# June 2011

# ACT Form 67B

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# 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.

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**PASSAGE I**

## George Rickey, Kinetic Sculptor

Though he started his art career as a painter, George Rickey (1907–2002) became fascinated with creating sculptures with moving parts. Eventually, one of the[1] leaders in the new field of kinetic art. Today, his sculptures—which[2] spin, tilt, shift, and sway—belong to private and public collections worldwide. [3]

To get an idea of Rickey's art, imagine a cluster of artistic cylinders standing in a grassy clearing. Attached[4]

1. A. NO CHANGE
   B. Becoming, eventually, one of
   C. Eventually, he established himself as one of
   D. With his eventual establishment among

2. F. NO CHANGE
   G. to
   H. making them
   J. DELETE the underlined portion.

3. At this point, the writer is considering adding the following true statement:

   Some of the artworks have found homes outside the United States.

   Should the writer make this addition here?

   A. Yes, because it establishes the importance of Rickey's work.
   B. Yes, because it effectively summarizes this paragraph.
   C. No, because it is written in a tone that is too formal for the essay.
   D. No, because it consists of information that has already been provided in the essay.

4. Given that all the choices are true, which one adds new and specific information to the essay?

   F. NO CHANGE
   G. vertical, stainless steel
   H. sculptural
   J. more than one cylindrical

to each shiny cylinder is a slender blade that moves in the slightest breeze. As the air current changes, the sculpture changes with it. Viewers witness art in motion, they are like a flock of elegant windmills.

Rickey was born in Indiana. The grandson of a clockmaker and the son of an engineer at a sewing machine company, however, the future artist grew up in a family with mechanical informational knowledge awareness. In college, Rickey studied history and art. After teaching for some years, he had began painting full time. During World War II, as a member of the Army Air Corps, he worked in a machine shop. This reexposure to mechanics pushed his art into the realm of moving parts, from two into three dimensions.

His early pieces of kinetic art were small, complicated forms that were displayed indoors. Over the years, his work increased in size, he simplified the forms, and started appearing outdoors. The changes, he said, reflected his efforts to focus on the essence of motion.

With a sophisticated understanding of gravity, Rickey worked with counterweights and bearings to create objects that move gracefully. His exploration of geometric figures—squares, circles, triangles, to name only a few. In this way, they were like the many artists of his day who worked primarily with abstract forms.

5. A. NO CHANGE
   B. each, shiny,
   C. each shiny,
   D. each, shiny

6. F. NO CHANGE
   G. something to describe
   H. because something
   J. something

7. A. NO CHANGE
   B. for instance,
   C. meanwhile,
   D. DELETE the underlined portion.

8. F. NO CHANGE
   G. expertise.
   H. traits of experience.
   J. features.

9. A. NO CHANGE
   B. would of begun
   C. began
   D. begun

10. Which of the following alternatives to the underlined portion would be LEAST acceptable?
    F. works
    G. things
    H. creations
    J. sculptures

11. A. NO CHANGE
    B. he made it simpler,
    C. became simpler in form,
    D. there was a new simplicity to it,

12. F. NO CHANGE
    G. To explore
    H. While exploring
    J. He explored

13. A. NO CHANGE
    B. it was
    C. he was
    D. his was

Rickey inspired a generation of sculptors many were
14
his students; others knew only his work. His last and tallest sculpture, over fifty-seven feet high, was installed in Japan just months before his death at age ninety-five.

14. F. NO CHANGE
G. sculptors, it can be said that many
H. sculptors. Many
J. sculptors

Question 15 asks about the preceding passage as a whole.

15. Suppose the writer had intended to write an essay focusing on a sculptor in the field of kinetic art. Would this essay accomplish that goal?
A. Yes, because it explains that the U.S.-born Rickey traveled to Japan to learn about kinetic art.
B. Yes, because it establishes that Rickey was a sculptor and leader in the field of kinetic art.
C. No, because it focuses on the generation of sculptors who were inspired by Rickey.
D. No, because it indicates that Rickey was a painter before he became a sculptor.

**PASSAGE II**

The following paragraphs may or may not be in the most logical order. Each paragraph is numbered in brackets, and question 29 will ask you to choose where Paragraph 4 should most logically be placed.

**Touching the Sky**

[1]

The summer, before her senior year at Boston
16
University, Noreen Grice worked as an intern at Boston's Museum of Science. While presenting a planetarium show to students from the nearby Perkins School for the Blind, it became apparent that the planetarium show relied
17
heavily on visual information and that no aids were available to enhance the planetarium experience for

16. F. NO CHANGE
G. summer, before her senior year,
H. summer before her senior year
J. summer before, her senior year

17. A. NO CHANGE
B. Grice realized that
C. it was noticed that
D. DELETE the underlined portion.

people who were visually impaired. [18]

[2]

Several years later, after completing her master's degree in astronomy. Grice began to experiment with ways of creating "tactile illustrations" that could be read by touch. Initially, she produced a book of simple but effective raised astronomical diagrams entitled *Touch the Stars*, published in 1999.

