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The SAT®

Practice Test [redacted]

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This version of the SAT Practice Test is for students who will be taking the digital SAT in nondigital format.

SAT®

6TSL02

Reading and Writing

33 QUESTIONS

DIRECTIONS

The questions in this section address a number of important reading and writing skills. Each question includes one or more passages, which may include a table or graph. Read each passage and question carefully, and then choose the best answer to the question based on the passage(s).

All questions in this section are multiple-choice with four answer choices. Each question has a single best answer.

1

Former astronaut Ellen Ochoa says that although she doesn't have a definite idea of when it might happen, she _____ that humans will someday need to be able to live in other environments than those found on Earth. This conjecture informs her interest in future research missions to the moon.

Which choice completes the text with the most logical and precise word or phrase?

A) demands
B) speculates
C) doubts
D) establishes

2

Beginning in the 1950s, Navajo Nation legislator Annie Dodge Wauneka continuously worked to promote public health; this _____ effort involved traveling throughout the vast Navajo homeland and writing a medical dictionary for speakers of *Diné bizaad*, the Navajo language.

Which choice completes the text with the most logical and precise word or phrase?

A) impartial
B) offhand
C) persistent
D) mandatory

CONTINUE

3

Following the principles of community-based participatory research, tribal nations and research institutions are equal partners in health studies conducted on reservations. A collaboration between the Crow Tribe and Montana State University _____ this model: tribal citizens worked alongside scientists to design the methodology and continue to assist in data collection.

Which choice completes the text with the most logical and precise word or phrase?

A) circumvents
B) eclipses
C) fabricates
D) exemplifies

4

The parasitic dodder plant increases its reproductive success by flowering at the same time as the host plant it has latched onto. In 2020, Jianqiang Wu and his colleagues determined that the tiny dodder achieves this _____ with its host by absorbing and utilizing a protein the host produces when it is about to flower.

Which choice completes the text with the most logical and precise word or phrase?

A) synchronization
B) hibernation
C) prediction
D) moderation

5

Given that the conditions in binary star systems should make planetary formation nearly impossible, it's not surprising that the existence of planets in such systems has lacked _____ explanation. Roman Rafikov and Kedron Silsbee shed light on the subject when they used modeling to determine a complex set of factors that could support planets' development.

Which choice completes the text with the most logical and precise word or phrase?

A) a discernible
B) a straightforward
C) an inconclusive
D) an unbiased

6

Seminole/Muscogee director Sterlin Harjo _____ television's tendency to situate Native characters in the distant past: this rejection is evident in his series *Reservation Dogs*, which revolves around teenagers who dress in contemporary styles and whose dialogue is laced with current slang.

Which choice completes the text with the most logical and precise word or phrase?

A) repudiates
B) proclaims
C) foretells
D) recants

CONTINUE

7

In 2007, computer scientist Luis von Ahn was working on converting printed books into a digital format. He found that some words were distorted enough that digital scanners couldn't recognize them, but most humans could easily read them. Based on that finding, von Ahn invented a simple security test to keep automated "bots" out of websites. The first version of the reCAPTCHA test asked users to type one known word and one of the many words scanners couldn't recognize. Correct answers proved the users were humans and added data to the book-digitizing project.

Which choice best states the main purpose of the text?

A) To discuss von Ahn's invention of reCAPTCHA

B) To explain how digital scanners work

C) To call attention to von Ahn's book-digitizing project

D) To indicate how popular reCAPTCHA is

8

The following text is from Edith Wharton's 1905 novel *The House of Mirth*. Lily Bart and a companion are walking through a park.

> Lily had no real intimacy with nature, but she had a passion for the appropriate and could be keenly sensitive to a scene which was the fitting background of her own sensations. The landscape outspread below her seemed an enlargement of her present mood, and she found something of herself in its calmness, its breadth, its long free reaches. On the nearer slopes the sugar-maples wavered like pyres of light; lower down was a massing of grey orchards, and here and there the lingering green of an oak-grove.

Which choice best describes the function of the underlined sentence in the text as a whole?

A) It creates a detailed image of the physical setting of the scene.

B) It establishes that a character is experiencing an internal conflict.

C) It makes an assertion that the next sentence then expands on.

D) It illustrates an idea that is introduced in the previous sentence.

CONTINUE

9

A study by a team including finance professor Madhu Veeraraghavan suggests that exposure to sunshine during the workday can lead to overly optimistic behavior. Using data spanning from 1994 to 2010 for a set of US companies, the team compared over 29,000 annual earnings forecasts to the actual earnings later reported by those companies. The team found that the greater the exposure to sunshine at work in the two weeks before a manager submitted an earnings forecast, the more the manager's forecast exceeded what the company actually earned that year.

Which choice best states the function of the underlined sentence in the overall structure of the text?

A) To summarize the results of the team's analysis

B) To present a specific example that illustrates the study's findings

C) To explain part of the methodology used in the team's study

D) To call out a challenge the team faced in conducting its analysis

10

The following text is adapted from Edith Nesbit's 1906 novel *The Railway Children*.

> Mother did not spend all her time in paying dull [visits] to dull ladies, and sitting dully at home waiting for dull ladies to pay [visits] to her. She was almost always there, ready to play with the children, and read to them, and help them to do their home-lessons. Besides this she used to write stories for them while they were at school, and read them aloud after tea, and she always made up funny pieces of poetry for their birthdays and for other great occasions.

According to the text, what is true about Mother?

A) She wishes that more ladies would visit her.

B) Birthdays are her favorite special occasion.

C) She creates stories and poems for her children.

D) Reading to her children is her favorite activity.

CONTINUE

23

In 1637, the price of tulips skyrocketed in Amsterdam, with single bulbs of rare varieties selling for up to the equivalent of $200,000 in today's US dollars. Some historians _____ that this "tulip mania" was the first historical instance of an asset bubble, which occurs when investors drive prices to highs not supported by actual demand.

Which choice completes the text so that it conforms to the conventions of Standard English?

A) claiming
B) claim
C) having claimed
D) to claim

24

Researchers studying magnetosensation have determined why some soil-dwelling roundworms in the Southern Hemisphere move in the opposite direction of Earth's magnetic field when searching for _____ in the Northern Hemisphere, the magnetic field points down, into the ground, but in the Southern Hemisphere, it points up, toward the surface and away from worms' food sources.

Which choice completes the text so that it conforms to the conventions of Standard English?

