2025 | 2026

ACT® Practice Test 2

A Message to Students

The practice test provided here is intended to help you do your best on the ACT to gain admission to colleges and universities. While this is a standalone practice test, ACT includes helpful hints and test-taking strategies, as well as an additional complete practice ACT in the document *Preparing for the ACT*. These practice tests include "retired" questions from earlier test subjects given on previous test dates at ACT test centers. Also featured are a practice writing test, a sample answer document, answer keys, and self-scoring instructions.

Read this document carefully and take the practice test well before test day. That way, you will be familiar with the test format, test subjects and what they measure, and strategies you can use to do your best on test day.

You may also want to consider *The Official ACT® Self-Paced Course, Powered by Kaplan®* to learn test content and strategies in a virtual classroom. To view all of our test preparation options, go to www.act.org/the-act/testprep.

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The ACT® www.act.org

  QU00002-2.CJ22902

Overview of the ACT

The ACT test consists of three multiple-choice sections—English, mathematics, and reading. Students may opt to take an optional multiple-choice science section and/or an optional writing section. Some colleges and universities require or accept ACT science or writing scores, so you may consider taking the science and writing sections.

Test	Questions	Minutes per Test
English	50 (40 scored)	35
Mathematics	45 (41 scored)	50
Reading	36 (27 scored)	40
Science (optional)	40 (34 scored)	40
Writing (optional)	1 essay	40

Each of the multiple-choice sections will include some embedded field test items that will not be included in your score. The results of the embedded field test items help develop future test questions. These items are not labeled, so you will not know which items contribute to your score. You should try your best on all items.

Taking the Practice Tests

It is a good idea to take the practice tests under conditions as similar as possible to those you will experience on test day. The following tips will help you:

- If you are taking the ACT (without science or writing), the three multiple-choice tests require 2 hours 20 minutes to complete. Take them in order, in one sitting, with a 10-to-15-minute break between Tests 2 and 3. If you take the ACT with science, the four multiple-choice sections of the test require 3 hours, with a 10- to 15- minute break between Tests 2 and 3.
- You will need only sharpened, soft lead No. 2 pencils and good erasers. Remove all other items from your desk. You will not be allowed to use unapproved scratch paper, but you can use the test booklet to make notes.
- If you plan to use a permitted calculator on the mathematics test, use the same one you will use on test day.
- Use a digital timer or clock to time yourself on each practice test. Set your timer for five minutes less than the time allowed for each test so you can get used to the verbal announcement of five minutes remaining.
- Give yourself only the time allowed for each test.
- Detach and use the sample answer document on pages 54–61.
- Read the test directions on the first page of each multiple-choice test. These are the same directions that will appear in your test booklet on test day.
- Start your timer and begin with Test 1. Continue through Test 4, if taking the optional science section, or end after Test 3 if you are not taking the science section. taking a 10-to-15-minute break between Tests 2 and 3. Use the timing table on page 2 to time each section of the test.
- Score your multiple-choice tests using the information beginning on page 62.
- If you plan to take the ACT with writing, read the directions on the first page of the practice ACT writing test (page 50). These are the same directions that will appear in your test booklet on test day. Start your timer (set for 40 minutes), then read the prompt on page 51. After you understand what the prompt is asking you to do, plan your essay and then write it on lined paper. On test day, if you test on paper, your answer document will have lined pages on which you will write your essay. Score your essay using the information on pages 67–69.
- A screen reader accessible practice test is available at https://practice.actdigitalservices.org/.

Practice Multiple Choice Test 2

EXAMINEE STATEMENTS, CERTIFICATION, AND SIGNATURE

1. **Statements:** I understand that by registering for, launching, starting, or submitting answer documents for an ACT® test, I am agreeing to comply with and be bound by the *Terms and Conditions: Testing Rules and Policies for the ACT® Test* ("Terms").

   I UNDERSTAND AND AGREE THAT THE TERMS PERMIT ACT TO CANCEL MY SCORES IN CERTAIN CIRCUMSTANCES. THE TERMS ALSO LIMIT DAMAGES AVAILABLE TO ME AND REQUIRE ARBITRATION OF CERTAIN DISPUTES. BY AGREEING TO ARBITRATION, ACT AND I BOTH WAIVE THE RIGHT TO HAVE THOSE DISPUTES HEARD BY A JUDGE OR JURY.

   I understand that ACT owns the test questions and responses, and I will not share them with anyone by any form of communication before, during, or after the test administration. I understand that taking the test for someone else may violate the law and subject me to legal penalties.

   I consent to the collection and processing of personally identifying information I provide, and its subsequent use and disclosure, as described in the ACT Privacy Policy (www.act.org/privacy.html). If I am taking the test outside of the United States, I also permit ACT to transfer my personally identifying information to the United States, to ACT, or to a third-party service provider, where it will be subject to use and disclosure under the laws of the United States, including being accessible to law enforcement or national security authorities.

2. **Certification:** Copy the italicized certification below, then sign, date, and print your name in the spaces provided.

   *I agree to the **Statements** above and certify that I am the person whose information appears on this form.*

Your Signature | Today's Date | Print Your Name

The ACT®

Form 25MC5

2025 | 2026

Directions

This booklet contains tests in English, mathematics, reading, and science. These tests measure skills and abilities highly related to high school course work and success in college. **Calculators may be used on the mathematics test only.**

The questions in each test are numbered, and the suggested answers for each question are lettered. On the answer document, the rows of ovals are numbered to match the questions, and the ovals in each row are lettered to correspond to the suggested answers.

For each question, first decide which answer is best. Next, locate on the answer document the row of ovals numbered the same as the question. Then, locate the oval in that row lettered the same as your answer. Finally, fill in the oval completely. Use a soft lead pencil and make your marks heavy and black. **Do not use ink or a mechanical pencil.**

Mark only one answer to each question. If you change your mind about an answer, erase your first mark thoroughly before marking your new answer. For each question, make certain that you mark in the row of ovals with the same number as the question.

Only responses marked on your answer document will be scored. Your score on each test will be based only on the number of questions you answer correctly during the time allowed for that test. You will **not** be penalized for guessing. **It is to your advantage to answer every question even if you must guess.**

You may work on each test **only** when the testing staff tells you to do so. If you finish a test before time is called for that test, you should use the time remaining to reconsider questions you are uncertain about in that test. You may **not** look back to a test on which time has already been called, and you may **not** go ahead to another test. To do so will disqualify you from the examination.

Lay your pencil down immediately when time is called at the end of each test. You may **not** for any reason fill in or alter ovals for a test after time is called for that test. To do so will disqualify you from the examination.

Do not fold or tear the pages of your test booklet.

DO NOT OPEN THIS BOOKLET UNTIL TOLD TO DO SO.

ENGLISH TEST

35 Minutes—50 Questions

DIRECTIONS: In the passages that follow, certain words and phrases are underlined and numbered. In the right-hand column, you will find alternatives for the underlined part. You are to choose the best answer to each question. If you think the original version is best, choose "**No Change**."

You will also find questions about a section of the passage, or about the passage as a whole. These questions do not refer to an underlined portion of the passage, but rather are identified by a number or numbers in a box.

For each question, choose the alternative you consider best and fill in the corresponding oval on your answer document. Read each passage through once before you begin to answer the questions that accompany it. For many of the questions, you must read several sentences beyond the question to determine the answer. Be sure that you have read far enough ahead each time you choose an alternative.

PASSAGE I

The Legacy of Choctaw Stickball

[1]

Every summer at the Choctaw Indian Fair in central Mississippi, hundreds of men, women, and children gather to take part in the fair's main event: the Choctaw World Series of Stickball. [A] This multiday tournament in summer[1] celebrates the fast-paced, aggressive game of stickball (also called *toli* or *ishtaboli*), possibly the oldest sport in North America. Players come not only for the sport but also for the sense of community that stickball affords.

[2]

In stickball, players work to move the *towa*—(ball)—down the field to their opponents'[2] end, where a narrow twelve-foot-high post stands. [B] To catch, carry, and throw the *towa*, they hold two *kabocca*, these are sticks made[3] of hardwood with a netted scoop at one end.

1. Which choice is least redundant in context?

A. No Change
B. multiday tournament in Mississippi
C. annual multiday tournament
D. multiday tournament

2. Which choice makes the sentence most grammatically acceptable?

F. No Change
G. *towa*, (ball),
H. *towa* (ball)
J. *towa*, ball

3. Which choice makes the sentence most grammatically acceptable?

A. No Change
B. these sticks consist
C. they're sticks made
D. sticks made

Kabocca are used to catch and throw the ball.[4]
Players score a point by either touching the post while carrying the *towa* or launching the *towa* and hitting the post.

[3]

Teams can be any size as long as both sides have the same number of players.[5] In fact, the sport is nicknamed "the little brother of war" because communities frequently settled disputes by playing stickball instead of waging battle. These contests were fierce and physical, and there was almost no[6] rules. The playing field had no boundaries, and the length of the field varied greatly—sometimes a significant amount.[7]

[4]

Modern-day stickball has inherited the game's intensity. True to the legacy of the game, players do not wear pads or helmets, also[8] many play barefoot. However, there have been some changes. The game today is usually played on a football field. New rules have been added for safety. For example, only participants making a play on the *towa* are permitted to be tackled. [C]

[5]

[D] For the Native people at the Choctaw Indian Fair, stickball is much more than an exciting game; it's a way to honor their heritage and keep it thriving. Through the centuries, stickball has remained a central part of Choctaw culture. Thomas Ben, the stickball commissioner, said, "This is us. This defines the Choctaw people."

4. Which choice is least redundant in context?

F. No Change
G. The ball that players use is called the *towa*.
H. The posts on the field are twelve feet high.
J. Delete the underlined portion.

5. Given that all the choices are accurate, which one best introduces the paragraph?

A. No Change
B. The first written record of Choctaw stickball was an account of a game that occurred around 1729.
C. In the tournament, winners are crowned from men's, women's, and youth divisions.
D. Historically, stickball played an important role in resolving conflicts.

6. Which choice makes the sentence most grammatically acceptable?

F. No Change
G. has been hardly any
H. were almost no
J. was hardly any

7. Given that all the choices are accurate, which one most clearly uses specific details to support the sentence's claim about stickball playing fields?

A. No Change
B. an important factor in how the games were played.
C. from one hundred feet to five miles.
D. which affected spectators.

8. Which choice makes the sentence most grammatically acceptable?

F. No Change
G. in addition,
H. and
J. Delete the underlined portion.

GO ON TO THE NEXT PAGE.

Questions 9 and 10 ask about the preceding passage as a whole.

9. The writer wants to add the following sentence to the essay:

Players cannot touch the ball with their hands.

The sentence would most logically be placed at:

A. Point A in Paragraph 1.
B. Point B in Paragraph 2.
C. Point C in Paragraph 4.
D. Point D in Paragraph 5.

10. Suppose the writer's primary purpose had been to provide an overview of a sport. Would this essay accomplish that purpose?

F. Yes, because it explains how Choctaw stickball is played and why it is important.
G. Yes, because it argues that Choctaw stickball was a historical method of conflict resolution.
H. No, because it instead describes the Choctaw Indian Fair, where the World Series of Stickball is played.
J. No, because it instead focuses on the reasons the World Series of Stickball was created.

PASSAGE II

The Keret House

[1] Szczęsny began designing the Keret House, today likely the narrowest building in the world. [2] While walking through Warsaw's Wola district, Polish architect Jakub Szczęsny (11) noticed a small gap between two buildings—one not particularly tall, (12) the other a contemporary, concrete apartment building. [3] He imagined transforming the space into a functional building that would physically link two different eras. [13]

Named to honor writer Etgar Keret, this impossibly slim house is only about four feet across at its widest point. Still, it has most of the features of a traditional house. The house contains a one-foot-wide dining table and chairs and a narrow bed.

11. Which choice makes the sentence most grammatically acceptable?

A. No Change
B. district, Polish architect, Jakub Szczęsny
C. district Polish architect, Jakub Szczęsny,
D. district Polish architect Jakub Szczęsny

12. Given that all the choices are accurate, which one sets up a direct contrast regarding the age of the two buildings?

F. No Change
G. a pre–World War II brick rooming house,
H. located on the corner of Zelazna Street,
J. being used as a warehouse,

13. Which sequence of sentences makes this paragraph most logical?

A. No Change
B. 1, 3, 2
C. 2, 3, 1
D. 3, 2, 1

GO ON TO THE NEXT PAGE.

Storage areas, kitchen, bathroom, and bedroom are compressed to fit into a spread[14] of space over two floors.

The building is primarily a working studio for artists in residence selected by Szczęsny and Keret. Artists apply for a short stay,[15] as Keret explains it, use the space as "a portal to all kinds of artistic initiatives." Since its opening in 2012, the Keret House has hosted several visitors from around the world, including photographers, writers, and filmmakers.

14. Which choice most precisely conveys the narrowness of the space?

F. **No Change**
G. sample
H. sliver
J. speck

15. Which choice makes the sentence most grammatically acceptable?

A. **No Change**
B. stay and,
C. stay;
D. stay

PASSAGE III

Retire the Penny

During the early twentieth century, many goods cost a few pennies or less. Candy lovers could buy a gumball or Tootsie Roll for a penny; moviegoers could watch a reel of a Charlie Chaplin film for a penny or two. Today, though, with the cumulative effects of inflation, the penny has almost zero purchasing power. Think about it: when's the last time you bought something for a penny? Although many of us harbor fond memories of collecting pennies in a piggy bank,[16] it's time to do the practical thing: retire the US penny.

16. The writer is considering revising the underlined portion to the following:

still gather pennies in change trays,

Given that the information is accurate, should the writer make this revision?

F. Yes, because the revision more clearly suggests that pennies, in bulk, still have at least some value.
G. Yes, because the revision more clearly suggests that nostalgia is unrelated to the purchasing power of the penny.
H. No, because the original more clearly suggests that nostalgia may be hindering the retirement of the penny.
J. No, because the original more clearly suggests that pennies would have little to no sentimental value if they were retired.

[1] Producing and distributing pennies isn't cheap. [2] And in that year alone, the Mint made nearly six and a half billion pennies, costing the US over 170 million dollars. [3] In 2022, the US Mint spent 2.72 cents to put each penny into circulation. [17]

Economics professor Robert Whaples cites another problem: the so-called penny tax, which is really a tax on time. When cashiers make change for a cash purchase, they often reach, into the registers' [18] penny trays and count out one to four cents. While the time it takes to do this may seem trivial, each year, billions of cash transactions are made annually. [19] These penny taxes, in aggregate, result in over 120 billion hours when cashiers (and consumers) could be completing more meaningful tasks.

Proponents of pennies—often lobbyists for the mining of zinc, zinc being the primary component of pennies— [20] argue that if the penny were eliminated, consumers would pay more for goods. [21] But in Canada, where the penny was eliminated in 2013, this hasn't been a problem.

17. Which sequence of sentences presents the writer's argument most logically?

A. No Change
B. 1, 3, 2
C. 2, 3, 1
D. 3, 1, 2

18. Which choice makes the sentence most grammatically acceptable?

F. No Change
G. reach, into the register's
H. reach into the registers
J. reach into the registers'

19. Which choice is least redundant in context?

A. No Change
B. billions of cash transactions occur each year when physical money is exchanged for goods.
C. on a yearly basis, billions of cash transactions occur annually.
D. billions of cash transactions are made each year.

20. If the writer were to delete the underlined portion (adjusting the punctuation as needed), the paragraph would primarily lose:

F. a suggestion that many proponents of keeping the penny in circulation may be motivated by self-interest.
G. an indication of the amount of money made by zinc miners when the penny is in circulation.
H. an explanation of how zinc mining affects the prices that consumers pay for goods.
J. a summary of the argument made by many proponents of pennies for keeping the penny in circulation.

21. At this point, the writer is considering adding the following sentence:

> Consistently, research shows that Americans respond negatively when prices increase due to inflation.

Should the writer make this addition here?

A. Yes, because it undermines the penny proponents' argument that eliminating the penny would cause consumers to pay more for goods.
B. Yes, because it cites research that strongly suggests most Americans favor the elimination of the penny.
C. No, because it is unrelated to the writer's rebuttal of the argument made by proponents of pennies.
D. No, because it supports the penny proponents' argument that consumers would have access to more goods if the penny were eliminated.

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Canadian merchants round each cash purchase to the nearest nickel. If a hair comb costs $1.02, consumers pay a dollar. If it costs $1.03, they pay $1.05. Studies have shown that its a wash; overall, consumers pay no more or no less then[22] they did when the penny was in circulation.

Bills for retiring the penny have been floating around Congress for decades. Whether out of nostalgia or fear of change, lawmakers have been disinclined to execute a proposed course of action.[23] But the value of today's penny is defective.[24] By retiring the penny, Congress would cut costs at the US Mint while also giving cashiers some time back at work.[25]

22. Which choice makes the sentence most grammatically acceptable?

F. No Change
G. it's a wash; overall, consumers pay no more or no less than
H. it's a wash; overall, consumers pay no more or no less then
J. its a wash; overall, consumers pay no more or no less than

23. Which choice most effectively maintains the essay's tone?

A. No Change
B. have been reluctant to act.
C. haven't closed the deal.
D. haven't ratified a thing.

24. Which choice is clearest and most precise in context?

F. No Change
G. negligible.
H. remote.
J. invalid.

25. Which choice provides the most effective conclusion by restating the main claims of the essay's argument?

A. No Change
B. reduce pollution caused by zinc mining while also increasing the purchasing power of the US dollar.
C. free up time for workers at the US Mint while also increasing the bargaining power of cashiers.
D. reduce "coin clutter" while also simplifying cash and noncash transactions.

