to examine the consequences of testing.

Chapter 8:
Growth Interpretations

When administered with other assessments that ACT offers, PreACT Secure can be used to generate useful measures of students' growth. Some scenarios where growth measures using PreACT Secure scores are of interest include the following:

- PreACT Secure is administered in Grade 10, and the ACT is administered in Grade 11.
- PreACT 9 Secure is administered in Grade 9, and PreACT Secure is administered in Grade 10.
- PreACT Secure is administered in Grade 9 and again in Grade 10.

In this chapter, we describe two types of growth models: the gain score model and the student growth percentile (SGP) model. Both models may be applied to describe growth across ACT's college and career readiness assessments.

8.1 Gain Scores

PreACT 8/9, PreACT 9 Secure, PreACT, PreACT Secure, and ACT test scores share common scales, making it easier to monitor students' progress over time. A gain score is the arithmetic difference in scores from one test to the next. Gain scores are an attractive growth measure because of their simplicity and intuitive appeal. Gain scores address the question, "How much has a student learned on an absolute scale?" (Castellano & Ho, 2013).

Gain scores generally have a high degree of measurement error. The standard error of measurement (SEM) of a gain score is equal to

$$\sqrt{SEM_x^2 + SEM_y^2},$$

where SEM_x and SEM_y are the SEMs of the component test scores. For example, if the SEM of a PreACT Secure English score is 2.0 and the SEM of an ACT English score is 1.7, then the SEM of the English gain score is 2.6. Because gain scores have relatively large SEMs, it is not uncommon for students to have negative gain scores. Because the SEMs of gain scores are large relative to the average gain, gain scores should not be used only to make inferences about individual students' learning.

8.1.1 Gain Score Statistics

For all subject areas, positive mean gain scores are anticipated because students are expected to increase their knowledge and skills in the tested areas with more schooling. In this section, we examine gain score summary statistics. Table 8.1 provides summary statistics for four groups of students who tested in spring 2026 and tested in a prior year. The groups are defined

by which assessments they took, the grade levels and seasons during which they tested, and the time elapsed between the tests:

1. Group 1 includes 117,936 students who took PreACT 9 Secure in the spring of Grade 9 and PreACT Secure in the spring of Grade 10 with 10–14 months between assessments.

2. Group 2 includes 59,042 students who took PreACT Secure in the spring of Grade 9 and spring of Grade 10 with 10–14 months between assessments.

3. Group 3 includes 58,022 students who took PreACT Secure in the spring of Grade 9 and the ACT in the spring of Grade 11, with 22–26 months between assessments.

4. Group 4 includes 195,447 students who took PreACT Secure in the spring of Grade 10 and the ACT in the spring of Grade 11, with 10–14 months between assessments.

The summary statistics presented in Table 8.1 include the mean Test 1 (PreACT 9 Secure or PreACT Secure) and Test 2 (PreACT Secure or ACT) scores, correlations of Test 1 scores and Test 2 scores, the mean gain score, and the standard deviation of the gain score. The mean gain per month is also presented to allow comparisons of growth rates across the different groups.

Table 8.1. Gain Score Summary Statistics

Group	Test section	Mean scores		*r*	Mean gain	SD gain	Mean gain per month
		Test 1	Test 2				
1. PreACT 9 Secure to PreACT Secure, Grade 9 to Grade 10, 10–14 months apart	Composite	16.72	17.38	0.92	0.65	2.22	0.05
	English	15.75	15.24	0.82	–0.52	3.81	–0.04
	Math	17.52	18.47	0.85	0.96	2.87	0.08
	Reading	17.32	18.39	0.80	1.07	4.12	0.09
	Science	15.80	16.90	0.78	1.10	3.80	0.09
2. PreACT Secure to PreACT Secure, Grade 9 to Grade 10, 10–14 months apart	Composite	16.59	17.55	0.90	0.96	2.26	0.08
	English	14.37	15.43	0.81	1.06	3.70	0.09
	Math	17.16	18.43	0.81	1.27	2.96	0.11
	Reading	18.02	18.58	0.78	0.56	4.17	0.05
	Science	16.31	17.25	0.74	0.93	3.78	0.08
3. PreACT Secure to ACT, Grade 9 to Grade 11, 22–26 months apart	Composite	16.59	19.71	0.88	3.12	2.51	0.13
	English	14.45	18.64	0.80	4.18	3.80	0.18
	Math	17.20	19.51	0.81	2.31	3.28	0.10
	Reading	17.71	20.14	0.74	2.43	4.42	0.10
	Science	16.47	20.04	0.70	3.57	4.01	0.15
4. PreACT Secure to ACT, Grade 10 to Grade 11, 10–14 months apart	Composite	17.35	19.42	0.91	2.08	2.28	0.18
	English	15.25	18.39	0.83	3.15	3.74	0.27
	Math	17.99	19.38	0.85	1.39	3.04	0.12
	Reading	18.83	19.85	0.79	1.03	4.33	0.09
	Science	16.83	19.58	0.76	2.75	3.88	0.23