A) food:
B) food,
C) food while
D) food

25

Scientists believe that, unlike most other species of barnacle, turtle barnacles (*Chelonibia testudinari*) can dissolve the cement-like secretions they use to attach _____ to a sea turtle shell, enabling the barnacles to move short distances across the shell's surface.

Which choice completes the text so that it conforms to the conventions of Standard English?

A) it
B) themselves
C) them
D) itself

CONTINUE

26

The classic children's board game Chutes and Ladders is a version of an ancient Nepalese game, Paramapada Sopanapata. In both games, players encounter "good" or "bad" spaces while traveling along a path; landing on one of the good spaces _____ a player to skip ahead and arrive closer to the end goal.

Which choice completes the text so that it conforms to the conventions of Standard English?

A) allows
B) are allowing
C) have allowed
D) allow

27

In 1943, in the midst of World War II, mathematics professor Grace Hopper was recruited by the US military to help the war effort by solving complex equations. Hopper's subsequent career would involve more than just _____ as a pioneering computer programmer, Hopper would help usher in the digital age.

Which choice completes the text so that it conforms to the conventions of Standard English?

A) equations, though:
B) equations, though,
C) equations. Though,
D) equations though

28

In 1453, English King Henry VI became unfit to rule after falling gravely ill. As a result, Parliament appointed Richard, Third Duke of York, who had a strong claim to the English throne, to rule as Lord Protector. Upon recovering two years later, _____ forcing an angered Richard from the royal court and precipitating a series of battles later known as the Wars of the Roses.

Which choice completes the text so that it conforms to the conventions of Standard English?

A) Henry resumed his reign,
B) the reign of Henry resumed,
C) Henry's reign resumed,
D) it was Henry who resumed his reign,

29

Although novels and poems are considered distinct literary forms, many authors have created hybrid works that incorporate elements of both. Bernardine Evaristo's *The Emperor's Babe*, _____ is a verse novel, a book-length narrative complete with characters and a plot but conveyed in short, crisp lines of poetry rather than prose.

Which choice completes the text with the most logical transition?

A) by contrast,
B) consequently,
C) secondly,
D) for example,

CONTINUE

30

At two weeks old, the time their critical socialization period begins, wolves can smell but cannot yet see or hear. Domesticated dogs, _____ can see, hear, and smell by the end of two weeks. This relative lack of sensory input may help explain why wolves behave so differently around humans than dogs do: from a very young age, wolves are more wary and less exploratory.

Which choice completes the text with the most logical transition?

A) in other words,
B) for instance,
C) by contrast,
D) accordingly,

31

Researchers Helena Mihaljević-Brandt, Lucía Santamaría, and Marco Tullney report that while mathematicians may have traditionally worked alone, evidence points to a shift in the opposite direction. _____ mathematicians are choosing to collaborate with their peers—a trend illustrated by a rise in the number of mathematics publications credited to multiple authors.

Which choice completes the text with the most logical transition?

A) Similarly,
B) For this reason,
C) Furthermore,
D) Increasingly,

CONTINUE

32

While researching a topic, a student has taken the following notes:

- Pterosaurs were flying reptiles that existed millions of years ago.
- In a 2021 study, Anusuya Chinsamy-Turan analyzed fragments of pterosaur jawbones located in the Sahara Desert.
- She was initially unsure if the bones belonged to juvenile or adult pterosaurs.
- She used advanced microscope techniques to determine that the bones had few growth lines relative to the bones of fully grown pterosaurs.
- She concluded that the bones belonged to juveniles.

The student wants to present the study and its findings. Which choice most effectively uses relevant information from the notes to accomplish this goal?

A) In 2021, Chinsamy-Turan studied pterosaur jawbones and was initially unsure if the bones belonged to juveniles or adults.

B) Pterosaur jawbones located in the Sahara Desert were the focus of a 2021 study.

C) In a 2021 study, Chinsamy-Turan used advanced microscope techniques to analyze the jawbones of pterosaurs, flying reptiles that existed millions of years ago.

D) In a 2021 study, Chinsamy-Turan determined that pterosaur jawbones located in the Sahara Desert had few growth lines relative to the bones of fully grown pterosaurs and thus belonged to juveniles.

33

While researching a topic, a student has taken the following notes:

- African American women played prominent roles in the Civil Rights Movement, including at the famous 1963 March on Washington.
- Civil rights activist Anna Hedgeman, one of the march's organizers, was a political adviser who had worked for President Truman.
- Civil rights activist Daisy Bates was a well-known journalist and advocate for school desegregation.
- Hedgeman worked behind the scenes to make sure a woman was included in the lineup of speakers at the march.
- Bates was the sole woman to speak, delivering a brief but memorable address to the cheering crowd.

The student wants to compare the two women's contributions to the March on Washington. Which choice most effectively uses relevant information from the notes to accomplish this goal?

A) Hedgeman and Bates contributed to the march in different ways; Bates, for example, delivered a brief but memorable address.

B) Hedgeman worked in politics and helped organize the march, while Bates was a journalist and school desegregation advocate.

C) Although Hedgeman worked behind the scenes to make sure a woman speaker was included, Bates was the sole woman to speak at the march.

D) Many African American women, including Bates and Hedgeman, fought for civil rights, but only one spoke at the march.

STOP

If you finish before time is called, you may check your work on this module only.
Do not turn to any other module in the test.

Math

27 QUESTIONS

DIRECTIONS

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Use of a calculator is permitted for all questions.

NOTES

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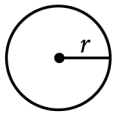
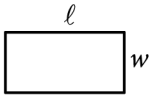
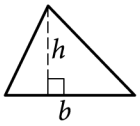


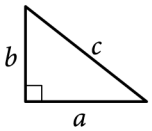
$A = \pi r^2$
$C = 2\pi r$



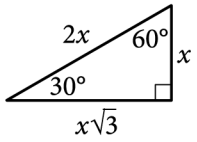
$A = \ell w$

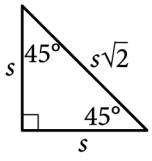


$A = \frac{1}{2}bh$

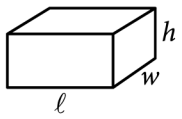


$c^2 = a^2 + b^2$

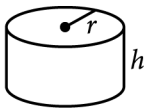




Special Right Triangles



$V = \ell wh$



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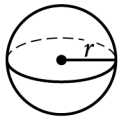
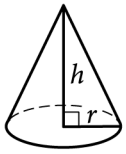
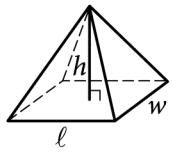


$V = \frac{4}{3}\pi r^3$



$V = \frac{1}{3}\pi r^2 h$



$V = \frac{1}{3}\ell wh$

The number of degrees of arc in a circle is 360.