PASSAGE IV

Under the Mediterranean

[1]

From the time Honor Frost made her first amateur underwater dive in the late 1940s, she was committed to spending as much time as possible exploring. [A] She was, consequently, thrilled to be invited by professional divers to join the excavation of a first-century Roman shipwreck in the Mediterranean Sea in 1957. But what Frost witnessed during that excavation shocked her.

The team, too, took little care with how they handled
26
artifacts and little note of where they found them.

A talented illustrator, Frost understood that the
27
excavation of shipwrecks would benefit from the same systematic approach used on land. She teamed up with fellow underwater explorers Peter Throckmorton and George Bass, and the field of maritime archaeology was born.

[2]

Frost made her first major discovery in 1960 with the excavation of a Bronze Age Phoenician ship that dated to 1200 BCE. The historical implications of the find were significant. Prior to the identification of the ship and its' contents, prevailing wisdom held that Bronze Age
28
maritime commerce was dominated exclusively by the Mycenaean Greeks. [B] In fact, most of them believed
29
that the Phoenicians didn't sail the Mediterranean at all until the Iron Age. The work of Frost and her colleagues fundamentally changed that understanding. [C]

[3]

Beginning in 1971, Frost directed the excavation of a 2,200-year-old Punic (or late Phoenician) warship off the coast of Sicily. The ship, which Frost surmised may have been sunk in a battle with a Roman vessel, was the first war galley of antiquity ever discovered.

26. Which transition word, if any, is most logical in context?

F. No Change
G. team, nevertheless,
H. team, however,
J. team

27. Given that all the choices are accurate, which one most effectively leads the reader from the preceding sentence to the information that follows?

A. No Change
B. Thanks to experience she'd gained on a formal archaeological land dig,
C. As one who rarely traveled without her trusty oxygen tank,
D. With an interest in the performing arts,

28. Which choice makes the sentence most grammatically acceptable?

F. No Change
G. their
H. it's
J. its

29. Which choice is clearest and most grammatically acceptable in context?

A. No Change
B. those individuals
C. scholars
D. they

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The excavation[30] took several years. [D] During that time, as Frost's team recovered[31] artifacts from the wreck, painstakingly recording and publishing their findings along the way. When the excavation was complete, the remnants of the ship was set to be[32] restored and reconstructed for display in a Sicilian museum. For Frost and the field of maritime archaeology, all at once, history was[33] being revealed and made at the same time.

30. Which choice is least redundant in context?

F. No Change
G. excavation of the 2,200-year-old warship
H. excavation off the coast of Sicily
J. excavation, which began in 1971,

31. Which choice makes the sentence most grammatically acceptable?

A. No Change
B. with Frost's team recovering
C. Frost's team recovering
D. Frost's team recovered

32. Which choice makes the sentence most grammatically acceptable?

F. No Change
G. was ready to be
H. were
J. was

33. Which choice is least redundant in context?

A. No Change
B. history was simultaneously
C. history was concurrently
D. history was

Questions 34 and 35 ask about the preceding passage as a whole.

34. The writer is considering adding the following sentence to the essay:

> A member of the first civilian diving club in the world, Frost was fond of saying that "time spent on the surface is time wasted."

If the writer were to add this sentence, it would most logically be placed at:

F. Point A in Paragraph 1.
G. Point B in Paragraph 2.
H. Point C in Paragraph 2.
J. Point D in Paragraph 3.

35. Suppose the writer's primary purpose had been to explore how a particular field of study has changed over the years. Would this essay accomplish that purpose?

A. Yes, because in addition to discussing the origins of maritime archaeology, it also explains recent controversies in the field.
B. Yes, because in addition to Frost, it mentions some of the other founders of maritime archaeology.
C. No, because it focuses instead on Frost and some of her most important contributions to maritime archaeology.
D. No, because it focuses instead on Frost's accomplishments prior to her work in maritime archaeology.

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PASSAGE V

A Birthplace of Stars

The winter night I attempted to see the famed Orion Nebula, I didn't expect to succeed. I was an inexperienced astronomer peering through[36] light-polluted skies. But I was eager to test my new telescope's capabilities, and the nebula is said to be one of the greatest sights in the night sky. So I bundled up, set out my scope to cool down (its mirrors must adjust to the cold air for optimal viewing), and scanned for the constellation Orion.

I had prepared for this night by studying constellations in my astronomy books. Orion appears as a hunter who, in some mythologies, is fighting Taurus the Bull, another constellation. [A] Even in bright skies, the telltale three stars marking Orion's belt are easy to spot. [B] I knew to follow the belt to Orion's sword, a dim line of stars extending south. [C] The middle of these is actually not a star but a nebula, the Great Orion Nebula, a birthplace of stars. [D] When gravity causes the gas and dust to collapse, forming stars.[37] The nebula, is home to thousands of young stars,[38] is often called a galactic "nursery." [39]

36. Which choice makes the sentence most grammatically acceptable?

F. No Change
G. astronomer, peering through,
H. astronomer: peering through
J. astronomer peering through,

37. Which choice makes the sentence most grammatically acceptable?

A. No Change
B. collapse to form stars.
C. collapse, stars form.
D. collapse and form stars.

38. Which choice makes the sentence most grammatically acceptable?

F. No Change
G. nebula is home to thousands of young stars, and
H. nebula, home to thousands of young stars, and
J. nebula, home to thousands of young stars,

39. The writer wants to add the following sentence to the preceding paragraph:

> Located 1,300 light-years from Earth, the nebula is a massive cloud of gas and dust.

This sentence would most logically be placed at:

A. Point A.
B. Point B.
C. Point C.
D. Point D.

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I centered my scope where the nebula should be, inserted my lowest-powered eyepiece, and leaned in to look. I just made out a dull smudge. I couldn't get much improvement even when I adjusted the focuser. Coincidentally, [40] I switched to a higher-powered eyepiece and tried a trick I'd read about for viewing faint objects: using averted vision.

The principle of averted vision states that the eye can often see distant objects better by looking to one side of them rather than directly at them. [41] I focused my eye on an area beside the smudge, and, sure enough, my peripheral vision yielded a far better view of the nebula's swirling clouds. I even saw the Trapezium star cluster, illuminated [42] by four bright young stars nestled in the nebula like birds' eggs [43] in a nest. [44]

40. Which transition word is most logical in context?

F. **No Change**
G. Similarly,
H. Besides,
J. So,

41. The writer is considering deleting the preceding sentence. Should the sentence be kept or deleted?

A. Kept, because it elaborates on why the narrator is capable of using averted vision when looking at the night sky.
B. Kept, because it explains the principle that allowed the narrator to see the nebula more clearly.
C. Deleted, because it adds a level of technical detail that is inappropriate for the tone of the essay.
D. Deleted, because it digresses from the main point of the paragraph.

42. Which choice is clearest and most precise in context?

F. **No Change**
G. emanated
H. emulated
J. eliminated

43. Which choice makes the sentence most grammatically acceptable?

A. **No Change**
B. bird's eggs
C. birds eggs
D. bird eggs'

44. Given that all the following sentences are accurate, which one, if added here, would best conclude the paragraph and the essay by referring back to the opening paragraph?

F. The Trapezium star cluster was originally discovered in 1617 by Galileo, whom I'd read about extensively in my astronomy books.
G. In addition to averted vision, it is also important to eliminate stray light and use the correct magnification when observing the night sky.
H. Although my initial goal was to observe Orion's belt and sword, the constellation is also very useful as an aid to locating other constellations such as Taurus and Gemini.
J. Observing these features made my winter trek outdoors worthwhile, teaching me that a change in focus is sometimes helpful to see more clearly.

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Question 45 asks about the preceding passage as a whole.

45. Suppose the writer's goal had been to write an essay about a personal experience with astronomy. Would this essay accomplish that goal?

A. Yes, because the narrator recounts several past adventures and challenges of using the telescope to view the night sky.
B. Yes, because the narrator describes a stargazing session from start to finish, from setting up the telescope to observing an actual constellation.
C. No, because it primarily focuses on the Orion Nebula and its process of star formation.
D. No, because it describes a universally used technique for viewing distant objects in the night sky.

PASSAGE VI

Robots Rock

Pittsburgh resident, Eric Singer, [46] is a technologist who creates robotic instruments. "Usually when I say musical robots, people think of humanoid robots that are playing musical instruments," Singer says. But these robots are themselves the instruments, creating music in unexpected ways.

[1] One such instrument is the XyloBot, a robotic xylophone. [2] On a standard xylophone, a musician strikes bars with mallets to produce bright, sharp tones. [3] The XyloBot, however, needs no musician. [4] Instead, the set of mallets are [47] built in, secured to the frame of the instrument and positioned such that each mallet hovers over its corresponding bar. [5] Beneath the instrument's frame is a mass of wires that transmit electromagnetic currents to the mechanized parts that then move the mallets to strike.

46. Which choice makes the sentence most grammatically acceptable?

F. No Change
G. Pittsburgh, resident, Eric Singer,
H. Pittsburgh resident, Eric Singer
J. Pittsburgh resident Eric Singer

47. Which choice makes the sentence most grammatically acceptable?

A. No Change
B. mallet are
C. mallets is
D. mallet is

GO ON TO THE NEXT PAGE.

[6] A computer program controls the duration and strength of the currents, enabling the XyloBot to play—get this—an entire song. [49] [48]

Singer has designed an array of robotic instruments—guitars, drums, keyboards, violins. His instruments have played alongside Grammy-winning artists onstage, and his work has been commissioned by premier art galleries.

48. Which choice most effectively maintains the essay's tone?

F. No Change
G. play an entire song—wow.
H. play a whole entire song!
J. play an entire song.

49. For the sake of the logic and cohesion of this paragraph, Sentence 3 should be placed:

A. where it is now.
B. after Sentence 1.
C. after Sentence 4.
D. after Sentence 5.

Question 50 asks about the preceding passage as a whole.

50. Suppose the writer's primary purpose had been to describe a designer's inspiration that led to a new invention. Would this essay accomplish that purpose?

F. Yes, because it provides specific details about Singer's background in art and technology that prompted him to create robotic instruments.
G. Yes, because it suggests that Singer's robotic instruments have changed the way technologists have since designed robots.
H. No, because it indicates that Singer's robotic instruments, while impressive, are not considered inventions because they produce the same sound as that of traditional instruments.
J. No, because while it mentions Singer's love of robots and music, it is more focused on describing his artistry and the designs of his robotic instruments.

END OF TEST 1

STOP! DO NOT TURN THE PAGE UNTIL TOLD TO DO SO.

MATHEMATICS TEST

50 Minutes—45 Questions

DIRECTIONS: Solve each problem, choose the correct answer, and then fill in the corresponding oval on your answer document.

Do not linger over problems that take too much time. Solve as many as you can; then return to the others in the time you have left for this test.

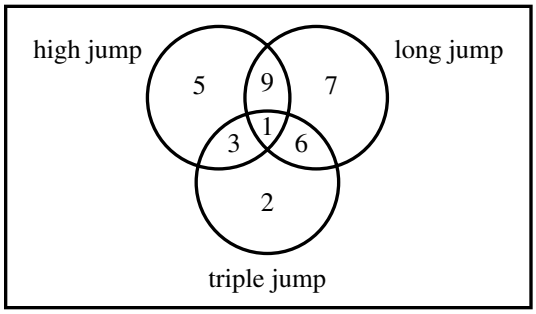
You are permitted to use a calculator on this test. You may use your calculator for any problems you choose, but some of the problems may best be done without using a calculator.

Note: Unless otherwise stated, all of the following should be assumed.

1. Illustrative figures are **not** necessarily drawn to scale.
2. Geometric figures lie in a plane.
3. The word "line" indicates a straight line.
4. The word "average" indicates arithmetic mean.

DO YOUR FIGURING HERE.

1. At a college track meet, there are 3 jumping events: high jump, long jump, and triple jump. The Venn diagram below shows the distribution of the number of athletes competing in each jumping event. How many athletes are competing in both high jump and triple jump but **not** long jump?



A. 3
B. 4
C. 10
D. 19

2. A function, f, is defined by the equation $f(x) = x^2 + 5$. What is $f(3) + 1$?

F. 9
G. 11
H. 12
J. 15

3. Given $b = 40$ and $c = -16$, $b + c$ is equal to the product of -4 and what number?

A. -14
B. -6
C. 6
D. 14

GO ON TO THE NEXT PAGE.

DO YOUR FIGURING HERE.

4. It takes Collin 24 minutes to walk to school in the morning. What fraction of his 24-hour day is spent walking to school in the morning?

F. $\frac{1}{1{,}440}$

G. $\frac{1}{60}$

H. $\frac{1}{24}$

J. $\frac{1}{12}$

5. A certain triangle has interior angle measures of $(6x)°$, $(2x)°$, and $x°$. What is the value of x?

A. 9
B. 12
C. 20
D. 57

6. Which of the following matrices is equal to $6\begin{bmatrix} -5 & 3 \\ 0 & -4 \end{bmatrix}$?

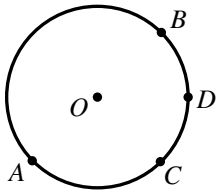
F. $\begin{bmatrix} -30 & -6 \end{bmatrix}$

G. $\begin{bmatrix} 1 & 9 \\ 6 & 2 \end{bmatrix}$

H. $\begin{bmatrix} -\frac{5}{6} & \frac{1}{2} \\ 0 & -\frac{2}{3} \end{bmatrix}$

J. $\begin{bmatrix} -30 & 18 \\ 0 & -24 \end{bmatrix}$

7. For circle O shown, A, B, C, and D are on circle O; A and B are as far apart as possible; C is halfway between A and B along circle O; and D is halfway between C and B along circle O. What percent of the area enclosed by circle O is enclosed by $\overline{OC}$, $\overline{OD}$, and minor arc $\overset{\frown}{CD}$?



A. 12.5%
B. 25%
C. 50%
D. 100%

GO ON TO THE NEXT PAGE.

DO YOUR FIGURING HERE.

8. An object is launched vertically at 30 meters per second from a 55-meter-tall platform. The height, $h(t)$ meters, of the object t seconds after launch is modeled by $h(t) = -4.9t^2 + 30t + 55$. What will be the height, in meters, of the object 3 seconds after launch?

F. 44.1
G. 100.9
H. 145
J. 189.1

9. Given the function $f(x) = 4x^2 - 14x + 12$, which of the following expressions is equivalent to $f(x)$?

A. $(-2x + 4)(2x + 3)$
B. $(2x - 4)(2x - 3)$
C. $(2x - 4)(2x + 3)$
D. $(2x - 3)(2x + 4)$

10. Which of the following is equivalent to $(6x + 3y) - (y - 2x)$?

F. $4x + 2y$
G. $5x + y$
H. $5x + 5y$
J. $8x + 2y$

11. Bryce owns an apartment building. He charges \$325 per month for each 1-bedroom apartment and \$410 per month for each 2-bedroom apartment. Bryce charged a total of \$4,905 in rent for 13 apartments this month. How many 1-bedroom apartments did Bryce charge for this month?

A. 5
B. 6
C. 7
D. 8

GO ON TO THE NEXT PAGE.

DO YOUR FIGURING HERE.

12. A restaurant surveyed its customers to determine whether or not they like hamburgers and whether or not they like turkey burgers. The table shows the results of the survey.

	Like hamburgers	Do **not** like hamburgers	Total
Like turkey burgers	97	39	136
Do **not** like turkey burgers	98	78	176
Total	195	117	312

To the nearest 1%, what percent of the customers who responded to the survey like hamburgers?

F. 31%
G. 50%
H. 63%
J. 71%

13. For what value of n does the quadratic equation $x^2 - 4x + n = 0$ have solutions of $x = 7$ and $x = -3$?

A. -21
B. -4
C. 4
D. 10

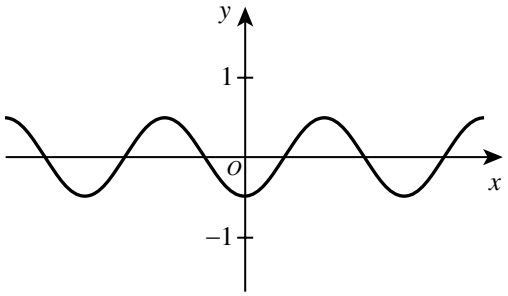
14. The lengths of corresponding sides of 2 similar right triangles are in the ratio 4:5. The hypotenuse of the smaller triangle is 20 inches long. How many inches long is the hypotenuse of the larger triangle?

F. 9
G. 20
H. 21
J. 25

GO ON TO THE NEXT PAGE.

DO YOUR FIGURING HERE.

15. What is the amplitude of the graph of function $f(x) = \frac{1}{2}\cos(3x + \pi)$, shown in the standard (x,y) coordinate plane?



A. $\frac{1}{3}$

B. $\frac{1}{2}$

C. 2

D. 3

16. A circle in the standard (x,y) coordinate plane has its center at $(3,-4)$ and passes through $(0,0)$. Which of the following is an equation for that circle?

F. $x^2 + y^2 = 5$

G. $(x - 3)^2 + (y + 4)^2 = 25$

H. $(x + 3)^2 + (y - 4)^2 = 7$

J. $(x + 3)^2 + (y - 4)^2 = 25$

17. $\sqrt{112} + \sqrt{63} + \sqrt{175} = ?$

A. $7\sqrt{12}$

B. $7\sqrt{50}$

C. $12\sqrt{7}$

D. $60\sqrt{7}$

18. The sum of 3 positive integers is 180, and the ratio of the integers is 5:3:2. What is the value of the smallest of the integers?