Note. *r* = Pearson correlation of Test 1 scores and Test 2 scores; SD = standard deviation. The composite score used for this analysis includes science.

The gain score results from Table 8.1 can be summarized as follows:

- Average gain scores increase with more time between assessments.
- The average Composite gain per month is highest for Grade 10 to Grade 11.
- Gains from PreACT Secure to the ACT tend to be lower for mathematics and reading relative to English and science.
- Correlations between PreACT Secure and ACT test scores are highest for the Composite, followed by English and mathematics.
- The standard deviation of the gain scores is large relative to the mean, indicating that gain scores for individual students have a high degree of variability.

Group 4 includes students who took the ACT test in the spring of Grade 11, 10–14 months after having taken the PreACT Secure test in the spring of Grade 10. For this group, mean gain scores are presented for student groups defined by gender, race/ethnicity, and English learner status (Table 8.2).

Table 8.2. Spring Grade 10 PreACT Secure to Spring Grade 11 ACT Mean Gain Scores by Student Group

Student group		*N*	Test section / score				
			English	Math	Reading	Science	Composite
All students		195,447	3.15	1.39	1.03	2.75	2.08
Gender	Female	92,561	3.15	1.31	0.81	2.61	1.97
	Male	95,283	3.16	1.46	1.23	2.89	2.18
Race/ ethnicity	Asian	8,818	3.53	2.22	0.70	2.80	2.31
	Black/African American	18,878	3.02	0.85	0.94	2.75	1.89
	Hispanic	44,450	3.04	1.00	0.96	2.67	1.92
	Native American	1,223	2.87	0.79	0.91	2.61	1.81
	Native Hawaiian/OPI	161	3.12	1.38	1.36	2.88	2.23
	Two or more races	7,996	3.13	1.44	1.05	2.78	2.10
	White	90,763	3.23	1.67	1.12	2.79	2.20
English learner		6,481	2.92	0.82	0.98	2.89	1.90