The number of radians of arc in a circle is 2π.

The sum of the measures in degrees of the angles of a triangle is 180.

CONTINUE

For multiple-choice questions, solve each problem, choose the correct answer from the choices provided, and then circle your answer in this book. Circle only one answer for each question. If you change your mind, completely erase the circle. You will not get credit for questions with more than one answer circled, or for questions with no answers circled.

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- If your answer is a **decimal** that is too long (over 5 characters for positive, 6 characters for negative), truncate it or round at the fourth digit.
- If your answer is a **mixed number** (such as $3\frac{1}{2}$), write it as an improper fraction (7/2) or its decimal equivalent (3.5).
- Don't include **symbols** such as a percent sign, comma, or dollar sign in your circled answer.

CONTINUE

1

What is 10% of 470?

A) 37

B) 47

C) 423

D) 460

4

The function g is defined by $g(x) = x^2 + 9$. For which value of x is $g(x) = 25$?

A) 4

B) 5

C) 9

D) 13

8

A teacher is creating an assignment worth 70 points. The assignment will consist of questions worth 1 point and questions worth 3 points. Which equation represents this situation, where x represents the number of 1-point questions and y represents the number of 3-point questions?

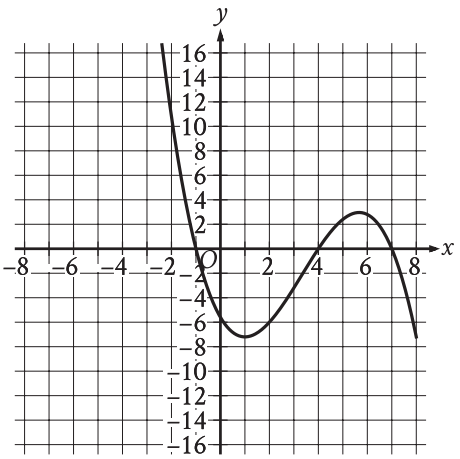
A) $4xy = 70$

B) $4(x + y) = 70$

C) $3x + y = 70$

D) $x + 3y = 70$

12



The graph of $y = f(x)$ is shown, where the function f is defined by $f(x) = ax^3 + bx^2 + cx + d$ and a, b, c, and d are constants. For how many values of x does $f(x) = 0$?

A) One

B) Two

C) Three

D) Four

16

Which expression is equivalent to $6x^8y^2 + 12x^2y^2$?

A) $6x^2y^2(2x^6)$

B) $6x^2y^2(x^4)$

C) $6x^2y^2(x^6 + 2)$

D) $6x^2y^2(x^4 + 2)$

CONTINUE

20

Data value	Frequency
6	3
7	3
8	8
9	8
10	9
11	11
12	9
13	0
14	6

The frequency table summarizes the 57 data values in a data set. What is the maximum data value in the data set?

24

x	y
18	130
23	160
26	178

For line h, the table shows three values of x and their corresponding values of y. Line k is the result of translating line h down 5 units in the xy-plane. What is the x-intercept of line k?

A) $\left(-\frac{26}{3}, 0\right)$

B) $\left(-\frac{9}{2}, 0\right)$

C) $\left(-\frac{11}{3}, 0\right)$

D) $\left(-\frac{17}{6}, 0\right)$

27

The perimeter of an equilateral triangle is 624 centimeters. The height of this triangle is $k\sqrt{3}$ centimeters, where k is a constant. What is the value of k?

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CONTINUE

No Test Material On This Page

Math

27 QUESTIONS

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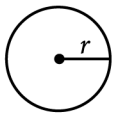

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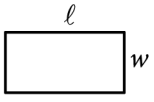

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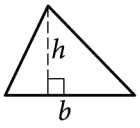

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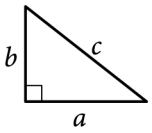

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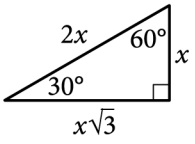

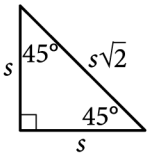

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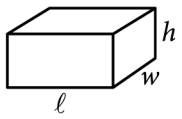

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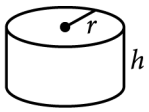

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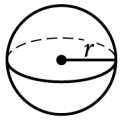

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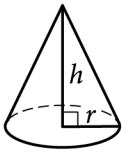

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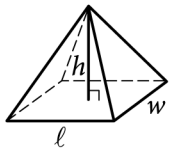

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- If your answer is a **fraction** that is too long (over 5 characters for positive, 6 characters for negative), write the decimal equivalent.
- If your answer is a **decimal** that is too long (over 5 characters for positive, 6 characters for negative), truncate it or round at the fourth digit.
- If your answer is a **mixed number** (such as $3\frac{1}{2}$), write it as an improper fraction (7/2) or its decimal equivalent (3.5).
- Don't include **symbols** such as a percent sign, comma, or dollar sign in your circled answer.

CONTINUE

1

Tilly earns p dollars for every w hours of work. Which expression represents the amount of money, in dollars, Tilly earns for $39w$ hours of work?

A) $39p$

B) $\frac{p}{39}$

C) $p + 39$

D) $p - 39$

4

$$s = 40 + 3t$$

The equation gives the speed s, in miles per hour, of a certain car t seconds after it began to accelerate. What is the speed, in miles per hour, of the car 5 seconds after it began to accelerate?

A) 40

B) 43

C) 45

D) 55

8

The function f is defined by $f(x) = \frac{1}{10}x - 2$. What is the y-intercept of the graph of $y = f(x)$ in the xy-plane?

A) $(-2, 0)$

B) $(0, -2)$

C) $\left(0, \frac{1}{10}\right)$

D) $\left(\frac{1}{10}, 0\right)$

12

The function p is defined by $p(n) = 7n^3$. What is the value of n when $p(n)$ is equal to 56?

A) 2

B) $\frac{8}{3}$

C) 7

D) 8

CONTINUE

16

$$g(x) = x^2 + 55$$

What is the minimum value of the given function?

A) 0

B) 55

C) 110

D) 3,025

20

An event planner is planning a party. It costs the event planner a onetime fee of \$35 to rent the venue and \$10.25 per attendee. The event planner has a budget of \$200. What is the greatest number of attendees possible without exceeding the budget?