F. 18

G. 36

H. 54

J. 90

GO ON TO THE NEXT PAGE.

DO YOUR FIGURING HERE.

19. Jeremy reaches into a box in the closet. The box contains 10 gloves that make up 5 matching pairs. He picks 1 glove at random and puts it on. Then he picks another glove at random. What is the probability that he has picked a matching pair?

A. $\frac{1}{9}$

B. $\frac{1}{5}$

C. $\frac{4}{9}$

D. $\frac{1}{2}$

20. During an event, a store gave a free T-shirt to every 24th customer that entered the store and a free gift certificate to every 60th customer that entered the store. Given that 500 customers entered the store during the event, how many customers received both a free T-shirt **and** a free gift certificate?

F. 2
G. 4
H. 12
J. 24

21. Cameron's bookshelf has 3 books with a rating of 10, 5 books with a rating of 100, and 2 books with a rating of 70. There are no other books on the bookshelf. What is the expected value, to the nearest whole number, of the rating of a book randomly selected from Cameron's bookshelf?

A. 18
B. 60
C. 67
D. 85

22. The 1st term of a certain sequence is −10, and the 2nd term is 1. Each subsequent term is obtained by adding the 2 immediately preceding terms. What is the 5th term of this sequence?

F. −23
G. −17
H. 19
J. 34

GO ON TO THE NEXT PAGE.

DO YOUR FIGURING HERE.

23. Which of the following values is the y-value of the solution to the given system of equations?

$$-4y - 3 = x$$
$$2x - 22 = 6y$$

A. $y = -2\frac{1}{2}$

B. $y = -2$

C. $y = -\frac{3}{4}$

D. $y = 5$

24. Some values of the function g are given in the table. One of the following equations defines g. Which one?

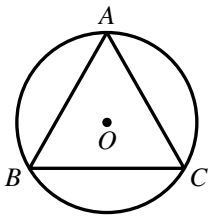
x	-2	0	1	2	3
$g(x)$	0	-8	-6	0	10

F. $g(x) = -2x - 8$
G. $g(x) = -x - 8$
H. $g(x) = x^2 + 2$
J. $g(x) = 2x^2 - 8$

25. The vertex angle of an isosceles triangle is 40°. What is the measure of a base angle?

A. 40°
B. 70°
C. 100°
D. 140°

26. Equilateral triangle $\triangle ABC$ is inscribed in circle O, as shown. What is the degree measure of minor arc $\overset{\frown}{BC}$?



F. 60°
G. 90°
H. 120°
J. 180°

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DO YOUR FIGURING HERE.

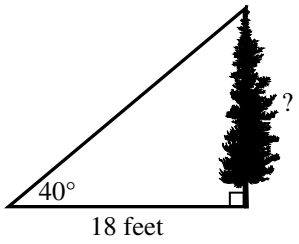
27. A scale model, where 1 coordinate unit represents 1 mile, is drawn in the standard (x,y) coordinate plane. Angelo's house is at (4,–3), Ella's house is at (4,7), Troy's house is at (–2,7), and Yoko's house is at (–2,–3). Which of the following is closest to the area, in square miles, of the rectangle whose vertices are the **real** locations of the 4 houses?

A. 32
B. 36
C. 60
D. 100

28. Let the function f be defined as $f(x) = -9x^2$. In the standard (x,y) coordinate plane, the graph of $y = f(x)$ undergoes a transformation such that the result is the graph of $y = f(x) - 4$. Under this transformation the graph of $y = f(x)$ is:

F. shifted downward 4 coordinate units.
G. shifted left 4 coordinate units.
H. stretched horizontally by a factor of 4.
J. stretched vertically by a factor of 4.

29. Which of the following expressions equals the height, in feet, of the tree shown?



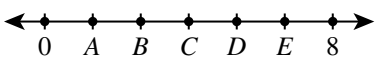
A. 18 tan 40°

B. 18 sin 40°

C. 18 cos 40°

D. $\frac{\tan 40°}{18}$

30. As shown, the number line between 0 and 8 is divided into 6 segments of equal length by points A through E. Which of the following statements about $\sqrt{8}$ is true?



F. $\sqrt{8}$ is at C.
G. $\sqrt{8}$ is at D.
H. $\sqrt{8}$ is between A and B.
J. $\sqrt{8}$ is between B and C.

GO ON TO THE NEXT PAGE.

DO YOUR FIGURING HERE.

31. Deon often flies his kite. He can only fly his kite on days with wind. He does not fly his kite on every day with wind. For any given day, let Event A be that there is wind and let Event B be that Deon flies his kite. Which of the following values can $P(A \text{ and } B)$ be?

A. 0
B. 0.5
C. 1
D. 1.5

32. Whenever $\frac{-3x^3 + 12x}{x^3 - x^2 - 6x}$ is defined, it is equivalent to:

F. -2

G. $\frac{1}{x+3}$

H. $\frac{6-3x}{x+3}$

J. $\frac{6-3x}{x-3}$

33. The roots of a polynomial equation are 0, 2, and -5. Which of the following is a factored form of the equation?

A. $(x-2)(x+5) = 0$
B. $x(x-2)(x+5) = 0$
C. $x(x+2)(x-5) = 0$
D. $(x-2)(x+5) = x$

34. If $\frac{3x-y}{x+y} = \frac{5}{8}$, then $\frac{x}{y} = ?$

F. $\frac{2}{19}$

G. $\frac{13}{19}$

H. $\frac{5}{8}$

J. $\frac{13}{7}$

GO ON TO THE NEXT PAGE.

DO YOUR FIGURING HERE.

35. Let the slope of $3x + 2y = 5$ be m_1, and the slope of $6x + 4y = 7$ be m_2. Which of the following is true?

A. $m_1 = m_2$
B. $m_1 = 2m_2$
C. $2m_1 = m_2$
D. $7m_1 = 5m_2$

36. The piecewise functions f and g are given.

$$f(x) = \begin{cases} -x^2 & \text{for } x < 0 \\ 1 - x & \text{for } x \geq 0 \end{cases}$$

$$g(x) = \begin{cases} |x| + 7 & \text{for } x \leq -1 \\ x - 3 & \text{for } x > -1 \end{cases}$$

What is the value of $f(g(-1))$?

F. −16
G. −7
H. −5
J. −1

37. Let f be defined by $f(x) = 4x + 7$. Let g be defined by $g(x) = -2x^2 + 11x + 1$. The graphs of $y = f(x)$ and $y = g(x)$ intersect at one of the following (x,y) points. Which one?

A. (−2,−1)
B. $\left(1\frac{1}{2},13\right)$
C. $\left(2,1\frac{1}{2}\right)$
D. (13,−1)

38. A tourism organization randomly selected 100 tourists finishing their summer visit to Spain. The organization asked them how many cities they had toured in the country. The table shows the results. Based on these data, for the population of tourists that visited Spain during the summer, what is the best estimate of the mean number of cities toured?

Number of cities	1	2	3
Number of tourists	10	40	50

F. 0.8
G. 2
H. 2.4
J. 3

GO ON TO THE NEXT PAGE.

DO YOUR FIGURING HERE.

39. Given that i is the imaginary unit, which of the following numbers is equal to $(7 + 4i)^2$?

A. 33
B. 65
C. $14 + 8i$
D. $33 + 56i$

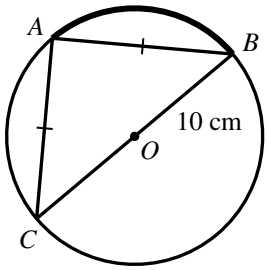
40. The product of 2 complex numbers, x and y, is a real number that is irrational. Which of the following statements **cannot** be true?

F. Both x and y are rational.
G. Both x and y are imaginary.
H. The product of x and y is $\sqrt{2}$.
J. The product of x and y is negative.

41. The real solution of the equation $3e^x = 12$ is:

A. $\ln 4$
B. $3 \ln 12$
C. 4^e
D. $\frac{\ln 12}{3}$

42. The figure shows $\triangle ABC$, a right isosceles triangle, inscribed in a circle with center O and radius 10 cm. What is the length, in centimeters, of arc $\overset{\frown}{AB}$ shown as the thick curved line?



F. 20π
G. 15π
H. 10π
J. 5π

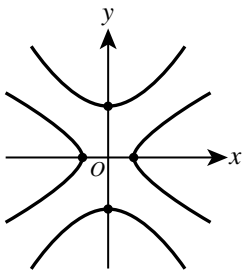
43. It took Sam x minutes to bike the d miles from home to work. Returning home on the same route, it took Sam y minutes. On the way home his average speed was 2 times his average speed on the way to work. Which of the following equations gives y in terms of x?

A. $y = \frac{x}{2}$
B. $y = x - 2$
C. $y = x + 2$
D. $y = 2x$

GO ON TO THE NEXT PAGE.

DO YOUR FIGURING HERE.

44. The hyperbolas $\frac{x^2}{9} - \frac{y^2}{4} = 1$ and $\frac{y^2}{36} - \frac{x^2}{25} = 1$ are graphed in the standard (x,y) coordinate plane. Which of the following equations is an ellipse that intersects all 4 vertices of the hyperbolas?



F. $\frac{x^2}{9} + \frac{y^2}{36} = 1$

G. $\frac{x^2}{25} + \frac{y^2}{4} = 1$

H. $\frac{x^2}{25} + \frac{y^2}{9} = 1$

J. $(x - 9)^2 + (y - 36)^2 = 1$

45. Given that $f(x) = \sqrt[3]{2x - 1}$, which of the following expressions is the inverse function, $f^{-1}(x)$?

A. $\frac{1}{\sqrt[3]{2x - 1}}$

B. $\sqrt[3]{\frac{x + 1}{2}}$

C. $\frac{x^3 + 1}{2}$

D. $(2x - 1)^3$

END OF TEST 2

STOP! DO NOT TURN THE PAGE UNTIL TOLD TO DO SO.

DO NOT RETURN TO THE PREVIOUS TEST.

READING TEST

40 Minutes—36 Questions

DIRECTIONS: There are several passages in this test. Each passage is accompanied by several questions. After reading a passage, choose the best answer to each question and fill in the corresponding oval on your answer document. You may refer to the passages as often as necessary.

Passage I

LITERARY NARRATIVE: Passage A is from the essay "A Windstorm in Downtown Brooklyn" by Robert Sullivan, and Passage B is from the essay "Down the Manhole" by Elizabeth Gaffney, both from the collection *Brooklyn Was Mine*, edited by Chris Knutsen and Valerie Steiker (©2008 by Chris Knutsen and Valerie Steiker).

Passage A by Robert Sullivan

The Hebrew word for wind is also the Hebrew word for spirit, *ruah*, and when I look at the wind I look at something immeasurable, spiritlike, a climactic feature of a soul or souls. Try as I may, I still can't predict the wind in downtown Brooklyn, nor can I even imagine how the wind blew when Walt Whitman stepped out on the corner of Cranberry Street that is no longer there, or how it will feel when downtown Brooklyn is redeveloped, or "utilized." I can feel it though. Especially I can feel the vortex, which draws me, calls to me. When it is windy elsewhere in New York or the world and I am far from the vortex, I think of it, imagine the swirl. Often I walk my daughter, who is eleven, through the vortex on her way back and forth to school, even though it's a little out of our way—after years of forced wind-watching, her older brother walks alone now, noticing, I hope, the wind on his own. On Saturday mornings, if we go to the farmer's market, we buy doughnuts and cider and sit on the benches in Columbus Park at the steps of Borough Hall, and wait and see what the wind will blow up. We face the Court-Montague Building and a London plane tree whose branches are notable among Brooklyn trees for their lack of plastic shopping bags. The wind rips the bags away.

Six years ago, I was with my son, who was ten at the time, and we were on our way to his school when I saw an entire stack of newspapers go up into the air, a trashy celebration! We were on Court Street, just about to the corner of Montague, when we passed a newsstand. The man selling the papers was doing a pretty good job holding down copies of the *Times* and the *Post* considering he had the not-so-good idea of setting up a newsstand inside the vortex, but he was having trouble with the *Daily News*, which eventually escaped, almost the whole stack, and was then whipped quickly and frantically into the vortex. In a second, the corner of Court and Montague had headlines all over it, the pages doing flip-flops, and then floating out into the street. In another second the sheets of paper began flying up, up, up. My son and I stepped back from the building and waited and watched as, at last, one sheet slowly climbed all forty-two stories of the Court-Montague Building. (A couple of days later, the newsstand relocated two blocks away.)

Passage B by Elizabeth Gaffney

My parents, as artists, were eager to have their children out discovering beauty in the pedestrian, complexity in the mundane, and they understood child psychology pretty well. Looking for these things underfoot, where few expected to find anything of value, was just the right kind of fun and worked better than yet another trip to the MoMA. We didn't have to behave. We were allowed, nay required, to touch. My parents believed that embedding beautiful designs in the asphalt and the sidewalks was a quintessentially democratic, political act. When we went out, we considered not just manhole covers but fire hydrants, alarm boxes, street and traffic lights, signage. They were interested in urban renewal and preservation, and so the ideas of street furniture and the livability of the street were important to them. We rated what we saw, and talked about why we did or didn't like it. To me, the very idea of street furniture was thrilling—it conjured images of nestling in the cushions of imaginary street-corner sofas and jumping on nonexistent double beds. My mother in particular was also a history buff, and so the connection of the manhole covers to Brooklyn's past was important. Most of them were old; we tried to figure out exactly how old from the names on them and the wear they had undergone. Some were rubbed so smooth there was nothing to make a rubbing of, and my mind boggled to think of the forces that could scrape such heavy metal down to nothing. When my mother explained that the metal wheels of horse-drawn vehicles wore the street down harder than modern rubber tires filled with air, I was catapulted into a new understanding of a previous era. The past had never seemed very believable to me, until then. People might have gone around riding horses and wearing bonnets somewhere out West, say where *Little House on the Prairie* had transpired, but not on the streets I inhabited. But thanks to manhole covers and several stretches of street still paved with Belgian blocks, not asphalt—also pointed out by my mother—I could suddenly fathom that Brooklyn had been something different once too. History had happened here.

GO ON TO THE NEXT PAGE.

1. In the context of Passage A, the event described in the second paragraph (lines 26–45) most nearly serves to:

- **A.** provide an anecdote that illustrates the power of the wind in Brooklyn.
- **B.** describe the newspaper seller's amusement as the papers were tossed about by the wind.
- **C.** recount an experience that left the narrator wary of the wind in Brooklyn.
- **D.** suggest that there are areas of Brooklyn that are intolerable because of the wind.

2. Which of the following statements best captures how the narrator of Passage A feels about the way his children might perceive the Brooklyn wind?

- **F.** He suspects the wind annoys them and assumes they take measures to avoid it.
- **G.** He hopes they share his interest in the wind and seek it out themselves.
- **H.** He feels they don't appreciate the wind or other facets of nature as much as they should.
- **J.** He hopes they notice how calm Brooklyn can be when the wind is not blowing.

3. According to the narrator of Passage A, the branches of the London plane tree near the Court-Montague Building are notable for:

- **A.** their exceptional length and graceful shape.
- **B.** the fact that they don't have plastic shopping bags clinging to them.
- **C.** the sound they make when the wind whips through them.
- **D.** their ability to provide shade for the nearby farmer's market.

4. According to the narrator of Passage B, some manhole covers she encountered as a child were rubbed smooth partly because of:

- **F.** the metal-wheeled vehicles of Brooklyn's past.
- **G.** urban renewal projects over many decades.
- **H.** road resurfacing methods that were unduly destructive.
- **J.** centuries of foot traffic at Brooklyn's intersections.

5. It can reasonably be inferred from Passage B that one result of the excursions the narrator took around Brooklyn with her mother was the narrator's:

- **A.** lifelong commitment to urban renewal and preservation.
- **B.** increased appreciation for the history of other American cities.
- **C.** fuller notion of what her city was like during different eras.
- **D.** decision to expose her own children to art museums.

6. Both passages are told from the point of view of narrators who:

- **F.** grew up learning about Brooklyn from their parents.
- **G.** try to imagine how Brooklyn might be perceived by tourists.
- **H.** illustrate their relationship with Brooklyn through family experiences.
- **J.** were raised in Brooklyn but have since gone on to live in other cities.

7. The tone of both passages can best be described as a combination of:

- **A.** humor and relief.
- **B.** doubt and hesitancy.
- **C.** introspection and regret.
- **D.** wonder and nostalgia.

8. Which of the following quotations from Passage B is most closely related to the themes in Passage A?

- **F.** "My parents, as artists, were eager to have their children out discovering beauty in the pedestrian, complexity in the mundane" (lines 46–48).
- **G.** "We didn't have to behave" (line 52).
- **H.** "My parents believed that embedding beautiful designs in the asphalt and the sidewalks was a quintessentially democratic, political act" (lines 53–56).
- **J.** "To me, the very idea of street furniture was thrilling" (lines 62–63).

9. The reference to Cranberry Street in Passage A and the reference to streets paved with Belgian blocks in Passage B both serve to:

- **A.** evoke historical details in order to provide a better understanding of Brooklyn.
- **B.** argue that history tends to be more appealing to adults than to children.
- **C.** illustrate how difficult it is to unearth details about Brooklyn's past.
- **D.** suggest that living in Brooklyn was more rewarding in certain historical eras than it is now.

GO ON TO THE NEXT PAGE.

Passage II

INFORMATIONAL: This passage is from the book *Welcome to Subirdia: Sharing Our Neighborhoods with Wrens, Robins, Woodpeckers, and Other Wildlife* by John M. Marzluff (©2014 by John M. Marzluff).