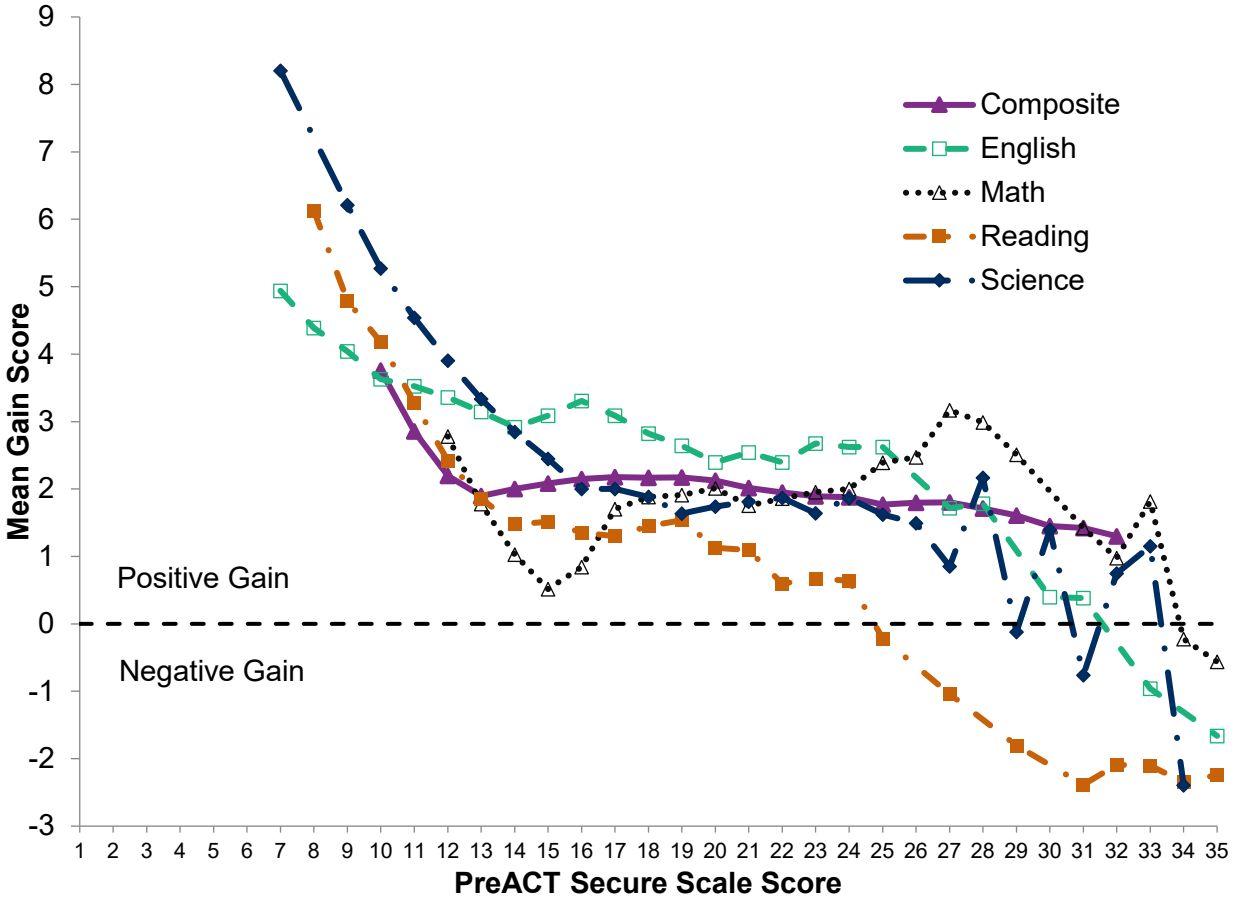
Note. OPI = Other Pacific Islander.

The results from Table 8.2 can be summarized as follows:

- Mean gain scores are generally higher for males than for females, though the difference for English is negligible.
- Mean Composite gain scores are highest for students who are Asian but are generally similar across racial/ethnic groups.
- Students who received services for English learners had lower than average gain scores in mat.

Gain scores from PreACT Secure to ACT tend to be high for students with very low PreACT Secure scores and low for students with very high PreACT Secure scores (Figure 8.1). For example, students with a PreACT Secure Composite score of 10 had a mean gain of 3.8, whereas students with a PreACT Secure Composite score of 30 had a mean gain of 1.5. This phenomenon is known as *regression to the mean* and is related to the gain score measurement error issue described earlier. In the middle of the PreACT Secure test score distributions, the average gain scores are more consistent. When determining how much gain should be expected from the PreACT Secure test to the ACT test, one should consider the mean gain, which is conditional on the PreACT Secure score.

Figure 8.1. Spring Grade 10 PreACT Secure to Spring Grade 11 ACT Mean Gain Scores by PreACT Secure Score



Note. Values are plotted for PreACT Secure scores between the 1st and 99th percentile in the sample.

8.2 Student Growth Percentiles

Student growth percentiles (SGPs) represent a student's current achievement compared to that of others with similar prior achievement. SGPs answer the question, "What is the percentile rank of a student's score compared to students with similar score histories?" (Castellano & Ho, 2013).