24

For the exponential function f, the value of $f(1)$ is k, where k is a constant. Which of the following equivalent forms of the function f shows the value of k as the coefficient or the base?

A) $f(x) = 50(1.6)^{x+1}$

B) $f(x) = 80(1.6)^{x}$

C) $f(x) = 128(1.6)^{x-1}$

D) $f(x) = 204.8(1.6)^{x-2}$

27

$$x^2 - 34x + c = 0$$

In the given equation, c is a constant. The equation has no real solutions if $c > n$. What is the least possible value of n?

CONTINUE

[redacted]

[redacted] The ACT® [redacted]

In response to your request for Test Information Release materials, this booklet contains the test questions, scoring keys, and conversion tables used in determining your ACT scores. Enclosed with this booklet is a report that lists each of your answers, shows whether your answer was correct, and, if your answer was not correct, gives the correct answer.

ENGLISH TEST

45 Minutes—75 Questions

DIRECTIONS: In the five passages that follow, certain words and phrases are underlined and numbered. In the right-hand column, you will find alternatives for the underlined part. In most cases, you are to choose the one that best expresses the idea, makes the statement appropriate for standard written English, or is worded most consistently with the style and tone of the passage as a whole. If you think the original version is best, choose "NO CHANGE." In some cases, you will find in the right-hand column a question about the underlined part. You are to choose the best answer to the question.

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

NASA's Inaugural Artist in Residence

[1]

For over forty years, Laurie Anderson has appropriated electronics, video, and sound, to create[1] art that defies categorization. In 1972, Anderson ignited her career;[2] by conducting a symphony using only car horns. [A] Five years later, she invented a violin that clones[3] as an audiotape player. Anderson went on to stage technology-enhanced performance art, direct music videos, and invent[4] tools to manipulate sound. [B] In 2002, Anderson's fascination with technology contributed to her being named the first artist in residence at NASA, where she was given free rein to explore the facilities in search of inspiration. [C]

[2]

She found her inspiration in how technology has developed over time. When Anderson was growing up in the 1950s, space travel and artificial intelligence existed only in science fiction stories.

1. **A.** NO CHANGE
B. sound, to create,
C. sound to create,
D. sound to create

2. **F.** NO CHANGE
G. Anderson, to ignite her career,
H. Anderson igniting her career
J. Anderson ignited her career

3. **A.** NO CHANGE
B. duplicates
C. doubles
D. copies

4. **F.** NO CHANGE
G. the invention of
H. inventing
J. to invent

A half century later, at NASA, Anderson witnessed the realization of both. During a visit to a virtual airport

control center, Anderson viewed panoramic images of the red planet, courtesy from a video feed provided of the Mars Global Surveyor satellite. At the Jet Propulsion Laboratory in Pasadena, California, she was introduced to robots that function autonomously through control-and-sensor-processing software. [D]

[3]

Drawing on her NASA experiences, Anderson wrote and produced a ninety-minute performance art piece titled *The End of the Moon*. The performance features Anderson on a candlelit stage, standing in front of an image of the moon's surface. [9]

5. Which choice provides the most effective transition from the first two sentences of the paragraph to the rest of the paragraph?

A. NO CHANGE
B. In fact, science fiction masters like Ray Bradbury and Isaac Asimov received much acclaim for their work at this time.
C. Anderson, who grew up in Chicago, studied classical violin as a child.
D. NASA has grown considerably since it was established in 1958.

6. **F.** NO CHANGE
G. eyeballed all-encompassing snapshots
H. beheld wide-ranging pictorial images
J. ogled comprehensive photographs

7. **A.** NO CHANGE
B. from a video feed provided by
C. of a video feed provided by
D. by a video feed provided of

8. Which of the following alternatives to the underlined portion would NOT be acceptable?

F. stage, where she stands
G. stage as she stands
H. stage. She stands
J. stage; standing

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

> Neil Armstrong was the first man to be photographed walking on the moon's surface.

Should the writer make this addition?

A. Yes, because the sentence contributes to the paragraph's discussion of how Anderson uses photography in her performance art.
B. Yes, because the sentence contributes to the paragraph's discussion of how and why *The End of the Moon* is a reimagining of NASA's first moon landing.
C. No, because the sentence is not relevant to the paragraph's description and interpretation of *The End of the Moon*.
D. No, because the sentence is not relevant to the paragraph's critique of Anderson's struggle to make performance art commercially viable.

Anderson begins the show by referencing the technology to which she was privy[10] at NASA. Anderson then complements these references by subtly demonstrating its[11] impact on music. While sweeping the bow over the strings of a viola,[12] Anderson manipulates the music via a laptop computer. The string music that transforms[13] into electronic sounds, which then reverberate into futuristic, otherworldly music. The result is surreal and stimulating exactly[14] what you might expect from NASA's inaugural artist in residence.

10. **F.** NO CHANGE
G. to, which she was privy,
H. to which, she was privy,
J. to which she was privy,

11. **A.** NO CHANGE
B. technology's
C. one's
D. this

12. Which choice provides the most vivid description of Anderson's action?

F. NO CHANGE
G. moving a bow over a stringed instrument,
H. producing music by playing a viola,
J. rubbing an instrument with a bow,

13. **A.** NO CHANGE
B. music is transformed
C. music, transforming
D. music transforming

14. **F.** NO CHANGE
G. stimulating: and
H. stimulating—
J. stimulating;

Question 15 asks about the preceding passage as a whole.

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

> Her "talking stick," for instance, was a six-foot-long baton that could record and replicate sounds.

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

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

DO YOUR FIGURING HERE.

11. The lengths of corresponding sides of 2 similar right triangles are in the ratio 4:5. The hypotenuse of the smaller triangle is 24 inches long. How many inches long is the hypotenuse of the larger triangle?

A. 1.25
B. 9
C. 20
D. 25
E. 30

12. The lengths of the 3 sides of right triangle $\triangle ABC$ shown below are given in meters. What is sin A ?

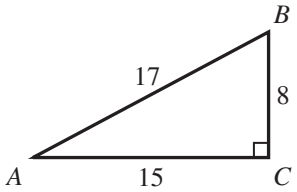
F. $\frac{8}{17}$

G. $\frac{8}{15}$

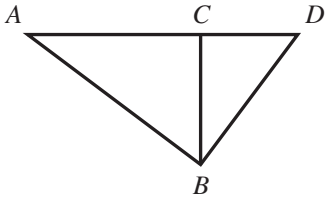
H. $\frac{15}{17}$

J. $\frac{17}{15}$

K. $\frac{17}{8}$



13. In the figure shown below, C is on the segment with endpoints A and D. The distance between A and B is 2,000 km, between A and C is 1,600 km, between A and D is 2,500 km, and between B and C is 1,200 km. What is the distance, in kilometers, between B and D ?