Do not covet your neighbor's lawn. Having a "perfect" lawn is an original sin of most Americans. Our love of lawn is rooted in our history as a former British colony, and perhaps even in our evolution on short-grass savannahs, where ancestral hominids found safety from predators. I mowed lawns for a living as a kid. So did my brothers and most of our friends. When we weren't cutting them, we played or relaxed on them. Frederick Law Olmsted, the father of suburbia, espoused the value of lawns as giving his neighborhoods a "sense of ampleness, greenness, and community." Many suburbanites foster lawns to boost the value of their homes, as safe havens for their kids, or as firebreaks. Some see lawns as art, as proof of our domination over nature, or as a way to gain prestige among their neighbors. Whatever the reason, most ecologists agree that the ubiquity of the lawn has outstripped its benefits. Domination of suburbia by lawn constrains the diversity of birds that could be supported. Robins, starlings, crows, wagtails, oystercatchers, and a few other birds forage in lawns, but to my knowledge, not a single species of bird, mammal, reptile, or amphibian reproduces and carries out its other life functions in the modern lawn.

In 2005, 2 percent of the coterminous United States, some forty million acres of land, was lawn. Nearly every bit was composed of only a few nonnative grass species. These invaders are regularly mowed to a low, even height and kept continuously green and free of weeds and pests. To maintain this sea of grass Americans annually spend $30 billion. They use eight hundred million gallons of gas, seven billion gallons of water, three million tons of nitrogen fertilizer, and thirty thousand tons of pesticide. The use of pesticides alone is ten times greater than used by the average farmer and includes chemicals that disrupt normal hormone function and reproduction, are suspected to cause cancer, and are banned in other countries. Simply filling up gas-powered lawnmowers is an ecological disaster of the highest order; seventeen million gallons of gas are spilled annually.

Concern about lawns has sparked a great deal of debate, creative thought, and neighbor-to-neighbor strife. In 1991, a savvy group of graduate students and faculty from Yale University's School of Forestry and Environmental Studies joined their colleagues in the School of Art and Architecture to consider how Americans could redesign their lawns. The resulting book details the history of lawns and charts a plan for those who wish to follow the first commandment. Lawn owners can increase bird use of their turf by reducing its extent, bordering it with shrubs, shading it with trees, mowing it with hand- or electric-powered machines, and skipping the fertilizers and pesticides. Doing this produces what the students and faculty refer to as a "Freedom Lawn." The plant composition of such lawns diversifies into a rich mix of grasses, forbs, and flowers pollinated and grazed by native, beneficial insects, which in turn are eaten by birds and other animals.

The less often a lawn is mowed, the more likely it is to be used by an array of animals. A less-disturbed lawn will attract goldfinches to ripe dandelion seeds, provide nest sites under tussocks for juncos and sparrows, and harbor frogs, turtles, and small mammals such as moles and voles.

Those who adopt Freedom Lawns buck a multinational industry heavily invested in producing seed, sod, fertilizer, pesticide, irrigation and lawn equipment, and service for those twenty-six million American homes that contract out their lawn care. But the pressure to conform is often more immediate. Neighbors who tolerate shaggy lawns are often thought of as laggards, negligent of their civic duty. As Michael Pollan, author of *The Omnivore's Dilemma,* notes: "That subtle yet unmistakable frontier, where the crew-cut lawn rubs up against a shaggy one, is a scar on the face of suburbia—an intolerable hint of trouble in paradise."

From the book *Welcome to Subirdia: Sharing Our Neighborhoods with Wrens, Robins, Woodpeckers, and Other Wildlife* by John M. Marzluff (©2014 by John M. Marzluff, reproduced with permission of Yale University Press).

10. The third paragraph (lines 42–60) marks a shift in the passage from:

- **F.** an argument that condemns the modern lawn to a counterargument that focuses on its benefits.
- **G.** an explanation of the drawbacks of the modern lawn to a description of a more environmentally friendly alternative to it.
- **H.** a history of the popularity of lawns to a description of typical features of the modern lawn.
- **J.** an overview of a debate between homeowners and environmentalists about the purpose of lawns to a plea for homeowners to stop mowing.

11. Based on the passage, who would most fully endorse the claim that lawns are particularly valuable for creating wide-open areas of green space that foster a feeling of community?

- **A.** The Yale graduate students and faculty mentioned in the passage
- **B.** The passage author
- **C.** Olmsted
- **D.** Pollan

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12. What reason does the passage author give to bolster his claim that "domination of suburbia by lawn constrains the diversity of birds that could be supported" (lines 18–19)?

- **F.** Robins, starlings, crows, wagtails, and oystercatchers make use of lawns.
- **G.** The ubiquity of the lawn has outstripped its benefits.
- **H.** Birds don't carry out any life functions in the modern lawn other than foraging.
- **J.** Some people see lawns as a way to gain prestige.

13. The passage most strongly suggests that the gradual diversification of plant composition in a Freedom Lawn leads to:

- **A.** native, beneficial insects being drawn to the lawn.
- **B.** native plants spreading to areas several miles away from the lawn.
- **C.** birds enjoying the nest sites that humans have constructed within the lawn.
- **D.** one or two plants becoming dominant in the lawn.

14. The passage author most strongly suggests that American homeowners who grow shaggy lawns likely feel the most immediate pressure from which of the following circumstances?

- **F.** The awareness that their actions might lead to corporate losses
- **G.** The wasted expense of the lawn equipment they already own
- **H.** The need to cancel their lawn care service
- **J.** The disapproval of their neighbors

15. The main point of the last paragraph (lines 67–78) is that:

- **A.** adopting a Freedom Lawn can arguably be a bold political and social act.
- **B.** the biggest benefit of adopting a Freedom Lawn is being able to buck a multinational industry.
- **C.** a neighborhood takes on a carefree feel when homeowners adopt a Freedom Lawn.
- **D.** it isn't logical to reject civic duty simply for the sake of adopting a Freedom Lawn.

16. The passage author includes the quotation by Pollan (lines 75–78) mainly to:

- **F.** explain why some neighbors gladly accept other neighbors' shaggy lawns.
- **G.** cautiously suggest that suburbanites often refuse to perform their civic duties.
- **H.** slightly mock the suburban ideals that have led to the proliferation of the modern lawn.
- **J.** illustrate how appealing a shaggy lawn looks next to a perfectly mowed lawn.

17. What evidence, if accurate, would best support the passage author's claim that "our love of lawn is rooted in our history as a former British colony" (lines 2–4)?

- **A.** Kentucky bluegrass, native to several countries, is a common species of grass for lawns in the United States.
- **B.** For generations in Britain, a trimmed lawn was a popular status symbol, showing that a homeowner could afford to own land that was not farmed.
- **C.** Many of the first lawns in Britain were sculpted to include low mounds where people could sit, though these makeshift benches were rarely used.
- **D.** Front lawns became popular in the United States in the 1930s, when lawn maintenance became easier.

18. Which of the following lists captures features of a Freedom Lawn as it is described in the passage?

- **F.** Formed of native and nonnative grasses, shaded by trees, large in size
- **G.** Treated with pesticides, bordered by trees, limited in size
- **H.** Unshaded, bordered by short grasses, mowed with a hand-powered mower
- **J.** Bordered by shrubs, unfertilized, shaded by trees

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Passage III

INFORMATIONAL: This passage is adapted from the article "Spiders: Web of Intrigue" by Katherine Bourzac (©2015 by Springer Nature). The graphic is adapted from the article "Spider Silk–Inspired Artificial Fibers" by Jiatian Li et al. (©2021 The Authors, Wiley-VCG GmbH).

A Madagascan bark spider releases a silk dragline into the air. The wind carries the thin threads to the other side of a river, where they land on foliage on the opposite bank 25 metres away. The bark spider (*Caerostris darwini*) then stretches the bridgeline to establish tension, reinforces it, and draws on a palette of other silks, stretchier or stickier as needed, to fashion a web to capture the bugs flying over the water.

C. darwini's bridging silk is the world's toughest known biomaterial—it is even tougher than steel fibre. But *C. darwini*'s versatility in producing different kinds of silk is not unique. Many spiders can spin several silks: stiff, structural strands to stabilize their webs; gooey, stretchy spirals to capture flying insects; adhesive pads to anchor their homes in place; and extraordinarily robust draglines from which to hang.

The remarkable mechanical properties of these natural fibres have attracted the attention of materials scientists. Researchers are looking to arachnids and other silk makers for ideas about how to make new structural materials for bridges and vehicles, dirt-resistant adhesives for climbing robots and sturdy polymers for biomedical devices. Many silks bring together properties that are not readily present in man-made materials—the extreme toughness and elasticity seen in spider threads is one example. Silk proteins can be moulded like plastic or perform optical functions like silicon. Yet because they're organic, biological materials, silks are environmentally friendly and biocompatible. Silk proteins can be fashioned into films that can be implanted in the body, releasing drugs as they dissolve. This combination of features is unavailable in polyester or collagen or anything else, says David Kaplan, an early proponent of high-tech biomedical silk at Tufts University in Medford, Massachusetts. "There's clearly a need for new biomaterials," he says. For Kaplan and others, silk is the best way to meet that need.

Silk evolved independently in many invertebrates, including spiders, honeybees and silkworms. Individual spiders can make as many as six different kinds of silk proteins (and two glue proteins), each of which has evolved over the creatures' 400 million years of natural history. Each spider species uses its own variations of these proteins to make many different types of thread.

"We think that a primordial spider had one kind of silk, and then there were multiple events when the gene duplicated and evolved," says Cheryl Hayashi, a spider specialist at the University of California, Riverside. The species that are more closely related to these ancestors, such as tarantulas and trapdoor spiders, make silks of simple designs—messy tangles to trap walking insects, for example, using fewer types of silk. Other spiders evolved to make more complex spiralling orb webs, in which different regions are composed of different kinds of silk—some optimized for capturing prey, others for structural support of large web designs.

This evolutionary bounty has happy implications for engineers looking to put spider silk into human service. If a design calls for a fibre with a particular ratio of strength to stretchiness, "it's probably already been invented" by one of the tens of thousands of types of spider, says Hayashi.

Most research has centred on taking advantage of the toughness of spider silk—in materials science, toughness is a measure of how much energy it takes to break something. Materials such as spider silk are both strong and elastic. A large insect that flies into a spiderweb at top speed stretches the superfine fibres in the web but does not break them.

The toughest silks are found in spider draglines, which researchers are studying intensely. Spiders use draglines to dangle safely, to make the frames of their webs, and for situations in which resistance to breakage is paramount. In a scene from the 2004 movie *Spider-Man 2*, the eponymous superhero stops a runaway New York City subway train with his webbing, which is not too far of a stretch from reality.

Mechanical Properties of Natural and Synthetic Fibers

Material	Strength (GPa[‡])	Elasticity (%)	Toughness (MJ/m^3[§])
Bark spider MA silk*	1.6	52	354
Silver garden spider flag silk[†]	0.095	465	75
Domestic silkworm silk	0.6	18	70
Nylon fiber	0.95	18	80
Kevlar 49 fiber	3.6	2.7	50
Carbon fiber	4	1.3	25
High-tensile steel fiber	1.5	0.8	6

*MA silk: non-sticky; used to make draglines and bridgelines and to anchor webs

[†]flag silk: sticky; used to capture prey in webs

[‡]gigapascal

[§]megajoule per cubic meter

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19. In the context of the passage, the main function of the first paragraph (lines 1–8) is to:

- **A.** provide an overview of the internal process that enables spiders to produce different types of silk.
- **B.** illustrate the strength and versatility of spider silks by describing how one particular spider uses its silks to create a web.
- **C.** introduce the idea that spiders are resourceful by describing the obstacles they encounter when producing silks for their webs.
- **D.** point out that the properties of silks made by spiders are similar to those of silks made by other animals.

20. According to the passage, how does the bark spider establish tension in its bridgeline?

- **F.** It drops the bridgeline into water.
- **G.** It reinforces the bridgeline with silk.
- **H.** It adds dirt to the bridgeline.
- **J.** It stretches the bridgeline.

21. In the context of the passage, the statement in lines 11–12 can best be described as:

- **A.** a claim asserted by several researchers but contradicted by the passage author.
- **B.** a fact the passage author supports by citing the variety of silks other spiders can produce.
- **C.** a reasoned judgment based on the passage author's understanding of how spiders produce silks.
- **D.** an opinion the passage author presents but offers no support for.

22. According to the passage, how many different kinds of silk proteins can an individual spider make?

- **F.** No more than two
- **G.** As many as six
- **H.** More than twenty-five
- **J.** About four hundred

23. It can reasonably be inferred from the passage that the author uses the word *stretch* (line 78) mainly to:

- **A.** reinforce an idea in the passage with a humorous play on words.
- **B.** emphasize the elaborate nature of some spiderwebs.
- **C.** suggest the passage's representation of spiderwebs may be slightly exaggerated.
- **D.** criticize the movie's lack of authenticity.

24. Based on lines 65–67 and the table, which of the following statements is accurate?

- **F.** High-tensile steel fiber requires much less energy to break than the bark spider's silk does.
- **G.** Only the silver garden spider's flag silk requires more energy to break than the domestic silkworm's silk does.
- **H.** Synthetic fibers like Kevlar 49 require much more energy to break than natural fibers like silk do.
- **J.** Nylon fiber requires the same amount of energy to break as carbon fiber does.

25. Based on the passage and the table, does the information in the table support the passage's claim about how the bark spider's silk compares to steel fiber?

- **A.** Yes, because while the table indicates the bark spider's silk is not as strong as steel fiber, the bark spider's silk is slightly tougher.
- **B.** Yes, because the table indicates the toughness of the bark spider's silk far exceeds the toughness of steel fiber.
- **C.** No, because the table indicates the toughness of steel fiber is approximately the same as the toughness of the bark spider's silk.
- **D.** No, because the table indicates steel fiber is tougher than the bark spider's silk.

26. Based on the table, which of the following pairs of materials are most different in terms of elasticity?

- **F.** Silver garden spider flag silk and high-tensile steel fiber
- **G.** Silver garden spider flag silk and Kevlar 49 fiber
- **H.** Domestic silkworm silk and nylon fiber
- **J.** Kevlar 49 fiber and carbon fiber

27. According to the table, compared to the silver garden spider's flag silk, the domestic silkworm's silk has:

- **A.** less strength and less elasticity.
- **B.** greater toughness and greater strength.
- **C.** greater strength but less toughness.
- **D.** less strength but greater elasticity.

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Passage IV

INFORMATIONAL: This passage is from the article "Native American Film outside the Margins of Filmmaking" by Beverly R. Singer (©2014 by University of Nebraska Press).

To manifest oneself as a filmmaker evokes such traditional professional titles as lawyer, doctor, engineer, writer, teacher, and plumber, where established institutional access is built on hierarchy and where acceptance into the profession opens opportunities for employment. One of those doors of access to filmmaking was opened to Native Americans in an exchange that took place at the Sundance Film Festival in 1997. Along with other Native filmmakers, including actor and producer Gary Farmer (Cayuga), I was invited that year to the festival to screen our productions. While there, we were invited to a consultation with the Sundance Institute executive staff to discuss how to enhance and improve the production of Native-made films to make them competitive with any film in the program. Robert Redford, founder of the Sundance Institute and Sundance Film Festival, was not present at that meeting, but we were told he was aware of it. When asked how the Sundance Institute could help improve the participation of Native American films at the Sundance Festival, we found the conversation wavering from helping to fund filmmakers, to the need for professional training and support for distribution of films.

Of most interest to me during the meeting was the discussion of the quality of films produced by Native American filmmakers. In evidence was a demonstration of the power held by the Sundance Festival to promote films that fit specific aesthetic preferences and expectations by festival audiences comprised of film critics, entrepreneurs, and Hollywood "types." To that end, Native American films had not yet achieved that appeal, but executive staff members thought it was possible. Hearing the familiar phrase "We really do want Native American participation," I instinctively sensed that little progress would be made toward "improving" Native filmmaking efforts if we did not become part of the system that made decisions. Maybe it was the timing, the place, or a release of the spirit of true collaboration that led me to say, "If we are to be taken seriously and respected, we need to be at the table helping to make decisions at the Sundance Institute's headquarters where you plan programs and decide policy." I suggested that the Sundance Institute hire a Native American as a key staff member to help identify and promote Native filmmaking, someone who could work from the inside and be at the table where decisions were made. The first Native American staff member, Heather Rae (Cherokee), was hired in that capacity by the Sundance Institute, which led to her own successful film production work.

Progress on behalf of Native filmmaking by the Sundance Institute through its production labs provided initial support for the production of *Smoke Signals* (1998), as noted by Joanna Hearne in her critical study of *Smoke Signals: Native Cinema Rising*. Hearne endorses *Smoke Signals* as a major event:

> The film can be seen as a landmark "first" in American film history—although it is important to remember the long history of Native filmmaking that came before *Smoke Signals*—and it can also be seen as a self-positioned first introduction to Native perspectives and Native filmmaking for many of its viewers. . . . As an intervention, *Smoke Signals* challenges widely accepted misconceptions about Native Americans. Its "firsts" can be seen in different ways as inaugurating a new generation of Native film production; as an important but also problematic industry marketing category; as part of a critical paradigm based on sovereignty; and as a strategic creation of politicized space for Indigenous identity in the public mediascape. (xv–xvi)

Hearne's extensive review and close readings of the film's production and major players, including the film's scriptwriter, Sherman Alexie, and film director, Chris Eyre, revives the energy surrounding the theatrical release of *Smoke Signals*. I endorse Hearne's willingness to take up the study years after the film's release, but I have to ask, "What is the second act for Native cinema?" Hearne's full attention to *Smoke Signals* is a combination of personal stories about the scripting and directorial decision-making processes and the actors' contributions; moreover, her critical discussion carefully articulates what cultural elements, including pop and Native culture, produced the film's crossover appeal to audiences on multiple levels.