The SGPs discussed here are estimated using quantile regression methods (Koenker, 2005) by the SGP R package (Betebenner et al., 2017). When interpreting SGPs, one should always consider the reference group used to estimate the model. The SGPs range from 1 to 99, and an SGP value of 50 represents typical growth relative to students in the reference group with the same prior achievement score.

8.2.1 ACT Growth Modeling Resources

An SGP table is available at the ACT growth modeling resources web page. As of fall 2025, the SGP tables covered the following assessment scenarios involving the PreACT Secure test:

- PreACT 8/9 to PreACT Secure, Grade 9 to Grade 10
- PreACT Secure to PreACT Secure, Spring Grade 9 to Spring Grade 10
- PreACT Secure to ACT, Spring Grade 9 to Spring Grade 11
- PreACT Secure to ACT, Spring Grade 10 to Spring Grade 11

The SGP lookup table provides the SGP value (ranging from 1 to 99) associated with each combination of current-year test score and prior-year test score. SGPs are provided for English, mathematics, reading, science, STEM, EMRS Composite (Composite score that includes science), EMR Composite (Composite score that does not include science), and English plus reading. For the ACT test, an ELA score is reported for students who take the English, reading, and writing tests. To measure growth when the ACT ELA score is used as the current test score, English plus reading is used as the prior test score.

The SGPs are updated periodically to reflect the most recent longitudinal data from ACT assessments. The SGPs are based on large samples of students from across the country who tested in recent years through school-day testing programs. The samples are weighted to be more representative of the population of students who take the ACT through school-day testing programs. The weighting variables include student demographics (race/ethnicity and gender), school poverty level, school type (public or private), school locale (rural, town, suburb, or urban), and school mean ACT score. The weighting procedure ensures that each of the samples is similar to a common population.

Table 8.3 presents SGP estimates for combinations of PreACT Secure and ACT Composite scores for students tested in the spring of Grade 10 and spring of Grade 11. (In this case, the Composite scores include science.) For example, the SGP for a student who earned a PreACT Secure Composite score of 20 and an ACT Composite score of 23 is 76. Yellow highlighting and asterisks indicate score combinations with SGP values of at least 25 but no greater than 74. In these cases, growth is considered average. Score combinations to the left of the yellow highlighting indicate below-average growth (SGP < 25); score combinations to the right indicate above-average growth (SGP $\geq$ 75). Table 8.3 includes only scores of 10 and higher, and the growth modeling resources provide SGPs for all subjects and all score combinations.

Table 8.3. Spring Grade 10 PreACT Secure to Spring Grade 11 ACT Composite Score SGPs

PreACT Secure Composite score	Composite score																											
	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
10	4	8	17	38*	67*	85	95	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99
11	4	6	14	38*	62*	84	93	97	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99
12	3	5	13	28*	51*	72*	86	94	98	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99
13	3	3	7	18	38*	62*	79	87	94	98	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99
14	3	3	4	11	26*	42*	59*	75	87	93	97	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99
15	3	3	3	6	9	19	35*	54*	71*	83	92	97	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99
16	1	1	1	4	7	12	19	33*	51*	67*	80	90	96	99	99	99	99	99	99	99	99	99	99	99	99	99	99
17	1	1	1	1	1	7	12	20	35*	50*	65*	79	89	96	99	99	99	99	99	99	99	99	99	99	99	99	99
18	1	1	1	1	1	1	5	11	20	32*	46*	63*	81	92	97	99	99	99	99	99	99	99	99	99	99	99	99
19	1	1	1	1	1	1	4	6	10	22	36*	52*	71*	85	94	98	99	99	99	99	99	99	99	99	99	99	99
20	1	1	1	1	1	1	1	4	6	11	24	40*	58*	76	88	95	99	99	99	99	99	99	99	99	99	99	99
21	1	1	1	1	1	1	1	3	5	8	12	21	38*	57*	75	89	96	98	99	99	99	99	99	99	99	99	99
22	1	1	1	1	1	1	1	3	3	4	7	12	22	36*	53*	70*	81	92	97	99	99	99	99	99	99	99	99
23	1	1	1	1	1	1	1	1	1	1	4	7	14	22	37*	55*	70*	82	91	97	99	99	99	99	99	99	99
24	1	1	1	1	1	1	1	1	1	1	3	4	8	15	23	38*	56*	72*	83	92	97	99	99	99	99	99	99
25	1	1	1	1	1	1	1	1	1	1	3	3	4	8	16	25*	41*	60*	72*	84	92	97	99	99	99	99	99
26	1	1	1	1	1	1	1	1	1	1	1	1	1	5	8	17	29*	44*	58*	73*	85	93	98	99	99	99	99
27	1	1	1	1	1	1	1	1	1	1	1	1	1	3	5	10	17	29*	44*	60*	75	86	94	99	99	99	99
28	1	1	1	1	1	1	1	1	1	1	1	1	1	3	3	6	10	14	27*	45*	61*	77	88	95	99	99	99
29	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	4	6	10	14	27*	44*	61*	78	89	96	99	99
30	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	3	3	6	10	15	27*	44*	62*	78	89	98	99
31	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	3	3	3	5	10	14	27*	44*	62*	81	94	99
32	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	3	3	3	3	5	8	14	26*	45*	67*	87	99
33	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	3	3	3	3	3	4	8	15	26*	48*	70*	96
34	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	3	3	3	3	3	3	4	8	16	26*	46*	81
35	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	3	3	3	3	3	3	3	4	7	15	22	46*