[3]

*Touch the Stars* attracted the attention of an astronomy professor at DePaul University. He suggested that Grice produce a book of more sophisticated tactile illustrations based on images beamed back to Earth from the orbiting Hubble Space Telescope.

[4]

Astronomy students, at the Colorado School for the Deaf and the Blind field-tested the illustrations and offered suggestions for improvement.

When Grice and the students were finally satisfied, the illustrations were stamped onto metal plates, which were then used to mass-produce molded plastic pages.

**18.** At this point, the writer is considering adding the following true statement:

> Helen Keller, who forever changed perceptions about what people who are visually and hearing impaired can do, attended the Perkins School for the Blind in the late 1880s.

Should the writer make this addition here?

- **F.** Yes, because it ties the essay to a well-known person.
- **G.** Yes, because it explains why the writer mentioned the Perkins School.
- **H.** No, because it has no connection to any other information in this paragraph.
- **J.** No, because it distracts the reader from the main topic of the essay.

**19.**
- **A.** NO CHANGE
- **B.** astronomy, Grice
- **C.** astronomy, Grice,
- **D.** astronomy; Grice

**20.**
- **F.** NO CHANGE
- **G.** students at the Colorado School for the Deaf and the Blind
- **H.** students at the Colorado School for the Deaf and the Blind,
- **J.** students—at the Colorado School for the Deaf and the Blind,

**21.**
- **A.** NO CHANGE
- **B.** made recommendations and offered suggestions
- **C.** gave their two cents' worth about ideas
- **D.** made suggestions, gave advice, and offered new ideas

**22.**
- **F.** NO CHANGE
- **G.** Nevertheless, when
- **H.** On the contrary, when
- **J.** For this reason, when

[5]

Grice went to work, putting in long hours at her kitchen table (23) to create prototype illustrations.

She traced images—of planets, stars, and galaxies (24) onto notebook-sized plastic sheets, then used various tools to create raised shapes that marked the outlines of celestial objects. Grice also inscribed raised lines and bumps to convey color and other relevant information. For example, solid lines represented the color blue, dotted lines signified rings, and wavy lines indicate (25) gas currents. [26]

[6]

The new book was called *Touch the Universe*. After its publication in 2002, one woman acquired a copy for her ten-year-old son, who is visually impaired and wants to be an astronaut. Thanks in part to Grice, the boys' access (27) to space may lie right at his doorstep. (28)

**23.** Which of the following placements for the underlined portion would be LEAST acceptable?

- **A.** Where it is now
- **B.** After the word *work* (and before the comma)
- **C.** After the word *putting*
- **D.** After the word *illustrations* (and before the period)

**24.**
- **F.** NO CHANGE
- **G.** images: of planets, stars, and galaxies
- **H.** images of planets, stars, and galaxies
- **J.** images of planets, stars, and galaxies,

**25.**
- **A.** NO CHANGE
- **B.** indicating
- **C.** indicated
- **D.** were indicated by

**26.** If the writer were to delete the preceding sentence, the paragraph would primarily lose:

- **F.** evidence for why Grice decided to produce the book.
- **G.** additional information about how the book works.
- **H.** details about which colors are used in the book.
- **J.** nothing at all; the information is irrelevant to the paragraph.

**27.**
- **A.** NO CHANGE
- **B.** boys' access,
- **C.** boy's access
- **D.** boys access

**28.** Which choice concludes the sentence with an image that best reflects the theme of the essay?

- **F.** NO CHANGE
- **G.** at his feet.
- **H.** in his own backyard.
- **J.** at his fingertips.

Questions 29 and 30 ask about the preceding passage as a whole.

29. For the sake of the logic and coherence of the essay, Paragraph 4 should be placed:

A. where it is now.
B. after Paragraph 1.
C. after Paragraph 2.
D. after Paragraph 5.

30. Suppose that the writer's goal had been to give a detailed example of how one individual helped people with a disability. Would this essay accomplish that goal?

F. Yes, because it focuses on how Grice helped people who are visually impaired experience astronomy.
G. Yes, because it illustrates how Grice and others were able to help people with a variety of disabilities.
H. No, because it focuses on the processes Grice used to create the books and doesn't refer to the people who use them.
J. No, because it doesn't give enough information about why Grice decided to create the books.

PASSAGE III

## Train to Kolkata

When I returned home to India recently, I had to travel from Delhi to Kolkata, the city where I was born and where I still have many relatives living there. [31] To save money, I decided to take the train [32] instead of by plane. Unlike in the United States, in my native land travel by train is extremely common between many of the countries [33] major cities—Mumbai, Jaipur, Chennai, Darjeeling, Shimla, and Agra, to name only a few.