Although the film's glow has receded somewhat, the direction of Native American filmmaking has led to measurable success and growth internationally.

28. It can reasonably be inferred that the passage author viewed the Sundance executives' claim in lines 34–35 as:

- **F.** a signal that the meeting would be productive.
- **G.** a long-overdue promise that would result in more support for Native films.
- **H.** evidence that the executives favored Native films over conventional "Hollywood" films.
- **J.** an assurance that, while well-meaning, felt hollow.

29. The passage author indicates that in order to become more active participants in the Sundance Festival, Native filmmakers were most in need of:

- **A.** greater funding for the production of big-budget Native films.
- **B.** a decision-making voice within the Sundance Institute.
- **C.** training in the Sundance Institute's film promotional practices.
- **D.** an opportunity to screen Native films internationally.

30. Which of the following statements best summarizes the excerpt from Hearne in lines 58–74?

- **F.** *Smoke Signals* grapples with themes of Native identity and was created to reach younger generations of Native Americans.
- **G.** Native films like *Smoke Signals* are important because they are marketed in the mainstream film industry.
- **H.** *Smoke Signals* is one film in a long line of Native films but was revolutionary in its presentation of Native Americans and advancement of Native filmmaking.
- **J.** Those who view *Smoke Signals* as a landmark Native film in American film history often forget Native films' long history and impact on American cinema.

31. Based on the passage, the passage author would most likely agree that Hearne's review of *Smoke Signals*:

- **A.** helped promote the film during its first release.
- **B.** tried to cover too many aspects of the film.
- **C.** came too late to be meaningful.
- **D.** is both thorough and insightful.

32. According to the passage, in their 1997 meeting with Native filmmakers, Sundance executives were primarily interested in making Native films:

- **F.** competitive with other films promoted by the Sundance Institute.
- **G.** more artistically inventive than films featured at other festivals.
- **H.** an integral part of the Sundance Institute's initiative to reinvent its brand.
- **J.** adaptable to various formats to allow for easy distribution.

33. The passage author describes the conversation between Native filmmakers and Sundance executives as "wavering" (line 22) primarily to make clear that, up to that point, the meeting had:

- **A.** been poorly managed and was behind schedule.
- **B.** inspired deliberation and debate among the filmmakers.
- **C.** become awkward due to the executives' reluctance to include more Native films in the festival.
- **D.** meandered in topic and somewhat lacked focus.

34. As it is used in line 28, the phrase *held by* most nearly means:

- **F.** wielded by.
- **G.** within reach of.
- **H.** perceived of.
- **J.** supported by.

35. It can reasonably be inferred from the passage that the Sundance Institute's decision to hire someone like Rae was the result of a suggestion from:

- **A.** Farmer.
- **B.** Alexie.
- **C.** the passage author.
- **D.** a Sundance executive.

36. In the context of the passage, the main purpose of the last paragraph (lines 89–91) is to:

- **F.** revisit the success *Smoke Signals* experienced at its release.
- **G.** note the success within Native American filmmaking since the release of *Smoke Signals*.
- **H.** illustrate the measurable growth of international films similar to *Smoke Signals*.
- **J.** highlight the powerful role the Sundance Festival played in producing *Smoke Signals*.

END OF TEST 3

STOP! DO NOT TURN THE PAGE UNTIL TOLD TO DO SO.

DO NOT RETURN TO A PREVIOUS TEST.

SCIENCE TEST

40 Minutes—40 Questions

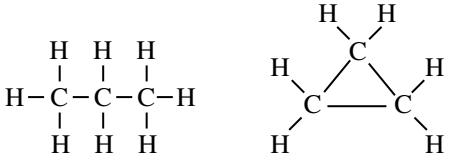
DIRECTIONS: There are several passages in this test. Each passage is followed by several questions. After reading a passage, choose the best answer to each question and fill in the corresponding oval on your answer document. You may refer to the passages as often as necessary.

You are **not** permitted to use a calculator on this test.

Passage I

Alkanes are chemical compounds consisting of only carbon and hydrogen atoms. Two types of alkanes are *n*-alkanes (molecules in which the carbon atoms are bonded together to form a chain) and cycloalkanes (molecules in which the carbon atoms are bonded together to form a ring). Figure 1 shows an example of an *n*-alkane and an example of a cycloalkane.

Figure 1



n-alkane cycloalkane

Table 1 shows, for each of 7 *n*-alkanes, the name, chemical formula, melting point (MP) at 1 atmosphere (atm) of pressure, and boiling point (BP) at 1 atm.

Table 1

Alkane	Chemical formula	MP (°C)	BP (°C)
Propane	C_3H_8	–187	–42
Butane	C_4H_{10}	–138	–1
Pentane	C_5H_{12}	–130	36
Hexane	C_6H_{14}	–95	69
Heptane	C_7H_{16}	–91	98
Octane	C_8H_{18}	–57	126
Nonane	C_9H_{20}	–53	151

Table 2 shows, for each of 7 cycloalkanes, the name, chemical formula, MP at 1 atm, and BP at 1 atm.

Table 2

Alkane	Chemical formula	MP (°C)	BP (°C)
Cyclopropane	C_3H_6	–128	–31
Cyclobutane	C_4H_8	–91	13
Cyclopentane	C_5H_{10}	–93	49
Cyclohexane	C_6H_{12}	7	81
Cycloheptane	C_7H_{14}	–8	119
Cyclooctane	C_8H_{16}	15	151
Cyclononane	C_9H_{18}	11	173

1. According to Table 2, at 1 atm, what is the BP of the alkane with the chemical formula C_5H_{10}?

A. –130°C
B. –93°C
C. 36°C
D. 49°C

2. For the *n*-alkanes listed in Table 1, as the number of carbon atoms per molecule increases, the BP at 1 atm:

F. increases only.
G. decreases only.
H. increases and then decreases.
J. decreases and then increases.

GO ON TO THE NEXT PAGE.

3. At 1 atm, how many of the cycloalkanes listed in Table 2 have an MP above the MP of ice?

A. 1
B. 3
C. 4
D. 7

4. Based on Tables 1 and 2, what is the name of the *n*-alkane shown in Figure 1, and what is the name of the cycloalkane shown in Figure 1?

F. *n*-alkane: propane
Cycloalkane: cyclopropane

G. *n*-alkane: propane
Cycloalkane: cyclobutane

H. *n*-alkane: butane
Cycloalkane: cyclopropane

J. *n*-alkane: butane
Cycloalkane: cyclobutane

5. Based on Table 2, in a molecule of any given cycloalkane, the number of hydrogen atoms is always equal to:

A. half the number of carbon atoms.
B. the number of carbon atoms.
C. twice the number of carbon atoms.
D. four times the number of carbon atoms.

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Passage II

Star formation begins with the gravitational collapse of matter in an interstellar gas cloud. A protostar (forming star) affects gas in the surrounding portions of the cloud in 2 ways:

- The protostar's gravitational field attracts gas, causing the gas to accrete (accumulate onto the protostar).
- Radiation pressure (RP) associated with the protostar's emissions causes gas to be pushed away from the protostar, inhibiting accretion.

Star formation ends when the effect of RP overcomes that of gravity. At that point, the protostar can no longer gain mass by accretion and is considered a fully formed star.

Three scientists debate whether the maximum mass that a protostar can reach by accretion is great enough to account for the most massive stars observed.

Scientist 1

The effect of RP is uniform in all directions around a protostar. As a result, the maximum mass that a protostar can reach by accretion is 20 M_S (1 M_S = mass of the Sun). Any further increase in mass requires at least 1 stellar merger (the combination of 2 or more fully formed stars into 1). Because stars tend to form in clusters, stellar mergers are likely.

Scientist 2

Scientist 1 is correct that stellar mergers are likely. However, because a protostar rotates about its axis, a disk of gas forms in the plane of the protostar's equator. This reduces the effect of RP in that plane, allowing gas from the disk to readily accrete. As a result, the maximum mass that a protostar can reach by accretion is 40 M_S. Any further increase in mass requires at least 1 stellar merger.

Scientist 3

Stellar mergers are very unlikely given the vast distances between stars, even within clusters. Scientist 2 is correct about the formation and the effect of the disk. In addition, a protostar produces bubble-like regions of radiation that increase the effect of RP near the protostar's poles, promoting the flow of gas into the disk. As a result, accretion continues until the surrounding portions of the cloud are nearly depleted of gas. Therefore, the maximum mass that a protostar can reach by accretion is limited only by the amount of available gas.

6. Relative to the center of the protostar, does gravity more likely accelerate gas particles inward or outward, and does RP more likely accelerate gas particles inward or outward?

F. Gravity: inward
RP: inward

G. Gravity: inward
RP: outward

H. Gravity: outward
RP: inward

J. Gravity: outward
RP: outward

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7. Based on Scientist 2's argument, do gas particles more likely accrete near the equator or near the poles of a protostar with a disk?

A. Near the equator, because the effect of RP is increased there.
B. Near the equator, because the effect of RP is reduced there.
C. Near the poles, because the effect of RP is increased there.
D. Near the poles, because the effect of RP is reduced there.

8. One of the most massive stars known is Eta Carinae, which has an approximate mass of 120 M_S. Based on the arguments of Scientists 1, 2, and 3, respectively, what is the **minimum** number of stars, each formed entirely by accretion, that would have been required to form Eta Carinae?

F. Scientist 1: 5
Scientist 2: 3
Scientist 3: 1

G. Scientist 1: 5
Scientist 2: 4
Scientist 3: 2

H. Scientist 1: 6
Scientist 2: 3
Scientist 3: 1

J. Scientist 1: 6
Scientist 2: 4
Scientist 3: 2

9. When the effect of RP overcomes that of gravity, a star is said to have "emerged from its envelope," because that is the first time the star is directly observable from outside the cloud. An observation of which of the following stars emerging from its envelope would support Scientist 2's argument but weaken Scientist 1's argument?

A. A 15 M_S star
B. A 20 M_S star
C. A 30 M_S star
D. A 50 M_S star

10. Scientists 2 and 3 agree that a disk forms around a protostar as a result of the protostar's:

F. motion.
G. emission of radiation.
H. location within a star cluster.
J. merger with another star.

11. Which of the scientists, if any, would be likely to agree that the Sun could have formed entirely by accretion?

A. Scientist 1 only
B. Scientist 3 only
C. Scientists 1, 2, and 3
D. None of the scientists

GO ON TO THE NEXT PAGE.

Passage III

Scientists conducted a study to examine how sunlight intensity (the percent of maximum possible sunlight) affects seedling growth and survival.

Study

Seeds were collected from a certain species of plant growing in a temperate grassland. The seeds were planted and grown in identical conditions for 2 months. Then 800 similar-sized seedlings were selected, and each was transplanted into its own pot. All the pots were identical and contained the same amount of a particular soil. The pots were equally divided into 4 groups (Groups 1–4), and then all the groups of pots were placed next to each other in the temperate grassland. In 3 of the groups, all the pots in a group were covered by the same number of layers of a plastic mesh to reduce sunlight intensity. The number of layers was different for each of those 3 groups.

Table 1

Group	Sunlight intensity
1	10%
2	25%
3	50%
4	100%

The seedlings were then grown for the next 10 weeks, during which all the pots were watered daily with the same amount of water.

At 10 weeks, the surviving plants were harvested, and the average dry mass of the plants in each group was determined. The seedlings that did not survive were counted, and the seedling mortality (the percent of seedlings that did not survive to 10 weeks) was also determined for each group. The results are shown in Table 2.

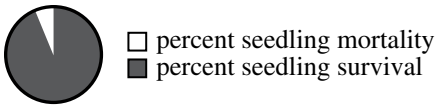
Table 2

Group	Average dry mass (g)	Seedling mortality (%)
1	0.18	8
2	0.58	3
3	0.80	2
4	0.57	6

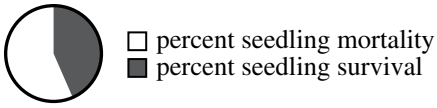
Table adapted from Marina Semchenko et al., "Positive Effect of Shade on Plant Growth: Amelioration of Stress or Active Regulation of Growth Rate?" ©2011 by British Ecological Society.

12. Which of the following pie charts best represents the seedling mortality results for Group 4?

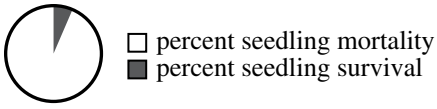
F.



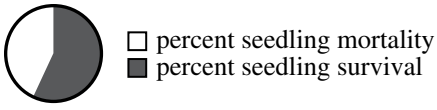
G.



H.



J.



13. The pots in which group were most likely covered by the greatest number of layers of the plastic mesh?

A. Group 1
B. Group 2
C. Group 3
D. Group 4

14. Based on the results of the study, approximately what percent of the seedlings that received a sunlight intensity of 10% **survived** to 10 weeks?

F. 8%
G. 18%
H. 92%
J. Cannot be determined from the given information

15. Suppose that as the plant dry mass increases, the leaf area ratio (a measure of the leaf area per gram of plant mass) decreases. Based on the results of the study, the plants in which group most likely had the lowest leaf area ratio?

A. Group 1
B. Group 2
C. Group 3
D. Group 4

16. The effect of what abiotic factor was examined in the study?

F. Average dry mass
G. Average precipitation
H. Seedling mortality
J. Sunlight intensity

17. Based on the results of the study, what was the dry mass of an individual seedling in Group 2?

A. 0.18 g
B. 0.58 g
C. 2.7 g
D. Cannot be determined from the given information

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Passage IV

Dyes such as Congo red are often found in industrial wastewater and must be removed before the water can be discharged. Scientists performed 3 experiments to determine how much Congo red would be removed from a solution by binding to particles of bentonite (B), which is a type of clay, or to particles of a chemically modified bentonite (MB).

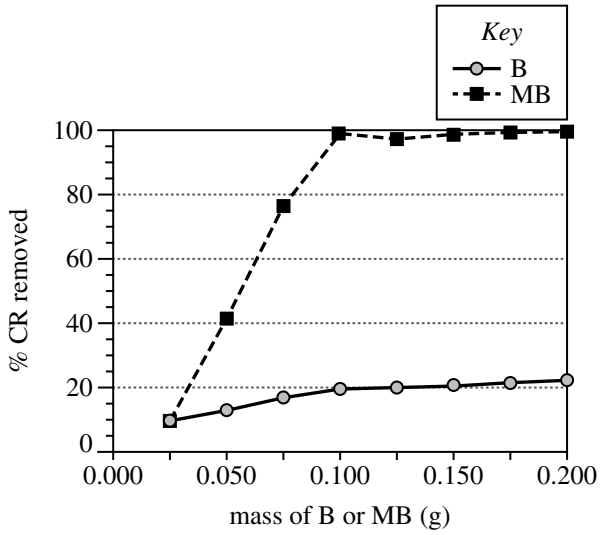
In each trial of each experiment, Steps 1–5 were performed:

1. A 50 mL volume of an aqueous 300 mg/L Congo red solution having a particular pH was placed in each of 2 flasks. A specific mass of B was added to one flask, and the same mass of MB was added to the other flask.
2. The flasks were sealed and shaken at a speed of 200 revolutions per minute for a certain length of time at 25°C.
3. The contents of each flask were filtered to remove all solid material.
4. The concentration of Congo red remaining in the solution from each flask was measured.
5. The percent of Congo red that had been removed (% CR removed) from the solution was calculated for each flask.

Experiment 1

In all trials, the pH of the Congo red solution was the same, and the shaking time was 360 min. From trial to trial, the mass of B and of MB was varied. The results are shown in Figure 1.

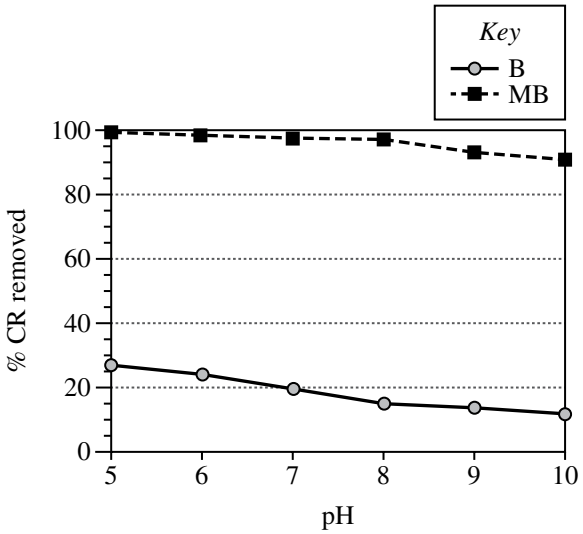
Figure 1



Experiment 2

In all trials, the mass of B and of MB was 0.100 g, and the shaking time was 360 min. From trial to trial, the pH of the Congo red solution was varied. The results are shown in Figure 2.