Note. Yellow highlighting and asterisks indicate score combinations of average growth (25 ≤ SGP ≤ 74).

8.2.2 Aggregating Student Growth Percentiles (SGPs)

Although all test scores have some measurement error, it is compounded for gain scores and SGPs because of the measurement error in both prior and current test scores. For this reason, we do not recommend using SGPs or gain scores as the primary measure of student learning. Instead, we recommend using aggregate forms of gain scores and SGPs for describing the growth of groups of students (e.g., by student demographic group, school, or district). The mean SGP and median SGP are common measures of group-level growth. Research suggests that the mean SGP may have advantages over the median SGP in terms of efficiency, greater alignment with expected values, and greater robustness to scale transformations (Castellano & Ho, 2015).

Table 8.4 shows mean SGPs by test section and student group for students who took PreACT Secure in the spring of Grade 10 and the ACT in the spring of Grade 11. The overall mean SGP values ranged from 51.5 in reading to 53.2 for English. Because an SGP of 50 represents typical growth, we might have expected the overall means to be closer to 50. The SGP reference group includes multiple cohorts of students and was weighted to be more representative of the population of students who take the ACT during the school day, whereas the results in Table 8.4 are based on unweighted data for a single cohort.

Table 8.4. Spring Grade 10 PreACT Secure to Spring Grade 11 ACT Mean SGPs by Student Group

Student group		*N*	Test section / score				
			English	Math	Reading	Science	Composite
All students		195,447	53.2	52.6	51.5	51.9	52.9
Gender	Female	92,561	53.8	52.2	51.1	51.3	52.0
	Male	95,283	52.5	53.0	51.7	52.5	53.9
Race/ ethnicity	Asian	8,818	59.8	60.1	54.5	58.1	57.8
	Black/African American	18,878	48.6	47.1	46.8	46.1	48.9
	Hispanic	44,450	50.1	49.6	48.4	48.1	50.2
	Native American	1,223	47.1	47.2	45.7	46.1	47.9
	Native Hawaiian/OPI	161	51.4	52.6	52.5	51.6	54.4
	Two or more races	7,996	54.3	53.1	53.2	53.3	53.9
	White	90,763	55.7	55.2	54.2	55.2	55.3
English learner		6,481	47.5	47.7	46.2	47.9	49.3

Note. OPI = Other Pacific Islander.

Table 8.4 shows that mean SGP varies by student group. Male students have slightly higher growth in mathematics, reading, and science, whereas female students have slightly higher growth in English. SGP differences emerged across racial/ethnic groups, with students who are Asian showing the highest growth (Composite mean SGP = 57.8) and students who are Native American showing the lowest growth (Composite mean SGP = 47.9). Students who are English learners had lower than average growth in all subjects.