A. $100\sqrt{481}$
B. $300\sqrt{7}$
C. 900
D. 1,200
E. 1,500

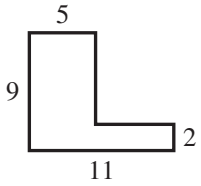
GO ON TO THE NEXT PAGE.

14. What is the sum of the 2 solutions of the equation $x^2 - 4x - 45 = 0$?

F. −45
G. −5
H. 0
J. 4
K. 9

DO YOUR FIGURING HERE.

15. In the figure shown below, all angles are right angles, and the side lengths given are in inches. What is the area, in square inches, of the figure?



A. 42
B. 57
C. 67
D. 89
E. 99

31. All 25 students in a chemistry class took a test. Each student earned a test score that was an integer number of points, and no 2 students earned the same test score. The median test score was 80 points. How many students earned a test score that was greater than 80 points?

A. 5
B. 12
C. 13
D. 14
E. 20

32. Shefali goes to a farmers' market every Saturday. Two Saturdays ago, Shefali purchased 3 apples and 4 oranges for a total of $3.47. Last Saturday, she purchased 12 oranges, but no apples, and spent $6.36. Today, she only has one $10 bill. Given that none of the prices have changed over the last 3 weeks, what is the maximum number of apples she can purchase today?

(Note: No sales tax is charged at this farmers' market.)

F. 18
G. 19
H. 21
J. 22
K. 23

GO ON TO THE NEXT PAGE.

DO YOUR FIGURING HERE.

Use the following information to answer questions 33–36.

Fletcher purchased 5 items at Hippity-Bippity Toy Store for a total of $18.55, which included sales tax. When he arrived home, he discovered that his receipt was torn and did not show the price of the bag of balloons or the 6% sales tax applied to the sum of the 5 prices. The partial receipt is shown below.

Hippity-Bippity Toy Store

Date: 12-20-2014
Time: 2:30 p.m.

Item	Price
Bag of marbles	$2.00
Doll	$6.00
Car	$3.00
Jump rope	$4.00
Bag of ballo	

33. Fletcher left his home 1 hour 15 minutes before he entered the store. He spent 25 minutes in the store before he made his purchase. What time did Fletcher leave his home?

A. 12:50 p.m.
B. 1:10 p.m.
C. 1:20 p.m.
D. 1:30 p.m.
E. 1:40 p.m.

34. To the nearest $0.10, what was the price of the bag of balloons?

F. $1.10
G. $2.40
H. $2.50
J. $2.70
K. $3.50

35. The price of the doll was how much greater than the mean of the 4 prices shown on the partial receipt?

A. $1.50
B. $2.00
C. $2.25
D. $2.50
E. $3.00

GO ON TO THE NEXT PAGE.

DO YOUR FIGURING HERE.

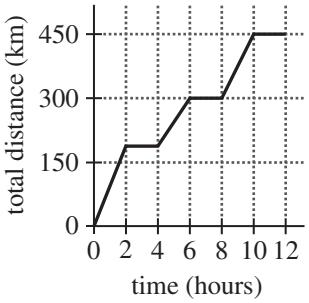
41. Given the functions $f(x) = x^2 + 1$ and $g(x) = x - 3$, which of the following expressions is $f(g(x))$?

A. $x^2 - 8$
B. $x^2 - 6x + 10$
C. $x^2 + x - 2$
D. $x^3 + x - 3$
E. $x^3 - 3x^2 + x -$

42. Given that the equation $\frac{4x - y}{x + y} = \frac{5}{2}$ is true, what is the value of $\frac{x}{y}$?

F. $\frac{2}{3}$
G. $\frac{5}{2}$
H. $\frac{7}{3}$
J. $\frac{7}{5}$
K. $\frac{7}{18}$

43. Juro traveled to 3 locations during a workday. Juro remained at each location a whole number of hours. The graph below shows the relationship between time, in hours, into his workday and total distance, in kilometers, traveled. Which of the following values is closest to Juro's average speed, in kilometers per hour, for the parts of the workday when he was traveling?



A. 45
B. 57
C. 60
D. 75
E. 94

GO ON TO THE NEXT PAGE.

DO YOUR FIGURING HERE.

44. What is the amplitude of the function $y = 3 \sin x$?

F. 1

G. 3

H. 6

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

K. $\frac{3}{2}$

45. For all nonzero values of w, which of the following expressions is equivalent to $\frac{4}{w} + \frac{2}{w^2}$?

A. $\frac{2w + 1}{w^2}$

B. $\frac{4w + 2}{w^2}$

C. $\frac{6}{w + w^2}$

D. $\frac{6}{w^2}$

E. $\frac{6}{w^3}$

GO ON TO THE NEXT PAGE.

READING TEST

35 Minutes—40 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 adapted from the autobiography *A Peculiar Treasure* by Edna Ferber (©1960 by Morris L. Ernst, et al., Trustees). Passage B is adapted from the memoir *Pull Me Up: A Memoir* by Dan Barry (©2004 by Dan Barry).

Passage A by Edna Ferber

The printing shop and pressroom were separated from the front office only by a doorway, and the door never was closed. There were the type forms and tables, the linotype machine (a new and fearsome invention to me), the small press, the big newspaper press, the boiler plate, the trays of type, all the paraphernalia that goes to make up the heart of a small-town newspaper. The front room is its head, but without the back room it could not function or even live. The linotype and the small press went all day, for there the advertising was set up and printed, as well as handbills, programs, all the odds and ends classified as job printing. Mac, who ruled this domain, was the perfect example of the fictional printer. He had come in years before, his brown hair curled over a mild brow, his limp shirt seemed perennial. But his eye was infallible, and few if any shrdlus and etaoins marred the fair sequence of Mac's copy. His voice was soft, gentle, drawling, but he was boss of the print shop from the cat to the linotype operator. Mac seldom talked but sometimes—rarely—he appeared in the front office, a drooping figure, with a piece of news by which he had come in some devious way. Standing at the side of the city editor's desk he would deliver himself of this information, looking mild and limply romantic. It always proved to be a bombshell.

Such was the make-up of the Appleton, Wisconsin, Daily Crescent office.