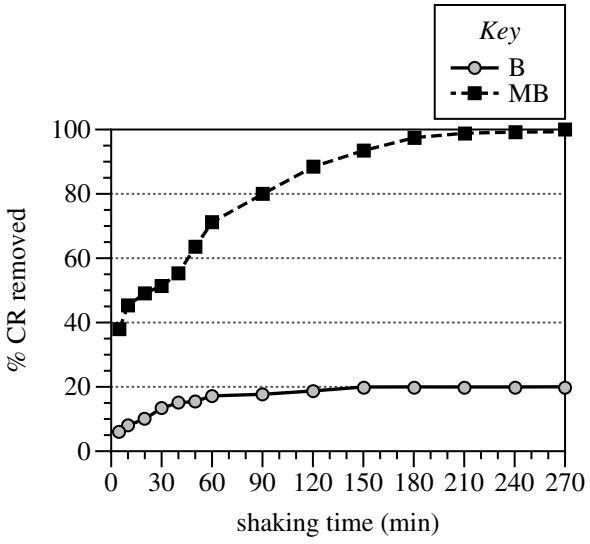
Figure 2



Experiment 3

In all trials, the pH of the Congo red solution was the same as it was in Experiment 1, and the mass of B and of MB was 0.100 g. From trial to trial, the shaking time was varied. The results are shown in Figure 3.

Figure 3



Figures adapted from M. A. Akl, A. M. Youssef, and M. M. Al-Awadhi, "Adsorption of Acid Dyes onto Bentonite and Surfactant-modified Bentonite." ©2013 by M. A. Akl, et al.

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18. In each trial, the flasks were most likely shaken to:

- **F.** increase the concentration of B and of MB in the solution.
- **G.** decrease the concentration of B and of MB in the solution.
- **H.** maximize the contact between the Congo red and the particles of B and of MB.
- **J.** minimize the contact between the Congo red and the particles of B and of MB.

19. Suppose that, in an additional trial of Experiment 3, a shaking time of 100 min had been tested. The % CR removed by MB in this trial would most likely have been between:

- **A.** 10% and 20%.
- **B.** 20% and 30%.
- **C.** 70% and 80%.
- **D.** 80% and 90%.

20. In Experiment 2, the % CR removed by B from the **neutral** Congo red solution was closest to which of the following?

- **F.** 10%
- **G.** 20%
- **H.** 90%
- **J.** 100%

21. Based on the results of Experiments 2 and 3, the % CR removed would likely be greatest for which of the following combinations of pH and shaking time?

- **A.** pH: 5.0
  Shaking time: 60 min
- **B.** pH: 5.0
  Shaking time: 240 min
- **C.** pH: 10.0
  Shaking time: 60 min
- **D.** pH: 10.0
  Shaking time: 240 min

22. Based on Figure 2 and additional information in the passage, how many trials were performed in Experiment 2?

- **F.** Two; in each trial, the % CR removed was determined for either B or MB at each of 6 pH values.
- **G.** Six; in each trial, the % CR removed was determined for both B and MB at 1 of 6 pH values.
- **H.** Twelve; in each trial, the % CR removed was determined for either B or MB at 1 of 6 pH values.
- **J.** Eighteen; in each trial, the % CR removed was determined for either B, MB, or Congo red at 1 of 6 pH values.

23. Consider the description of Experiment 1 and the % CR removed by MB in the 0.200 g trial of Experiment 1. The concentration of Congo red that **remained** in the solution when the shaking ended was approximately:

- **A.** 0 mg/L.
- **B.** 100 mg/L.
- **C.** 200 mg/L.
- **D.** 300 mg/L.

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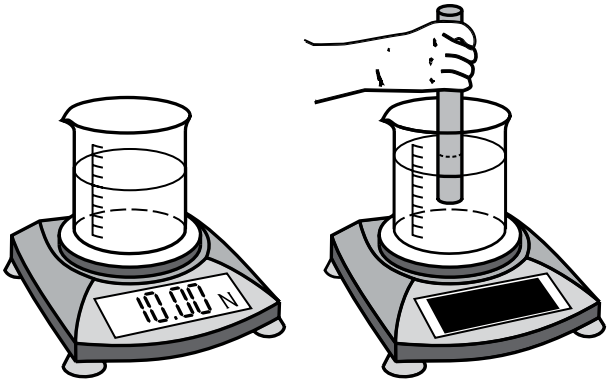
Passage V

Introduction

A teacher performed a demonstration on forces. She placed a beaker on a digital scale and added water until the combined weight (the force of gravity on an object) of the beaker and water was 10.00 newtons (N). She then covered the display panel and held a solid steel rod at rest, partially submerged in the water such that it was not in contact with the beaker (see Figure 1).

Figure 1



before after

The teacher then asked her students, "The rod has a weight of 5.00 N. How much of that weight is supported by my hand, and how much force is exerted on the scale?" Four students responded.

Student 1

The rod displaces some water, producing 2 simultaneous effects:

- An upward buoyant force, B, is exerted on the rod. Regardless of the rod's density, B is equal in magnitude to the weight of the water that is displaced.
- The depth of the water increases, which causes the water pressure at the bottom of the beaker to increase. As a result, a downward force—equal in magnitude to B—is exerted on the bottom of the beaker.

Therefore, the teacher's hand is supporting a weight equal to (5.00 N) − B, and the force exerted on the scale is equal to (10.00 N) + B.

Student 2

Student 1 is correct that B is exerted on the rod and that water depth increases. However, depth has no effect on water pressure. Therefore, the teacher's hand is supporting a weight equal to (5.00 N) − B, and the force exerted on the scale is 10.00 N.

Student 3

Student 1 is correct that B is exerted on the rod and that water depth increases. However, the rod is less dense than water, so B is equal in magnitude to the weight of the rod. Further, Student 2 is correct that depth has no effect on water pressure. Therefore, the teacher's hand is supporting 0.00 N, and the force exerted on the scale is 15.00 N.

Student 4

Student 1 is correct that water depth increases. However, the rod is denser than water, so B is zero. Further, Student 2 is correct that depth has no effect on water pressure. Therefore, the teacher's hand is supporting 5.00 N, and the force exerted on the scale is 10.00 N.

24. Which student would be most likely to agree that while the rod was partially submerged, the scale was supporting the entire weight of the rod?

F. Student 1
G. Student 2
H. Student 3
J. Student 4

25. Within a fluid, pressure increases as depth increases. This fact **weakens** the response(s) given by which student(s)?

A. Student 1 only
B. Students 1 and 2 only
C. Students 3 and 4 only
D. Students 2, 3, and 4 only

GO ON TO THE NEXT PAGE.

26. Suppose that it were determined that the magnitude of B was 1.37 N. Based on Student 2's argument, how much weight would the teacher's hand have been supporting?

F. 1.37 N
G. 3.63 N
H. 5.00 N
J. 6.37 N

27. Suppose that the teacher had held the rod above the water such that no portion of the rod was ever submerged. Based on Student 1's response, how much weight would the teacher's hand have been supporting, 0.00 N or 5.00 N?

A. 0.00 N; the teacher's hand would not have been supporting any weight, because the buoyant force would have been 5.00 N.
B. 0.00 N; the teacher's hand would not have been supporting any weight, because the buoyant force would have been zero.
C. 5.00 N; the teacher's hand would have been supporting the entire weight of the rod, because the buoyant force would have been 5.00 N.
D. 5.00 N; the teacher's hand would have been supporting the entire weight of the rod, because the buoyant force would have been zero.

28. In regard to B, which of the following statements summarizes the responses given by Students 1 and 3?

F. Student 1 claimed that B is equal in magnitude to the weight of the displaced water, whereas Student 3 claimed that B is equal in magnitude to the weight of the rod.
G. Student 1 claimed that B is equal in magnitude to the weight of the rod, whereas Student 3 claimed that B is equal in magnitude to the weight of the displaced water.
H. Students 1 and 3 both claimed that B is equal in magnitude to the weight of the displaced water.
J. Students 1 and 3 both claimed that B is equal in magnitude to the weight of the rod.

29. Consider the "before" portion of Figure 1, and assume that the scale was on a lab bench. If the scale itself had a weight of 45.80 N, what total force must the lab bench have been exerting on the underside of the scale?

A. 35.80 N
B. 40.80 N
C. 50.80 N
D. 55.80 N

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Passage VI

Antioxidants are substances that can protect against cellular damage. Over time, antioxidants break down. Antioxidants break down faster when exposed to light or added heat. Blackberries are a good source of antioxidants such as total monomeric anthocyanins (TMA).

Scientists conducted an experiment to study how different types and concentrations of pectin (a substance used in jam production) affect the breakdown of TMA in blackberry jam during 6 months of storage.

Experiment

The scientists obtained fresh blackberries and determined that the concentration of TMA was 200 mg TMA per 100 g of blackberries. The scientists then made 9 batches of blackberry jam. Each batch used 1 of 3 types of pectin (Pectin X, Y, or Z) at 1 of 3 concentrations (0.3%, 0.7%, or 1.0% by mass). For each batch, 6 identical transparent jars were obtained. Each batch was equally portioned into its 6 jars, which were then capped and submerged in boiling water for 10 min. All jars were then placed in a dark storage area maintained at 20°C.

Jars from each batch were selected after storage times of 1 day, 1 month, 3 months, and 6 months. Once selected, a jar was removed from storage, and its contents were analyzed for TMA concentration before being discarded. The results are shown in Table 1.

Table 1

Pectin type	Pectin concentration (% by mass)	TMA concentration (mg/100 g of jam) at a storage time of:			
		1 day	1 month	3 months	6 months
X	0.3	32	27	24	17
	0.7	34	31	27	20
	1.0	37	34	30	22
Y	0.3	36	31	28	21
	0.7	39	37	32	26
	1.0	41	39	34	28
Z	0.3	23	19	15	10
	0.7	26	22	20	13
	1.0	28	25	20	15

Table adapted from Mariana-Atena Poiana et al., "Assessing the Effects of Different Pectins Addition on Color Quality and Antioxidant Properties of Blackberry Jam." ©2013 by Poiana et al.

30. For the batch of jam prepared with 1.0% Pectin Z by mass, as storage time increased, the TMA concentration:

F. increased only.
G. decreased only.
H. increased and then decreased.
J. decreased and then increased.

31. Suppose the scientists had also prepared a batch of jam using 0.5% Pectin Y. Based on the results of the experiment, at a storage time of 3 months, the TMA concentration would most likely have been between:

A. 21 mg/100 g and 26 mg/100 g.
B. 26 mg/100 g and 28 mg/100 g.
C. 28 mg/100 g and 32 mg/100 g.
D. 32 mg/100 g and 34 mg/100 g.

32. Which of the following variables was **not** an independent variable in the experiment?

F. Pectin concentration
G. Storage time
H. TMA concentration
J. Type of pectin

33. Suppose that the experiment had been repeated, except that the jars had been stored at 30°C. Would the TMA concentrations in this new experiment more likely have been less than or greater than the corresponding TMA concentrations listed in Table 1? The TMA concentrations in the new experiment would most likely have been:

A. less, because more TMA would have broken down at the higher temperature.
B. less, because more TMA would have broken down at the lower temperature.
C. greater, because less TMA would have broken down at the higher temperature.
D. greater, because less TMA would have broken down at the lower temperature.

34. Assume that, in the recipe the scientists used, 100 g of jam was produced for every 70 g of blackberries. If no TMA broke down as the jam was prepared, what mass of TMA would have been found in 100 g of jam before the jars were placed in boiling water?

F. 70 mg
G. 140 mg
H. 200 mg
J. 280 mg

35. A total of how many jars were prepared in the experiment?

A. 12
B. 36
C. 48
D. 54

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Passage VII

A computer simulation was run to study genetic drift (random fluctuations in allele frequencies) over several generations of 8 populations (P1–P8) of amoebas that reproduce asexually. Each amoeba in the initial generation (G0) of each population was homozygous for 1 of the alleles, Allele A or Allele B, of a specific gene. Each of 6 subsequent generations (G1–G6) was produced by randomly choosing half of the amoebas from the previous generation to reproduce. Figure 1 shows the frequency of Allele A in G0–G6 for each of P1–P4; Figure 2 shows the same for each of P5–P8. There were 10,000 amoebas in G0 of each of P1–P4; there were 12 amoebas in G0 of each of P5–P8.

Figure 1

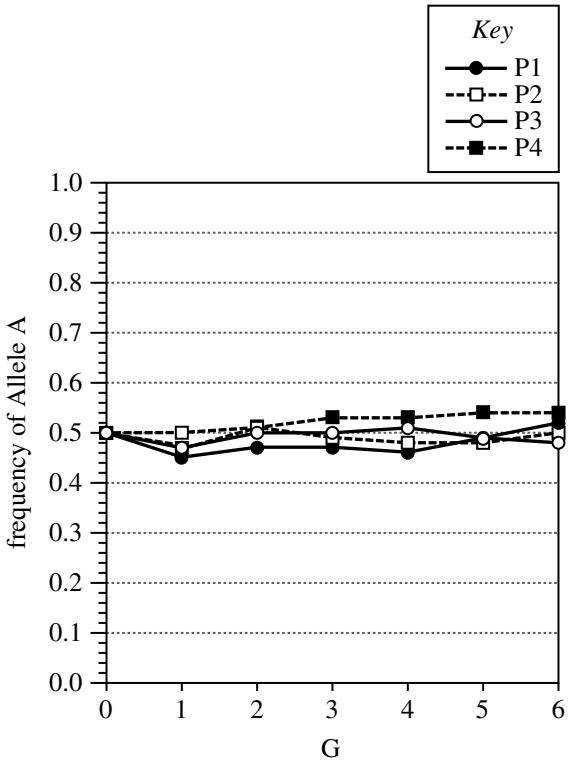
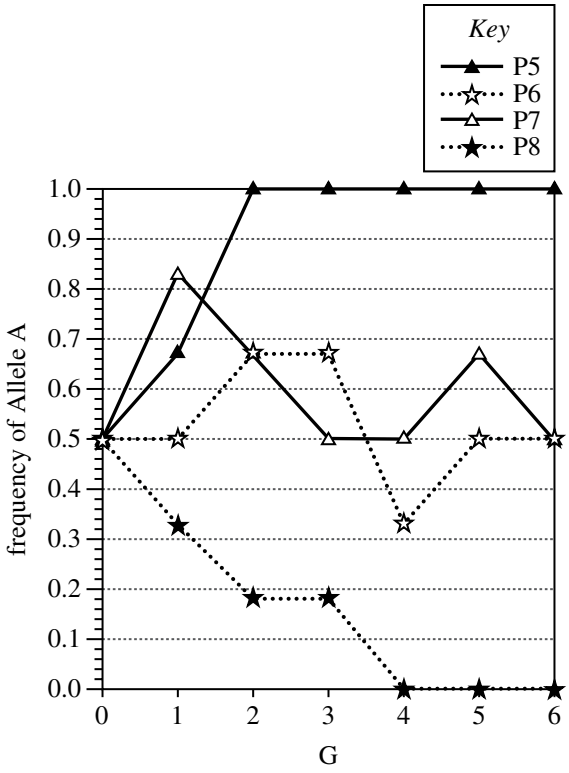


Figure 2



Figures adapted from Teresa Audesirk et al., *Biology: Life on Earth*, 6th ed. ©2002 by Prentice-Hall, Inc.

36. Allele A and Allele B can best be described as:

- **F.** different versions of the same gene.
- **G.** different versions of different genes.
- **H.** identical versions of the same gene.
- **J.** identical versions of different genes.

GO ON TO THE NEXT PAGE.

37. Suppose that another population of amoebas with an initial Allele A frequency of 0.5 and an initial size of 10,000 had been included in the computer simulation. Based on Figure 1, the frequency of Allele B in G2 for that population would most likely have been closest to which of the following?

A. 0.0
B. 0.5
C. 0.8
D. 1.0

38. According to Figure 2, Allele B was absent from which of P5–P8 in G2?

F. P5
G. P6
H. P7
J. P8

39. Based on Figures 1 and 2, is the effect of genetic drift on allele frequency greater in a relatively large population or in a relatively small population?

A. Relatively large; each of P1–P4 experienced greater fluctuations in the frequency of Allele A than did each of P5–P8.
B. Relatively large; each of P5–P8 experienced greater fluctuations in the frequency of Allele A than did each of P1–P4.
C. Relatively small; each of P1–P4 experienced greater fluctuations in the frequency of Allele A than did each of P5–P8.
D. Relatively small; each of P5–P8 experienced greater fluctuations in the frequency of Allele A than did each of P1–P4.

40. Based on Figure 1, in the initial generation of each of P1–P4, how many amoebas had the genotype AA, and how many amoebas had the genotype BB?

F. Amoebas with genotype AA: 5,000
Amoebas with genotype BB: 5,000
G. Amoebas with genotype AA: 5,000
Amoebas with genotype BB: 10,000
H. Amoebas with genotype AA: 10,000
Amoebas with genotype BB: 5,000
J. Amoebas with genotype AA: 10,000
Amoebas with genotype BB: 10,000

END OF TEST 4

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Practice Writing Test Prompt 2

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This is a test of your writing skills. You will have **forty** (40) minutes to read the prompt, plan your response, and write an essay in English. Before you begin working, read all material in this test booklet carefully to understand exactly what you are being asked to do.

You will write your essay on the lined pages in the **answer document** provided. Your writing on those pages will be scored. You may use the unlined pages in this test booklet to plan your essay. Your work on these pages will not be scored.

Your essay will be evaluated based on the evidence it provides of your ability to:

- clearly state your own perspective on a complex issue and analyze the relationship between your perspective and at least one other perspective
- develop and support your ideas with reasoning and examples
- organize your ideas clearly and logically
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Lay your pencil down immediately when time is called.

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Work Ethic

For many people, a willingness to work hard is one of the most desirable qualities. A strong work ethic, it is said, is a reflection of good character and is the primary driver in personal success and societal prosperity. But is it possible to work too hard or too much? Does everyone need to have a strong work ethic? Can hard work come into conflict with other important priorities? Given its strong societal emphasis, it is worth examining the role of hard work in the lives of individuals.

Read and carefully consider these perspectives. Each suggests a particular way of thinking about the role of hard work in the lives of individuals.