References

ACT. (2026). *ACT technical manual. ACT.* https://www.act.org/content/dam/act/unsecured/documents/ACT_Technical_Manual.pdf

AERA, APA, & NCME. (2014). *Standards for educational and psychological testing*. American Educational Research Association.

Allen, J. (2013). *Updating the ACT college readiness benchmarks* (ACT Research Report No. 2013-6). ACT. https://www.act.org/content/dam/act/unsecured/documents/ACT_RR2013-6.pdf

Allen, J. (2018). *Examining the effects of PreACT adoption on college readiness outcomes* (ACT Technical Brief No. R1724). ACT. https://www.act.org/content/dam/act/unsecured/documents/pdfs/R1724-pre-act-efficacy-2018-10.pdf

Allen, J. (2022). *Examining the COVID-19 pandemic's impacts on ACT scores: Spring 2022 Update*. ACT. https://www.act.org/content/dam/act/unsecured/documents/2022/R2275-COVID-19-Impacts-on-ACT-Scores-Spring-2022-Update-11-2022.pdf

Allen, J., & Sconing, J. (2005). *Using ACT assessment scores to set benchmarks for college readiness* (ACT Research Report 2005-3). ACT. https://files.eric.ed.gov/fulltext/ED489766.pdf

Betebenner, D. W., Vanwaarden, A., Domingue, B., & Shang, Y. (2017). *SGP: Student growth percentiles & percentile growth trajectories* (R package version 1.7-0.0) [computer software]. Retrieved from sgp.io.

Birnbaum, A. (1968). Some latent trait models and their use in inferring an examinee's ability. In Lord, F. M., & Novick, M. R. (Eds.), *Statistical theories of mental test scores* (pp. 397–479). Addison-Wesley.

Bollen, K. A. (1989). *Structural equations with latent variables*. Jon Wiley & Sons. Retrieved from https://doi.org/10.1002/9781118619179.

Brennan, R. L., & Kolen, M. J. (2004). *Test equating, scaling, and linking*. American Council on Education and Springer Publisher.

Castellano, K. E., & Ho, A. D. (2013). *A practitioner's guide to growth models*. Council of Chief State of School Officers. https://andrewho.scholars.harvard.edu/sites/g/files/omnuum4106/files/andrewho/files/a_practitioners_guide_to_growth_models.pdf

Castellano, K. E., & Ho, A. D. (2015). *Practical differences among aggregate-level conditional status metrics: from median student growth percentiles to value-added models*. Journal of Educational and Behavioral Statistics, 40(1), 35–68. https://doi.org/10.3102/1076998614548485

Cattell, R. B. (1966). *The scree test for the number of factors*. Multivariate Behavioral Research, 1(2), 245–276. https://doi.org/10.1207/s15327906mbr0102_10

Cohen, J. (1960). *A coefficient of agreement for nominal scales*. Educational and Psychological Measurement, 20(1), 37–46. https://doi.org/10.1177/001316446002000104

Hatcher, L. (1994). *A step-by-step approach to using SAS® system for factor analysis and structural equation modeling* (1st ed.). SAS Institute.

Holland, P. W., & Thayer, D. T. (1988). Differential item performance and the Mantel-Haenszel procedure. In Wainer, H., & Braun, H. I. (Eds.), *Test validity* (pp. 129–145). Lawrence Erlbaum Associates, Inc.

Hu, L., & Bentler, P. M. (2009). *Cutoff criteria for fit indexes in covariance structure analysis: conventional criteria versus new alternatives*. Structural Equation Modeling: A Multidisciplinary Journal, 6(1), 1–55. https://doi.org/10.1080/10705519909540118

International Organization for Standardization. (2017). *Information security management systems* (ISO/IEC Standards Family 27000). Retrieved from https://www.iso.org/isoiec-27001-information-security.html.

Joint Committee on Testing Practices. (2004). *Code of fair testing practices in education*. https://www.apa.org/science/programs/testing/fair-testing.pdf

Koenker, R. (2005). *Quantile regression*. Cambridge University Press.