In the past thirty years all sorts of ex-newspaper men from Richard Harding Davis to Vincent Sheean and John Gunther have written about the lure of the reporter's life, the smell of printer's ink, the adventure of reporting. It all sounds slightly sentimental and silly, but it's true—or it was, at least, in my newspaper experience. To this day I can't smell the scent of white paper, wet ink, oil, hot lead, mucilage and cats that goes to make up the peculiar odor of any newspaper plant, be it Appleton, Wisconsin, or Cairo, Egypt, that I don't get a pang of nostalgia for the old reporting days. "I was once a newspaper man myself" has come to be a fun phrase. But practically everyone seems to have been, or to have wanted to be, a newspaper reporter.

Passage B by Dan Barry

Ink. The building smelled of ink, spilled and bled. It was a tart and chemical smell, the kind that weaves into the fabric of your clothes and then under your skin, the kind that comes home with you, sits with you at the dinner table, tells you constantly what it is you do. Car mechanics know their smell, as do fishermen and hair stylists, nurses and short-order cooks. You are a man who chases halibut, a woman who perms hair. You smell of it.

I waded into that invisible veil of ink, inhaled it deeply, allowed it to wash over me. It smelled of words and phrases, rants and ideas, sports scores and felony arrests, announcements of marriage and notices of death. Maybe the chemical-like aroma was inducing hallucination, but I doubted it. In a squat concrete building, no different from all the others in a drab Connecticut industrial park, I was experiencing a moment of revelation—an epiphany, really, at the age of twenty-five.

This is what I do.

Pinned like a manifesto to a bulletin board in the center of this ink-perfumed building was a typewritten note from my new employer, announcing that on this day, October 17, 1983, I would begin working as a reporter for a daily newspaper. The note formalized my calling in life with a splash of perspective that would stay with me forever:

Dan is a former intern at the Daily News *in New York and a graduate assistant for the journalism department at New York University. His writing has appeared in the* Daily News, *the* New York Times *and the* Rocky Mountain News. *Soon it will appear in trashcans throughout north-central Connecticut. Please make him feel relevant.*

Reading the note, I thought, I'm home.

GO ON TO THE NEXT PAGE.

Finding my way had not been easy. The internship at the *Daily News* had ended, the graduate degree from NYU had been shoved in a drawer, and I had returned to living beside the sump pump in my parents' basement. I spent my days splitting sod for a lawn and sprinkling company alongside Eddie, who had taken to calling me "Professor," and my nights typing out professional love letters to the *New London Day*, the *Asbury Park Press*, the *Poughkeepsie Journal*, the *Stamford Advocate*, the *Anywhere Clarion-Bugle-Star-Record-Sentinel*, and every other Northeastern newspaper that I had never read.

Questions 1–4 ask about Passage A.

1. It can reasonably be inferred that Passage A is narrated from the point of view of someone who:

A. once worked in the newspaper business.
B. recently started a career in the newspaper business.
C. is outside the newspaper business and is evaluating the inner workings of various news offices.
D. is outside the newspaper business and longs to be a reporter.

2. Based on Passage A, the narrator believes that, compared to what goes on in the front office, what goes on in the printing shop and pressroom is:

F. more tedious.
G. equally critical.
H. equally chaotic.
J. less regulated.

3. The narrator of Passage A most nearly characterizes Mac as both:

A. innately talented and professionally incompetent.
B. innately talented and professionally inexperienced.
C. temperamentally unimposing and professionally inexperienced.
D. temperamentally unimposing and professionally invaluable.

4. According to the narrator of Passage A, Mac would occasionally appear in the front office in order to:

F. set up and print the advertising.
G. supervise the linotype operator.
H. chastise the reporters for having too many errors in their copy.
J. share newsworthy information with the city editor.

Questions 5–7 ask about Passage B.

5. What is the epiphany the narrator of Passage B experienced at the age of twenty-five?

A. He couldn't live in his parents' basement forever.
B. His dream of being a reporter had finally been realized.
C. He would rather write news stories than work for a lawn company.
D. His success as a reporter would depend on his work ethic.

6. Based on Passage B, the note that the narrator's employer wrote can best be described as:

F. mildly sarcastic.
G. overtly solemn.
H. blatantly apologetic.
J. particularly optimistic.

7. The last sentence of Passage B mainly serves to indicate that the narrator:

A. had disdain for most northeastern newspapers.
B. was familiar with the newspapers published around the area.
C. was desperate to find a newswriting job.
D. had extensive newswriting experience.

Questions 8–10 ask about both passages.

8. Compared to the description of the newspaper office mentioned in Passage A, the description of the newspaper office mentioned in Passage B provides less information about the:

F. types of machines used to print the newspaper.
G. outside appearance of the office building.
H. number of people who work in the office.
J. types of stories being written and printed for the newspaper.

9. Compared to Passage A, the style of Passage B is more strongly characterized by its use of:

A. technical jargon.
B. dialogue.
C. formal diction.
D. figurative language.

10. Based on the passages, who would be most likely to associate the smell of ink with pleasant memories?

F. The narrator of Passage A only
G. The narrator of Passage B only
H. Both narrators
J. Neither narrator

GO ON TO THE NEXT PAGE.

Passage II

SOCIAL SCIENCE: This passage is adapted from the book *Lost Discoveries: The Ancient Roots of Modern Science—from the Babylonians to the Maya* by Dick Teresi (©2002 by Dick Teresi).

"In the history of culture," wrote mathematician Tobias Dantzig in 1930, "the discovery of zero will always stand out as one of the greatest single achievements of the human race." Zero, he said, marked a "turning point" in math, science, and industry. He also noted that the zero was invented not in the West but by the Indians in the early centuries after Christ. Negative numbers followed soon thereafter. The Maya invented zero in the New World at approximately the same time. Europe, says Dantzig, did not accept zero as a number until the twelfth or thirteenth century.

There are many "biographies of zero," and Dantzig's concise and spirited account of the birth of a number is adequate for most of us. He sees zero's invention appearing on an Indian's counting board in, say, the first or second century A.D. The Indian counting board had columns for the ones, tens, hundreds, thousands, and so on. To "write" 302, for instance, a mathematician would put a 2 in the first (right) column and a 3 in the third, leaving the second column empty. On one fateful day, as Dantzig sees it, an unknown Indian drew an oval in the second column. He called it *sunya*, for "empty" or "blank." *Sunyata*, an important concept in Buddhism, is often translated as "emptiness" or "void."