Perspective One

Hard work is the key to reaching our personal goals. We all need time to unwind, relax, and recharge, but work must always come before play.

Perspective Two

The ethic of hard work is promoted mostly by people who benefit from the hard work of others: business and industry owners. It has little to offer ordinary people.

Perspective Three

All work need not be *hard* work. When we put our efforts toward the things we truly love to do, the difference between work and play dissolves.

Essay Task

Write a unified, coherent essay about the role of hard work in the lives of individuals. In your essay, be sure to:

- clearly state your own perspective and analyze the relationship between your perspective and at least one other perspective
- develop and support your ideas with reasoning and examples
- organize your ideas clearly and logically
- communicate your ideas effectively in standard written English

Your perspective may be in full agreement with any of those given, in partial agreement, or completely different.

Planning Your Essay

Your work on these prewriting pages will not be scored.

Use the space below and on the back cover to generate ideas and plan your essay. You may wish to consider the following as you think critically about the task:

Strengths and weaknesses of different perspectives on the issue

- What insights do they offer, and what do they fail to consider?
- Why might they be persuasive to others, or why might they fail to persuade?

Your own knowledge, experience, and values

- What is your perspective on this issue, and what are its strengths and weaknesses?
- How will you support your perspective in your essay?

Planning Your Essay

Use this page to continue planning your essay. Your work on this page will not be scored.

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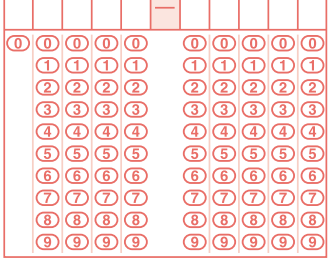
ALL examinees must complete block A – please print.

Blocks B, C, and D are required for all examinees. Find the MATCHING INFORMATION on your ticket. Enter it EXACTLY the same way, even if any of the information is missing or incorrect. Fill in the corresponding ovals. If you do not complete these blocks to match your previous information EXACTLY, your scores will be **delayed up to 8 weeks.**

B MATCH NAME (First 5 letters of last name)

C MATCH NUMBER



D DATE OF BIRTH

Month	Day	Year
January		
February		
March	0 0	0 0 0 0
April	1 1	1 1 1 1
May	2 2	2 2 2 2
June	3 3	3 3 3 3
July		4 4 4
August		5 5 5
September		6 6 6
October		7 7 7
November		8 8 8
December		9 9 9

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SERIAL #

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Correct mark: ⬭ ⬬ ⬭ ⬭

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Incorrect marks: ⬭ ⬭ ⬭ ⬭
Overlapping mark: ⬭ ⬭ ⬭
Cross-out mark: ⬭ ⬭ ⬭
Smudged erasure: ⬭ ⬭ ⬭
Mark is too light: ⬭ ⬭ ⬭ ⬭

BOOKLET NUMBER

0	0	0	0	0	0	0	0	0
1	1	1	1	1	1	1	1	1
2	2	2	2	2	2	2	2	2
3	3	3	3	3	3	3	3	3
4	4	4	4	4	4	4	4	4
5	5	5	5	5	5	5	5	5
6	6	6	6	6	6	6	6	6
7	7	7	7	7	7	7	7	7
8	8	8	8	8	8	8	8	8
9	9	9	9	9	9	9	9	9

Print your 3-character **Test Form** in the boxes at the right and fill in the corresponding ovals.

FORM

F	0	0
G	1	1
H	2	2
J	3	3
K	4	4
L	5	5
M	6	6
N	7	7
P	8	8
Z	9	9

TEST 1: ENGLISH

1 Ⓐ Ⓑ Ⓒ Ⓓ	11 Ⓐ Ⓑ Ⓒ Ⓓ	21 Ⓐ Ⓑ Ⓒ Ⓓ	31 Ⓐ Ⓑ Ⓒ Ⓓ	41 Ⓐ Ⓑ Ⓒ Ⓓ
2 Ⓕ Ⓖ Ⓗ Ⓙ	12 Ⓕ Ⓖ Ⓗ Ⓙ	22 Ⓕ Ⓖ Ⓗ Ⓙ	32 Ⓕ Ⓖ Ⓗ Ⓙ	42 Ⓕ Ⓖ Ⓗ Ⓙ
3 Ⓐ Ⓑ Ⓒ Ⓓ	13 Ⓐ Ⓑ Ⓒ Ⓓ	23 Ⓐ Ⓑ Ⓒ Ⓓ	33 Ⓐ Ⓑ Ⓒ Ⓓ	43 Ⓐ Ⓑ Ⓒ Ⓓ
4 Ⓕ Ⓖ Ⓗ Ⓙ	14 Ⓕ Ⓖ Ⓗ Ⓙ	24 Ⓕ Ⓖ Ⓗ Ⓙ	34 Ⓕ Ⓖ Ⓗ Ⓙ	44 Ⓕ Ⓖ Ⓗ Ⓙ
5 Ⓐ Ⓑ Ⓒ Ⓓ	15 Ⓐ Ⓑ Ⓒ Ⓓ	25 Ⓐ Ⓑ Ⓒ Ⓓ	35 Ⓐ Ⓑ Ⓒ Ⓓ	45 Ⓐ Ⓑ Ⓒ Ⓓ
6 Ⓕ Ⓖ Ⓗ Ⓙ	16 Ⓕ Ⓖ Ⓗ Ⓙ	26 Ⓕ Ⓖ Ⓗ Ⓙ	36 Ⓕ Ⓖ Ⓗ Ⓙ	46 Ⓕ Ⓖ Ⓗ Ⓙ
7 Ⓐ Ⓑ Ⓒ Ⓓ	17 Ⓐ Ⓑ Ⓒ Ⓓ	27 Ⓐ Ⓑ Ⓒ Ⓓ	37 Ⓐ Ⓑ Ⓒ Ⓓ	47 Ⓐ Ⓑ Ⓒ Ⓓ
8 Ⓕ Ⓖ Ⓗ Ⓙ	18 Ⓕ Ⓖ Ⓗ Ⓙ	28 Ⓕ Ⓖ Ⓗ Ⓙ	38 Ⓕ Ⓖ Ⓗ Ⓙ	48 Ⓕ Ⓖ Ⓗ Ⓙ
9 Ⓐ Ⓑ Ⓒ Ⓓ	19 Ⓐ Ⓑ Ⓒ Ⓓ	29 Ⓐ Ⓑ Ⓒ Ⓓ	39 Ⓐ Ⓑ Ⓒ Ⓓ	49 Ⓐ Ⓑ Ⓒ Ⓓ
10 Ⓕ Ⓖ Ⓗ Ⓙ	20 Ⓕ Ⓖ Ⓗ Ⓙ	30 Ⓕ Ⓖ Ⓗ Ⓙ	40 Ⓕ Ⓖ Ⓗ Ⓙ	50 Ⓕ Ⓖ Ⓗ Ⓙ

TEST 2: MATHEMATICS

1 Ⓐ Ⓑ Ⓒ Ⓓ	11 Ⓐ Ⓑ Ⓒ Ⓓ	21 Ⓐ Ⓑ Ⓒ Ⓓ	31 Ⓐ Ⓑ Ⓒ Ⓓ	41 Ⓐ Ⓑ Ⓒ Ⓓ
2 Ⓕ Ⓖ Ⓗ Ⓙ	12 Ⓕ Ⓖ Ⓗ Ⓙ	22 Ⓕ Ⓖ Ⓗ Ⓙ	32 Ⓕ Ⓖ Ⓗ Ⓙ	42 Ⓕ Ⓖ Ⓗ Ⓙ
3 Ⓐ Ⓑ Ⓒ Ⓓ	13 Ⓐ Ⓑ Ⓒ Ⓓ	23 Ⓐ Ⓑ Ⓒ Ⓓ	33 Ⓐ Ⓑ Ⓒ Ⓓ	43 Ⓐ Ⓑ Ⓒ Ⓓ
4 Ⓕ Ⓖ Ⓗ Ⓙ	14 Ⓕ Ⓖ Ⓗ Ⓙ	24 Ⓕ Ⓖ Ⓗ Ⓙ	34 Ⓕ Ⓖ Ⓗ Ⓙ	44 Ⓕ Ⓖ Ⓗ Ⓙ
5 Ⓐ Ⓑ Ⓒ Ⓓ	15 Ⓐ Ⓑ Ⓒ Ⓓ	25 Ⓐ Ⓑ Ⓒ Ⓓ	35 Ⓐ Ⓑ Ⓒ Ⓓ	45 Ⓐ Ⓑ Ⓒ Ⓓ
6 Ⓕ Ⓖ Ⓗ Ⓙ	16 Ⓕ Ⓖ Ⓗ Ⓙ	26 Ⓕ Ⓖ Ⓗ Ⓙ	36 Ⓕ Ⓖ Ⓗ Ⓙ	
7 Ⓐ Ⓑ Ⓒ Ⓓ	17 Ⓐ Ⓑ Ⓒ Ⓓ	27 Ⓐ Ⓑ Ⓒ Ⓓ	37 Ⓐ Ⓑ Ⓒ Ⓓ	
8 Ⓕ Ⓖ Ⓗ Ⓙ	18 Ⓕ Ⓖ Ⓗ Ⓙ	28 Ⓕ Ⓖ Ⓗ Ⓙ	38 Ⓕ Ⓖ Ⓗ Ⓙ	
9 Ⓐ Ⓑ Ⓒ Ⓓ	19 Ⓐ Ⓑ Ⓒ Ⓓ	29 Ⓐ Ⓑ Ⓒ Ⓓ	39 Ⓐ Ⓑ Ⓒ Ⓓ	
10 Ⓕ Ⓖ Ⓗ Ⓙ	20 Ⓕ Ⓖ Ⓗ Ⓙ	30 Ⓕ Ⓖ Ⓗ Ⓙ	40 Ⓕ Ⓖ Ⓗ Ⓙ	

TEST 3: READING

1 Ⓐ Ⓑ Ⓒ Ⓓ	9 Ⓐ Ⓑ Ⓒ Ⓓ	17 Ⓐ Ⓑ Ⓒ Ⓓ	25 Ⓐ Ⓑ Ⓒ Ⓓ	33 Ⓐ Ⓑ Ⓒ Ⓓ
2 Ⓕ Ⓖ Ⓗ Ⓙ	10 Ⓕ Ⓖ Ⓗ Ⓙ	18 Ⓕ Ⓖ Ⓗ Ⓙ	26 Ⓕ Ⓖ Ⓗ Ⓙ	34 Ⓕ Ⓖ Ⓗ Ⓙ
3 Ⓐ Ⓑ Ⓒ Ⓓ	11 Ⓐ Ⓑ Ⓒ Ⓓ	19 Ⓐ Ⓑ Ⓒ Ⓓ	27 Ⓐ Ⓑ Ⓒ Ⓓ	35 Ⓐ Ⓑ Ⓒ Ⓓ
4 Ⓕ Ⓖ Ⓗ Ⓙ	12 Ⓕ Ⓖ Ⓗ Ⓙ	20 Ⓕ Ⓖ Ⓗ Ⓙ	28 Ⓕ Ⓖ Ⓗ Ⓙ	36 Ⓕ Ⓖ Ⓗ Ⓙ
5 Ⓐ Ⓑ Ⓒ Ⓓ	13 Ⓐ Ⓑ Ⓒ Ⓓ	21 Ⓐ Ⓑ Ⓒ Ⓓ	29 Ⓐ Ⓑ Ⓒ Ⓓ	
6 Ⓕ Ⓖ Ⓗ Ⓙ	14 Ⓕ Ⓖ Ⓗ Ⓙ	22 Ⓕ Ⓖ Ⓗ Ⓙ	30 Ⓕ Ⓖ Ⓗ Ⓙ	
7 Ⓐ Ⓑ Ⓒ Ⓓ	15 Ⓐ Ⓑ Ⓒ Ⓓ	23 Ⓐ Ⓑ Ⓒ Ⓓ	31 Ⓐ Ⓑ Ⓒ Ⓓ	
8 Ⓕ Ⓖ Ⓗ Ⓙ	16 Ⓕ Ⓖ Ⓗ Ⓙ	24 Ⓕ Ⓖ Ⓗ Ⓙ	32 Ⓕ Ⓖ Ⓗ Ⓙ	

TEST 4: SCIENCE

1 Ⓐ Ⓑ Ⓒ Ⓓ	9 Ⓐ Ⓑ Ⓒ Ⓓ	17 Ⓐ Ⓑ Ⓒ Ⓓ	25 Ⓐ Ⓑ Ⓒ Ⓓ	33 Ⓐ Ⓑ Ⓒ Ⓓ
2 Ⓕ Ⓖ Ⓗ Ⓙ	10 Ⓕ Ⓖ Ⓗ Ⓙ	18 Ⓕ Ⓖ Ⓗ Ⓙ	26 Ⓕ Ⓖ Ⓗ Ⓙ	34 Ⓕ Ⓖ Ⓗ Ⓙ
3 Ⓐ Ⓑ Ⓒ Ⓓ	11 Ⓐ Ⓑ Ⓒ Ⓓ	19 Ⓐ Ⓑ Ⓒ Ⓓ	27 Ⓐ Ⓑ Ⓒ Ⓓ	35 Ⓐ Ⓑ Ⓒ Ⓓ
4 Ⓕ Ⓖ Ⓗ Ⓙ	12 Ⓕ Ⓖ Ⓗ Ⓙ	20 Ⓕ Ⓖ Ⓗ Ⓙ	28 Ⓕ Ⓖ Ⓗ Ⓙ	36 Ⓕ Ⓖ Ⓗ Ⓙ
5 Ⓐ Ⓑ Ⓒ Ⓓ	13 Ⓐ Ⓑ Ⓒ Ⓓ	21 Ⓐ Ⓑ Ⓒ Ⓓ	29 Ⓐ Ⓑ Ⓒ Ⓓ	37 Ⓐ Ⓑ Ⓒ Ⓓ
6 Ⓕ Ⓖ Ⓗ Ⓙ	14 Ⓕ Ⓖ Ⓗ Ⓙ	22 Ⓕ Ⓖ Ⓗ Ⓙ	30 Ⓕ Ⓖ Ⓗ Ⓙ	38 Ⓕ Ⓖ Ⓗ Ⓙ
7 Ⓐ Ⓑ Ⓒ Ⓓ	15 Ⓐ Ⓑ Ⓒ Ⓓ	23 Ⓐ Ⓑ Ⓒ Ⓓ	31 Ⓐ Ⓑ Ⓒ Ⓓ	39 Ⓐ Ⓑ Ⓒ Ⓓ
8 Ⓕ Ⓖ Ⓗ Ⓙ	16 Ⓕ Ⓖ Ⓗ Ⓙ	24 Ⓕ Ⓖ Ⓗ Ⓙ	32 Ⓕ Ⓖ Ⓗ Ⓙ	40 Ⓕ Ⓖ Ⓗ Ⓙ

ACT STUDENT REVIEW: The test administrator will give you instructions for completing this section.

Student Review: Your responses to these items will assist ACT and your test center in providing the best possible conditions for testing and planning for the future. Fill in the oval indicating your response to each item printed on the back of your test booklet.

	Yes	No		Yes	No		Yes	No		Yes	No		Yes	No
1	⬭	⬭	4	⬭	⬭	7	⬭	⬭	10	⬭	⬭	13	⬭	⬭
2	⬭	⬭	5	⬭	⬭	8	⬭	⬭	11	⬭	⬭	14	⬭	⬭
3	⬭	⬭	6	⬭	⬭	9	⬭	⬭	12	⬭	⬭	15	⬭	⬭

Print your name in the spaces below (one letter per space).

Last Name | First Name | MI

The ACT® Writing Test

Do NOT mark in this shaded area.

NOTE: When finished, close document with page 1 facing you.

PLEASE DO NOT WRITE IN THIS AREA.

SERIAL #

Please enter the information at the right before beginning the writing test.

Use a No. 2 pencil only. Do NOT use a mechanical pencil, ink, ballpoint, or felt-tip pen.

WRITING TEST BOOKLET NUMBER

Print your 9-digit **Booklet Number** in the boxes at the right.

WRITING TEST FORM

Print your 3-character **Test Form** in the boxes at the right and fill in the corresponding ovals.

0	A	A
1	B	B
2	C	C
3	D	D
4	E	E
5	F	F
6	G	G
7	H	H
8	J	J
9	Z	Z

Begin WRITING TEST here.

If you need more space, please continue on the next page.

1

Do not write in this shaded area.

WRITING TEST

If you need more space, please continue on the back of this page.

2

Do not write in this shaded area.

WRITING TEST

If you need more space, please continue on the next page.

PLEASE DO NOT WRITE IN THIS AREA.

SERIAL #

WRITING TEST

STOP here with the writing test.

4

Do not write in this shaded area.

DO NOT WRITE
ON THIS PAGE.

Close document with
page 1 facing you.

ACT®
PO Box 168
Iowa City, IA 52243-0168

PLEASE DO NOT WRITE IN THIS AREA.

SERIAL #

How to Score the Practice Multiple-Choice Tests

Follow the instructions below and on the following pages to score your practice multiple-choice tests and review your performance.

To calculate your writing score, use Scoring the Practice Writing Test, page 67.

Raw Scores

The number of questions you answered correctly on each test section is a raw score. Because there are many forms of the ACT, each with different questions, the difficulty level varies between the forms. A raw score of 35 on one form of the mathematics test section, for example, may be about as difficult to earn as a raw score of 37 on another form of that test section.