Livingston, S. A., & Lewis, C. (1993). *Estimating the consistency and accuracy of classifications based on test scores*. Journal of Educational Measurement, 32(2), 179–197. https://doi.org/10.1111/j.1745-3984.1995.tb00462.x

Lord, F. M., & Wingersky, M. S. (1984). *Comparison of IRT true-score and equipercentile observed—score "equatings."* Applied Psychological Measurement, 8, 435–461.

Lu, Y., & Allen, J. (2019). *The 2018 PreACT norming study.* https://www.act.org/content/dam/act/unsecured/documents/R1752-preact-2018-norming-study-2019-05.pdf

Mattern, K., Radunzel, J., & Westrick, P. (2015). *Development of STEM readiness benchmarks to assist educational and career decision making* (Research Report 2015-3). ACT. https://www.act.org/content/dam/act/unsecured/documents/ACT_RR2015-3.pdf

Millman, J., & Greene, J. (1989). The specification and development of tests of achievement and ability. In Linn, R. L. (Ed.), *Educational measurement* (3rd ed., 335–366). American Council on Education; Macmillan Publishing Company.

NCME Ad Hoc Committee on the Development of a Code of Ethics. (1995). *Code of professional responsibilities in educational measurement*. National Council on Measurement in Education. http://www.edmeasurement.net/resources/code-of-professional-responsibilities.pdf

Radunzel, J., Allen, J. (2020). *Predicting success on Advanced Placement exams using ACT Aspire, PreACT, and ACT test scores*. ACT. https://www.act.org/content/dam/act/unsecured/documents/R1835-predicting-success-AP.pdf

Radunzel, J. & Fang, Y. (2018). *Updating the progress toward the ACT national career readiness certificate indicator* (Technical Brief No. R1712). ACT. https://www.act.org/content/dam/act/unsecured/documents/R1712-ACT-progress-toward-NCRC.pdf

Radunzel, J., Mattern, K., Crouse, J., & Westrick, P. (2015). *Development and validation of a STEM benchmark based on the ACT STEM score*. ACT. https://www.act.org/content/dam/act/unsecured/documents/2015-Tech-Brief-Development-and-Validation.pdf

Radunzel, J., Westrick, P., Bassiri, D., & Dongmei, L. (2017). *Development and validation of a preliminary ELA readiness benchmark based on the ACT ELA score* (ACT Research Report Series 2017-9). ACT. https://www.act.org/content/dam/act/unsecured/documents/R1640-preliminary-ela-benchmark-2017-06.pdf

Robbins, S. B., Lauver, K., Le, H., Davis, D., Langley, R., & Carlstrom, A. (2004). *Do psychosocial and study skill factors predict college outcomes? A meta-analysis.* Psychological Bulletin, 130(2), 261–288. https://psycnet.apa.org/doi/10.1037/0033-2909.130.2.261

Spray, J. A. (1989). *Performance of three conditional DIF statistics in detecting differential item functioning on simulated tests* (ACT Research Report 89-7). ACT. https://www.act.org/content/dam/act/unsecured/documents/ACT_RR89-7.pdf