The Arabs turned *sunya* into *sifr* ("empty" in Arabic), which became *zephirum* in Italy, and eventually zero. In Germany and elsewhere, *sifr* became *cifra*, and then, in English, *cipher*. In other words, it took over a thousand years for Western civilization to accept a number for "nothing." Dantzig blames the Greeks. "The concrete mind of the ancient Greeks could not conceive the void as a number, let alone endow the void with a symbol."

That's the short version, and not a bad one. You don't want to hear the long version, so let's suffice with a medium-sized tale.

Zero lay rustling in the weeds for many centuries before that Indian drew it on a counting board. It was an unnamed, unwritten force. It took many more centuries after the Indians and the Maya dared speak its name before zero was promoted to a full-fledged number.

The U.S. Library of Congress defends our calendar and its missing zero. "There has never been a system of recording reigns, dynasties, or eras," the library states, "that did not designate its first year as the year 1." In fact, the Maya had both years 0 and days 0.

The Babylonians had no zero, but they knew something was wrong. If they numbered the first year of each king's reign as year 1, then added up the number of years of each separate reign, they'd end up with too many years unless each king died just before midnight on New Year's Eve and his successor took the throne after midnight. Thus, the Babylonians called a king's first year the *accession year*. The following year was year 1. The accession year was a kind of year 0. The Babylonians, so far as we know, never articulated zero, but seemed aware that there was a missing number in their system.

The contemporary mathematician who has conducted the most rigorous research on nothing is Robert Kaplan, the author of *The Nothing That Is: A Natural History of Zero*. Zero turns up throughout history in different cultures as a series of dots and circles, and Kaplan writes of following "the swarm of dots we find in writings from a host of languages, across great spans of time, and on topics mathematical and otherwise."

Kaplan traces the roots of zero to Sumer and Babylonia. The Sumerians counted by tens and sixties, a system adopted by the Babylonians, who eclipsed them in Mesopotamia. The Babylonians, far ahead of the Romans and Greeks to come, imposed a positional notation on the old Sumerian sexagesimal system. Writing their numbers on clay, the Babylonians needed a symbol to put in the "empty" columns, just as we today use zero to differentiate between 302 and 32.

Somewhere between the sixth and third centuries B.C., the Babylonians began using two slanted tacklike symbols to insert in the empty columns. They borrowed the slanty tacks from their language, where they were used as periods, among other things. However, the Babylonians used their "zero" only in the middle of numbers, never at the end. Clearly, this was not a full-fledged zero.

Kaplan argues that when Alexander invaded the Babylonian empire in 331 B.C., he hauled off zero along with the gold. Shortly thereafter we find the symbol 0 for zero in the papyri of Greek astronomers, but the mathematicians never pursued the concept.

11. According to the passage, the Babylonian and Indian civilizations were similar in that they both:

- **A.** wrote zero using tacklike symbols.
- **B.** referred to their rulers' first year in power as the *accession year*.
- **C.** derived their names for zero from their respective religions.
- **D.** used a symbol for zero in the middle of numbers.

GO ON TO THE NEXT PAGE.

12. As it is presented in the second paragraph (lines 12–25), the story of an unknown person drawing an oval on a counting board is best described as:

F. a factual account from a document Dantzig discovered.
G. a factual account from ancient Indian writings.
H. Dantzig's theory of how a historic invention occurred.
J. Kaplan's theory of how a historic invention occurred.

13. According to the passage, the Maya invented zero at about the same time as:

A. the Indians invented zero.
B. the Sumerians invented zero.
C. Alexander invaded Babylonia.
D. Europe accepted zero as a number.

14. As it is used in line 21, the phrase *fateful day* most nearly refers to a day that was:

F. unfortunate.
G. momentous.
H. ominous.
J. foretold.

15. According to the passage, in Germany, the word for zero became:

A. *sunya*.
B. *zephirum*.
C. *sifr*.
D. *cifra*.

16. In the passage, Dantzig criticizes the ancient Greeks because he thinks they:

F. lacked the abstract thinking necessary to think of the void as a number.
G. attempted to use zero in their mathematics before they understood it fully.
H. were unwilling to share their knowledge of zero with other European countries.
J. focused so much on negative numbers that they couldn't imagine a number for the void.

17. The passage author most clearly indicates that he thinks his readers wouldn't be interested in hearing:

A. the story of how the Maya conceived of zero.
B. what Dantzig contributed to mathematics.
C. the long version of the story of zero.
D. who drew the oval on the counting board in India.

18. The statement "Zero lay rustling in the weeds for many centuries" (line 38) most nearly means that the concept of zero:

F. had far-reaching effects on mathematics.
G. existed long before it was articulated.
H. had been developed and then forgotten.
J. was initially rejected by mathematicians.

19. The passage author responds to the US Library of Congress's statement that there has never been a system of dates with a year 0 by:

A. arguing that undiscovered civilizations may have had years 0.
B. citing an expert who disagrees with the statement.
C. suggesting that the Library of Congress's research is authoritative.
D. providing an example that contradicts the statement.

20. The passage author most clearly indicates that compared to other contemporary mathematicians' research on zero, Kaplan's research is more:

F. interesting.
G. speculative.
H. thorough.
J. admired.

GO ON TO THE NEXT PAGE.

SCIENCE TEST

35 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

The freezing point of an aqueous solution (T_f), in °C, can be calculated using the equation

$$T_f = -1.86 \times m \times i$$

where m is the concentration of the solute in moles of solute per kilogram of H_2O (mol/kg H_2O) and i is the average number of particles produced by 1 formula unit of the solute when the formula unit dissolves in H_2O. The *theoretical i value* of a solute is the total number of particles produced when 1 formula unit of the solute dissolves in H_2O. Table 1 gives, for 4 ionic compounds, the chemical formula and the theoretical i value. Table 2 shows how the *observed i value* at 25°C for these compounds changes with solute concentration.

Table 1

Name	Chemical formula	Theoretical i value
Sodium chloride	NaCl	2
Potassium chloride	KCl	2
Magnesium chloride	$MgCl_2$	3
Ammonium sulfate	$(NH_4)_2SO_4$	3

Table 2

Concentration of aqueous solution (mol/kg H_2O)	Observed i value at 25°C for:			
	NaCl	KCl	$MgCl_2$	$(NH_4)_2SO_4$
0.1	1.87	1.85	2.58	2.30
0.2	1.85	1.83	2.63	2.19
0.3	1.84	1.81	2.68	2.12
0.4	1.84	1.80	2.76	2.07
0.5	1.84	1.80	2.84	2.03
0.6	1.85	1.80	2.92	2.00
0.7	1.85	1.79	3.01	1.97
0.8	1.86	1.79	3.11	1.96
0.9	1.86	1.79	3.21	1.94
1.0	1.87	1.80	3.32	1.92
2.0	1.97	1.83	4.57	1.87

Table 2 adapted from B. A. Kunkel, "Comments on 'A Generalized Equation for the Solution Effect in Droplet Growth.'" ©1969 by American Meteorological Society.