Computing raw scores: To compute your raw scores, check your answers with the scoring information in the scoring keys and conversion table, then do the following:

1. Mark a one (1) in the blank for each question answered correctly.
2. Count the number of correct answers for each of the multiple-choice test sections.
3. Add up the total number correct for each category and test section and capture it as directed beneath its scoring key.

Use the scoring key for each test to score your answer document for the sections in the practice test. Mark a "1" in the blank for each question you answered correctly and add up the total number correct for each test. Do not count correct answers for Not Scored cells, as those are for field test items not included in converting raw scores to scale scores.

Please note, the placement of these field test questions varies across different test forms, and will NOT remain in the same test item slots each test administration.

These numbers are your raw scores on the individual multiple-choice test sections. The highest raw score for a given test section is the number of scored questions included on that test section:

- English: 40
- Mathematics: 41
- Reading: 27
- Science: 34

Scale Scores

To adjust for the small differences among different forms of the ACT test, raw scores are converted into scale scores. Scale scores appear on reports sent to your school.

When your raw scores are converted into scale scores, it becomes possible to compare your scores with those of examinees who took different test forms. For example, a scale score of 26 on the mathematics test section has the same meaning for any form of the ACT.

Converting Raw Scores to Scale Scores: Each ACT test section generates a single scale score between 1 and 36. Use the scale score conversion table to convert your raw scores to scale scores for each test section.

English Scoring Key

English Number	Correct Answer	Correct (Mark 1)	Reporting Categories
1	D		KLA
2	H		CSE
3	D		CSE
4	J		KLA
5	D		POW
6	H		CSE
7	C		POW
8	H		CSE
9	B		POW
10	F		POW
11	A		CSE
12	G		POW
13	C		POW
14	H		KLA
15	B		CSE
16	H	Not Scored	——
17	B	Not Scored	——
18	J	Not Scored	——
19	D	Not Scored	——
20	F	Not Scored	——
21	C	Not Scored	——
22	G	Not Scored	——
23	B	Not Scored	——
24	G	Not Scored	——
25	A	Not Scored	——
26	J		POW
27	B		POW
28	J		CSE
29	C		CSE
30	F		KLA
31	D		CSE
32	H		CSE
33	D		KLA
34	F		POW
35	C		POW
36	F		CSE
37	C		CSE
38	J		CSE
39	D		POW
40	J		POW
41	B		POW
42	F		KLA
43	A		CSE
44	J		POW
45	B		POW
46	J		CSE
47	C		CSE
48	J		KLA
49	A		POW
50	J		POW

English Reporting Categories

(Capture raw scores/correct answers.)

Production of Writing (POW) = ____ of 17

Knowledge of Language (KLA) = ____ of 7

Conventions of Standard English (CSE) = ____ of 16

Total English Raw Score (POW + KLA + CSE) = ____ of 40

English Scale Score Conversion Table

Use the Total English Raw Score number from the previous table to find the scale score you could expect if you got that number correct on test day.

English Raw Score	English Scale Score
40	36
39	35
38	35
37	34
36	32
35	30
34	28
33	27
32	26
31	25
30	24
29	23
28	23
27	22
26	21
25	21
24	20
23	20
22	19
21	18
20	17

English Raw Score	English Scale Score
19	16
18	15
17	15
16	14
15	14
14	13
13	12
12	11
11	11
10	11
9	10
8	10
7	9
6	8
5	7
4	6
3	5
2	4
1	2
0	1

English Scale Score = ____

Mathematics Scoring Key

Math Number	Correct Answer	Correct (Mark 1)	Reporting Categories
1	A		S
2	J		F
3	B		IES
4	G		N
5	C		IES
6	J		N
7	A		G
8	G	Not Scored	——
9	B		F
10	J		A
11	A		A
12	H		S
13	A		A
14	J		G
15	B		F
16	G		G
17	C		N
18	G	Not Scored	——
19	A		S
20	G		IES
21	C		S
22	G		F
23	B		IES
24	J		F
25	B		G
26	H		G
27	C		IES
28	F	Not Scored	——
29	A		G
30	J		IES
31	B		S
32	J		A
33	B		A
34	G		A
35	A		IES
36	G		F
37	B		A
38	H	Not Scored	——
39	D		N
40	F		N
41	A		F
42	J		G
43	A		IES
44	F		G
45	C		F

Mathematics Reporting Categories

(Capture raw scores/correct answers.)

Preparing for Higher Math (PHM)
(A + F + G + N + S) = ____ of 33

A = Algebra
F = Functions
G = Geometry
N = Number & Quantity
S = Statistics & Probability

Integrating Essential Skills (IES) = ____of 8

Total Mathematics Raw Score
(PHM + IES) = ____ of 41

Mathematics Scale Score Conversion Table

Use the Total Mathematics Raw Score from the previous table to find the scale score you could expect if you got that number correct on test day.

Math Raw Score	Math Scale Score
41	36
40	36
39	35
38	34
37	33
36	31
35	30
34	29
33	28
32	27
31	27
30	26
29	25
28	25
27	24
26	23
25	22
24	21
23	20
22	19
21	18

Math Raw Score	Math Scale Score
20	18
19	17
18	17
17	17
16	16
15	16
14	16
13	15
12	15
11	14
10	14
9	14
8	14
7	13
6	12
5	11
4	10
3	9
2	7
1	4
0	1

Mathematics Scale Score = ____

Reading Scoring Key

Reading Number	Correct Answer	Correct (Mark 1)	Reporting Categories
1	A		CS
2	G		KID
3	B		KID
4	F		KID
5	C		KID
6	H		IKI
7	D		IKI
8	F		IKI
9	A		IKI
10	G		CS
11	C		CS
12	H		IKI
13	A		KID
14	J		KID
15	A		KID
16	H		CS
17	B		IKI
18	J		KID
19	B	Not Scored	——
20	J	Not Scored	——
21	B	Not Scored	——
22	G	Not Scored	——
23	A	Not Scored	——
24	F	Not Scored	——
25	B	Not Scored	——
26	F	Not Scored	——
27	C	Not Scored	——
28	J		KID
29	B		KID
30	H		KID
31	D		CS
32	F		KID
33	D		CS
34	F		CS
35	C		KID
36	G		CS

Reading Reporting Categories

(Capture raw scores/correct answers.)

Key Ideas & Details (KID) = ____ of 13

Craft & Structure (CS) = ____ of 8

Integration of Knowledge & Ideas (IKI) = ____ of 6

Total Reading Raw Score (KID + CS + IKI) = ____ of 27

Reading Scale Score Conversion Table

Use the Total Reading Raw Score from the previous table to find the scale score you could expect if you got that number correct on test day.

Reading Raw Score	Reading Scale Score
27	36
26	35
25	34
24	32
23	30
22	28
21	27
20	25
19	24
18	23
17	22
16	21
15	20
14	18

Reading Raw Score	Reading Scale Score
13	17
12	16
11	15
10	14
9	13
8	12
7	11
6	11
5	10
4	9
3	7
2	5
1	3
0	1

Reading Scale Score = ____

Science Scoring Key

Science Number	Correct Answer	Correct (Mark 1)	Reporting Categories
1	D		IOD
2	F		IOD
3	B		IOD
4	F		EMI
5	C		EMI
6	G	Not Scored	——
7	B	Not Scored	——
8	H	Not Scored	——
9	C	Not Scored	——
10	F	Not Scored	——
11	C	Not Scored	——
12	F		IOD
13	A		SIN
14	H		IOD
15	C		EMI
16	J		IOD
17	D		SIN
18	H		SIN
19	D		SIN
20	G		IOD
21	B		SIN
22	G		SIN
23	A		IOD
24	H		EMI
25	D		EMI
26	G		EMI
27	D		EMI
28	F		EMI
29	D		IOD
30	G		IOD
31	C		SIN
32	H		SIN
33	A		SIN
34	G		IOD
35	D		SIN
36	F		IOD
37	B		EMI
38	F		EMI
39	D		EMI
40	F		IOD

Science Reporting Categories

(Capture raw scores/correct answers.)

Interpretation of Data (IOD) = ____ of 13

Scientific Investigation (SIN) = ____ of 10

Evaluation of Models, Inferences & Experimental Results (EMI) = ____ of 11

Total Science (IOD + SIN + EMI) = ____ of 34

Science Scale Score Conversion Table

Use the Total Science Raw Score from the previous table to find the scale score you could expect if you got that number correct on test day.

Science Raw Score	Science Scale Score
34	36
33	35
32	34
31	32
30	30
29	28
28	27
27	26
26	26
25	25
24	24
23	24
22	23
21	23
20	22
19	21
18	21
17	20

Science Raw Score	Science Scale Score
16	19
15	18
14	18
13	17
12	16
11	15
10	14
9	13
8	12
7	11
6	11
5	10
4	9
3	7
2	5
1	3
0	1

Science Scale Score = ____

Calculating a Composite Score

An ACT test generates a single Composite score of 1–36. Compute the Composite score by averaging the three scale scores:

1. Add your English, Mathematics, and Reading scale scores. Enter this sum in the blanks below.
2. Divide the sum by 3. If the resulting number ends in a fraction, round it to the nearest whole number. (Round down any fraction less than one-half, except for averages lower than one; round up any fraction that is one-half or more. Also round up averages that are less than one.)
3. Enter this number in the blank below. This is your Composite score.

Composite of scale scores:

English Scale Score = ____

Mathematics Scale Score = ____

Reading Scale Score = ____

Sum of Scale Scores = ____

Composite score (sum ÷ 3) = ____

Note: *If you left a test section completely blank and marked no items, do not list a scale score for that section and do not calculate a Composite score.*

Scoring the Practice Writing Test

It's difficult to be objective about your own work. However, it's to your advantage to read your own writing critically, as doing so can help you grow as a writer and as a reader. It may also be helpful for you to give your practice essay to another reader, such as a classmate, parent, or teacher. To rate your essay, you and your reader(s) should review the guidelines and sample essays at http://www.actstudent.org and then use The ACT Writing Test Scoring Rubric, starting on the next page to assign your practice essay a score of 1 (low) through 6 (high) in each of the four writing domains (Ideas & Analysis, Development & Support, Organization, and Language Use).

Scoring Rubric

The rubric presents the standards by which your essay will be evaluated. Readers will use this rubric to assign your essay four unique scores, one per writing domain. These are the six possible rubric scores:

Score 6: Responses demonstrate effective skill in writing an argumentative essay.

Score 5: Responses demonstrate well-developed skill in writing an argumentative essay.

Score 4: Responses demonstrate adequate skill in writing an argumentative essay.

Score 3: Responses demonstrate some developing skill in writing an argumentative essay.

Score 2: Responses demonstrate weak or inconsistent skill in writing an argumentative essay.

Score 1: Responses demonstrate little or no skill in writing an argumentative essay.

Because each domain receives its own score, the four scores you assign need not be identical. For example, you may find that your essay exhibits stronger skill in organization than in the development of ideas. In this case, you may determine that your essay should receive a higher score in Organization than in Development & Support.

Calculating Your Writing Score

The writing test section generates a single score of 2–12. Complete these steps to calculate your writing score:

1. Determine which score (range 1–6) in each of the four domains best describes the features of your writing.
2. Multiply each rubric score by 2 to get a score for each domain (range 2–12).
3. Add your four writing domain scores. Enter this sum of domain scores in the blank below (range 8–48).
4. Divide the sum by 4. If the resulting number ends in a fraction, round it to the nearest whole number. (Round down any fraction less than one-half; round up any fraction that is one-half or more.)

Writing test rubric and domain scores:

Ideas & Analysis = ____ x 2 = ____

Development & Support = ____ x 2 = ____

Organization = ____ x 2 = ____

Language Use = ____ x 2 = ____

Sum of domain scores = ____

Writing subject score (sum ÷ 4) = ____

The ACT Writing Test Scoring Rubric

Ideas & Analysis Domain

Rubric Score	Ideas & Analysis Scoring Standards
6	The writer generates an argument that critically engages with multiple perspectives on the given issue. The argument's thesis reflects nuance and precision in thought and purpose. The argument establishes and employs an insightful context for analysis of the issue and its perspectives. The analysis examines implications, complexities, tensions, and/or underlying values and assumptions.
5	The writer generates an argument that productively engages with multiple perspectives on the given issue. The argument's thesis reflects precision in thought and purpose. The argument establishes and employs a thoughtful context for analysis of the issue and its perspectives. The analysis addresses implications, complexities, tensions and/or underlying values and assumptions.
4	The writer generates an argument that engages with multiple perspectives on the given issue. The argument's thesis reflects clarity in thought and purpose. The argument establishes and employs a relevant context for analysis of the issue and its perspectives. The analysis recognizes implications, complexities, tensions, and/or underlying values and assumptions.
3	The writer generates an argument that responds to multiple perspectives on the given issue. The argument's thesis reflects some clarity in thought and purpose. The argument establishes a limited or tangential context for analysis of the issue and its perspectives. Analysis is simplistic or somewhat unclear.
2	The writer generates an argument that weakly responds to multiple perspectives on the given issue. The argument's thesis, if evident, reflects little clarity in thought and purpose. Attempts at analysis are incomplete, largely irrelevant, or consist primarily of restatement of the issue and its perspectives.
1	The writer fails to generate an argument that responds intelligibly to the task. The writer's intentions are difficult to discern. Attempts at analysis are unclear or irrelevant

Development & Support Domain

Rubric Score	Development & Support Scoring Standards
6	Development of ideas and support for claims deepen insight and broaden context. An integrated line of skillful reasoning and illustration effectively conveys the significance of the argument. Qualifications and complications enrich and bolster ideas and analysis.
5	Development of ideas and support for claims deepen understanding. A mostly integrated line of purposeful reasoning and illustration capably conveys the significance of the argument. Qualifications and complications enrich ideas and analysis.
4	Development of ideas and support for claims clarify meaning and purpose. Lines of clear reasoning and illustration adequately convey the significance of the argument. Qualifications and complications extend ideas and analysis.
3	Development of ideas and support for claims are mostly relevant but are overly general or simplistic. Reasoning and illustration largely clarify the argument but may be somewhat repetitious or imprecise.
2	Development of ideas and support for claims are weak, confused, or disjointed. Reasoning and illustration are inadequate, illogical, or circular, and fail to fully clarify the argument.
1	Ideas lack development and claims lack support. Reasoning and illustration are unclear, incoherent, or largely absent.

Organization Domain

Rubric Score	Organization Scoring Standards
6	The response exhibits a skillful organizational strategy. The response is unified by a controlling idea or purpose, and a logical progression of ideas increases the effectiveness of the writer's argument. Transitions between and within paragraphs strengthen the relationships among ideas.
5	The response exhibits a productive organizational strategy. The response is mostly unified by a controlling idea or purpose, and a logical sequencing of ideas contributes to the effectiveness of the argument. Transitions between and within paragraphs consistently clarify the relationships among ideas.
4	The response exhibits a clear organizational strategy. The overall shape of the response reflects an emergent controlling idea or purpose. Ideas are logically grouped and sequenced. Transitions between and within paragraphs clarify the relationships among ideas.
3	The response exhibits a basic organizational structure. The response largely coheres, with most ideas logically grouped. Transitions between and within paragraphs sometimes clarify the relationships among ideas.
2	The response exhibits a rudimentary organizational structure. Grouping of ideas is inconsistent and often unclear. Transitions between and within paragraphs are misleading or poorly formed.
1	The response does not exhibit an organizational structure. There is little grouping of ideas. When present, transitional devices fail to connect ideas.

Language Use Domain

Rubric Score	Language Use Scoring Standards
6	The use of language enhances the argument. Word choice is skillful and precise. Sentence structures are consistently varied and clear. Stylistic and register choices, including voice and tone, are strategic and effective. While a few minor errors in grammar, usage, and mechanics may be present, they do not impede understanding.
5	The use of language works in service of the argument. Word choice is precise. Sentence structures are clear and varied often. Stylistic and register choices, including voice and tone, are purposeful and productive. While minor errors in grammar, usage, and mechanics may be present, they do not impede understanding.
4	The use of language conveys the argument with clarity. Word choice is adequate and sometimes precise. Sentence structures are clear and demonstrate some variety. Stylistic and register choices, including voice and tone, are appropriate for the rhetorical purpose. While errors in grammar, usage, and mechanics are present, they rarely impede understanding.
3	The use of language is basic and only somewhat clear. Word choice is general and occasionally imprecise. Sentence structures are usually clear but show little variety. Stylistic and register choices, including voice and tone, are not always appropriate for the rhetorical purpose. Distracting errors in grammar, usage, and mechanics may be present, but they generally do not impede understanding.
2	The use of language is inconsistent and often unclear. Word choice is rudimentary and frequently imprecise. Sentence structures are sometimes unclear. Stylistic and register choices, including voice and tone, are inconsistent and are not always appropriate for the rhetorical purpose. Distracting errors in grammar, usage, and mechanics are present, and they sometimes impede understanding.
1	The use of language fails to demonstrate skill in responding to the task. Word choice is imprecise and often difficult to comprehend. Sentence structures are often unclear. Stylistic and register choices are difficult to identify. Errors in grammar, usage, and mechanics are pervasive and often impede understanding.

ACT is committed to representing the diversity of society in all its aspects, including race, ethnicity, and gender. Questions, passages, and writing prompts are chosen to reflect a range of cultures and are written to not disadvantage any particular group of examinees. ACT employs extensive reviews and statistical procedures to ensure the fairness of test materials.

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- Code of Fair Testing Practices in Education: American Psychological Association (https://www.apa.org/science/programs/testing/fair-testing.pdf)
- Code of Professional Responsibilities in Educational Measurement: National Council on Measurement in Education (https://www.ncme.org/resources-publications/professional-learning/library)