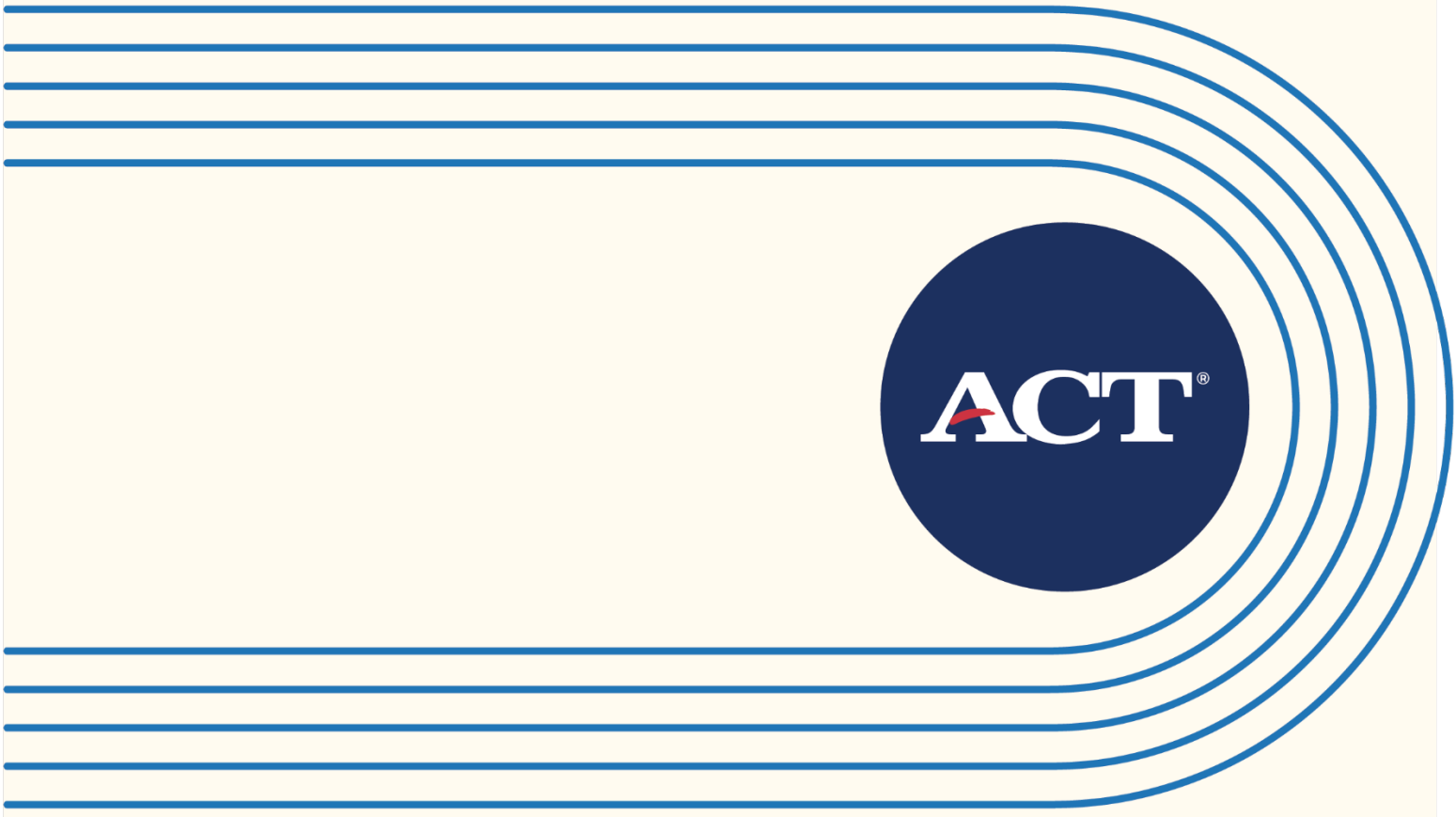
Stocking, M. L., & Lord, F. M. (1983). *Developing a common metric in item response theory*. Applied Psychological Measurement, 7(2), 201–210. https://doi.org/10.1177/014662168300700208

Swaminathan, H., Hambleton, R. K., & Algina, J. (1974). *Reliability of criterion-referenced tests: A decision-theoretic formulation*. Journal of Educational Measurement, 11(4), 263–267. https://doi.org/10.1111/j.1745-3984.1974.tb00998.x

Wang, M., & Stanley, J. (1970). *Differential weighing: A review of methods and empirical studies.* Review of Educational Research, 40, 663–705. https://doi.org/10.3102/00346543040005663

Webb, N. L. (2002). *Depth-of-knowledge levels for four content areas*. Language Arts, 28(March). http://ossucurr.pbworks.com/w/file/fetch/49691156/Norm%20web%20dok%20by%20subject%20area.pdf

Zwick, R. (2012). *A review of ETS differential item functioning assessment procedures: Flagging rule, minimum sample size requirements, and criterion refinement*. (ETS RR-12-08). ETS. https://files.eric.ed.gov/fulltext/EJ1109842.pdf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