1. Based on Table 2, what is the observed *i* value for a 0.6 mol/kg H_2O solution of $(NH_4)_2SO_4$?

A. 1.97
B. 2.00
C. 2.03
D. 2.92

2. According to Table 2, which compounds have observed *i* values less than 2.50 at all the concentrations listed?

F. NaCl, KCl, and $MgCl_2$ only
G. NaCl, KCl, and $(NH_4)_2SO_4$ only
H. KCl, $MgCl_2$, and $(NH_4)_2SO_4$ only
J. NaCl, KCl, $MgCl_2$, and $(NH_4)_2SO_4$

3. According to Table 2, at which of the following concentrations is the observed *i* value for KCl the *lowest* ?

A. 0.3 mol/kg H_2O
B. 0.6 mol/kg H_2O
C. 0.9 mol/kg H_2O
D. 2.0 mol/kg H_2O

4. Based on Tables 1 and 2, which ionic compound has the largest deviation from its theoretical *i* value at a concentration of 2.0 mol/kg H_2O ?

F. NaCl
G. KCl
H. $MgCl_2$
J. $(NH_4)_2SO_4$

5. Consider the following substances: sodium chloride, potassium chloride, magnesium chloride, ammonium sulfate, and water. Which of these substances would be classified as a solvent in the solutions represented in Table 2 ?

A. Ammonium sulfate only
B. Water only
C. Sodium chloride, potassium chloride, and magnesium chloride only
D. Water, sodium chloride, potassium chloride, magnesium chloride, and ammonium sulfate

6. Sucrose ($C_{12}H_{22}O_{11}$) is a molecular compound and remains intact when it dissolves in water. Based on this information and the passage, would the theoretical *i* value for $C_{12}H_{22}O_{11}$ more likely be less than that of KCl or greater than that of KCl ?

F. Less; the theoretical *i* value for $C_{12}H_{22}O_{11}$ is most likely 1.
G. Less; the theoretical *i* value for $C_{12}H_{22}O_{11}$ is most likely 4 or greater.
H. Greater; the theoretical *i* value for $C_{12}H_{22}O_{11}$ is most likely 1.
J. Greater; the theoretical *i* value for $C_{12}H_{22}O_{11}$ is most likely 4 or greater.

GO ON TO THE NEXT PAGE.

Passage II

Some mutations in *Escherichia coli* allow the bacteria to survive exposure to an antibiotic. These antibiotic-resistant bacteria may have a different *relative fitness* (a measure of survival and reproductive success) than *E. coli* without mutations. Scientists conducted a study to determine the relative fitness of 5 *E. coli* strains—1 nonmutated (Strain U) and 4 mutated (Strains W, X, Y, and Z)—when the strains were exposed for 24 hr to each of 5 different concentrations of the antibiotic *streptomycin* (see Table 1). The effect of the mutation in each of Strains W–Z is listed in Table 2.

Table 1

Strain	Relative fitness of *E. coli* exposed for 24 hr to a streptomycin concentration (in μg/mL*) of:				
	0	2	4	6	8
U	1.0	0.5	0.0	0.0	0.0
W	1.2	0.3	0.1	0.0	0.0
X	0.9	0.8	0.5	0.2	0.0
Y	0.7	0.8	0.7	0.5	0.3
Z	1.0	0.1	0.9	0.8	1.5

*micrograms per milliliter

Note: A relative fitness of 0.0 indicates no surviving bacteria.

Table 1 adapted from Viktória Lázár et al., "Bacterial Evolution of Antibiotic Hypersensitivity." ©2013 by EMBO and Macmillan Publishers Limited.

Table 2

Strain	Effect of mutation
W	Increased rate of cell division
X	Increased rate of streptomycin removal from the cell
Y	Decreased rate of streptomycin entry into the cell
Z	Decreased rate of DNA damage repair

7. Based on Table 1, as streptomycin concentration increased, the relative fitness of Strain Y:

A. increased only.
B. decreased only.
C. increased and then decreased.
D. decreased and then increased.

8. Based on Table 1, if Strain X had been exposed for 24 hr to a streptomycin concentration of 3 μg/mL, its relative fitness would most likely have been:

F. less than 0.5.
G. between 0.5 and 0.8.
H. between 0.8 and 0.9.
J. greater than 0.9.

9. According to Table 2, which of the following statements best describes the effect of the mutation in Strain X cells? Compared to nonmutated *E. coli* cells, Strain X cells move streptomycin:

A. into the cell at a decreased rate.
B. into the cell at an increased rate.
C. out of the cell at a decreased rate.
D. out of the cell at an increased rate.

10. Suppose an equal number of Strain W cells and Strain X cells were exposed for 24 hr to a streptomycin concentration of 2 μg/mL. Based on Table 1, which of Strain W or Strain X would more likely have the greater number of cells survive and reproduce?

F. Strain W; Strain W had a relative fitness of 0.3, and Strain X had a relative fitness of 0.8.
G. Strain W; Strain W had a relative fitness of 1.2, and Strain X had a relative fitness of 0.9.
H. Strain X; Strain X had a relative fitness of 0.8, and Strain W had a relative fitness of 0.3.
J. Strain X; Strain X had a relative fitness of 0.9, and Strain W had a relative fitness of 1.2.

GO ON TO THE NEXT PAGE.

11. Consider the mutated strain with an increased rate of cell division. According to Table 1, what was the relative fitness of this strain when it was exposed for 24 hr to a streptomycin concentration of 4 μg/mL ?

A. 0.0
B. 0.1
C. 0.5
D. 0.7

12. In the study, the relative fitness of a nonmutated strain that was grown for 24 hr in the absence of an antibiotic was set to 1.0. Was this strain more likely Strain U or Strain Z, and was this strain grown for 24 hr at a streptomycin concentration of 0 μg/mL or at a streptomycin concentration of 8 μg/mL ?

F. Strain U; 0 μg/mL
G. Strain U; 8 μg/mL
H. Strain Z; 0 μg/mL
J. Strain Z; 8 μg/mL