At the busy station in Delhi, I found my name on a passenger list posted on one of the sleeper cars and boarded the overnight train. With our luggage carefully stowed, [34] we left the station

31. A. NO CHANGE
B. kinfolk and relatives in Kolkata.
C. relatives of mine in the area.
D. relatives.

32. F. NO CHANGE
G. go by train
H. chose the train
J. take a train ride

33. A. NO CHANGE
B. country's
C. countries'
D. countries,

34. Given that all the choices are true, which one is most relevant to developing the description of the countryside covered by the train?

F. NO CHANGE
G. Some of us more homesick than others,
H. With one thousand miles to go,
J. To the sound of a train whistle blowing,

at five in the afternoon. By then, the city vanished behind
35
us, and the green fields of Uttar Pradesh spread out on either side of the tracks. Though we were traveling at high speeds, the ride was smooth.

In the hours before nightfall, I watched the landscape change. The color of the earth, the shapes of dwellings, and the silhouettes of grazing animals against the setting sun all held my attention. The view stirred pleasant memories of my childhood. Mesmerized, I never bothered to unpack the books or magazines I had brought along to pass the hours. [36]

[1] At dinnertime,
a waiter serving hot meals came through the car.
37
[2] Afterward, with the flip of a few latches, my seat turned into a bunk bed. [3] Just like when I was little,

the clean sheets, the cushion beneath me was soft, and
38
the gentle rocking of the train made it easy to drift into a deep, soothing sleep. [4] I woke in the morning to a view of the Bengal countryside speeding by.

[5] As a child, I would of craned my neck to spot
39
a visible landmark. [6] Some thirty years later,
40

**35.** A. NO CHANGE
B. Once in a while,
C. Time after time,
D. Soon,

**36.** If the writer were to delete the preceding sentence, the paragraph would primarily lose details that:

F. maintain the focus on the narrator's engagement with the scenery on the trip.
G. indicate what subjects the narrator likes to read about while traveling.
H. suggest the narrator eventually grew tired of looking out the window at the scenery.
J. imply that the interior of the train was well lit, even at night, to allow passengers to read.

**37.** A. NO CHANGE
B. hot meals were served through the car and that was by a waiter.
C. coming through the car, hot meals were served by a waiter.
D. meals came through the car, served hot by a waiter.

**38.** F. NO CHANGE
G. the cushion felt soft beneath me,
H. the soft cushion beneath me,
J. it was a soft cushion.

**39.** A. NO CHANGE
B. would crane
C. crane
D. would have crane

**40.** Given that all the choices are true, which one most clearly indicates that the train ride is almost over?

F. NO CHANGE
G. a bridge that is used by vehicles and pedestrians.
H. the Rabindra Setu, also known as the Howrah Bridge.
J. the Howrah Bridge as we drew near Kolkata.

I was delighted to see the bridge again. [7] Its' metal
41
spires rose out of the mist as if nothing had changed, or ever would. [8] Sipping from a warm cup of fragrant *chai*, the patter was noticeable
42
of a soft rain that had begun to fall. [9] Now I miss the comforting sound of that train.
43
[10] When we pulled into Howrah station, there were my relatives waiting to take me home. [44]

41. A. NO CHANGE
    B. Its
    C. The sight of it's
    D. Seeing its'

42. F. NO CHANGE
    G. I listened to the patter
    H. the sound of the patter indicated the start
    J. the pattering sound was

43. Given that all the choices are true, which one provides visual description of an aspect of the narrator's train ride?
    A. NO CHANGE
    B. The train was running ten minutes behind schedule.
    C. I had meant to buy some postcards in Delhi to write during the train ride.
    D. The windows on the train shimmered as the water swept across them.

44. The writer would like to divide the preceding paragraph into two paragraphs, each one focusing on a different day of the train ride. The best place to start the new paragraph would be at the beginning of Sentence:
    F. 4.
    G. 5.
    H. 6.
    J. 7.

Question 45 asks about the preceding passage as a whole.

45. Suppose the writer's goal had been to write an essay in which childhood memories are mingled with descriptions of an adult's experience. Would this essay accomplish that goal?
    A. Yes, because it reveals that a train ride taps into the adult narrator's memories of similar trips taken years earlier.
    B. Yes, because it expresses that, as a child, the narrator found it impossible to imagine traveling far from home.
    C. No, because it makes no references to children riding on the train.
    D. No, because it is not specific about how old the narrator was on previous rides on the train.

PASSAGE IV

## New Life in an Old Forest

If you hike among the shadows of Olympic National Park in Washington State, you'll notice an unusual feature of this temperate rain forest.[46] Many of the towering trees here grow in straight rows, or colonnades[47] as if they had been planted by a human hand. No forester arranged these trees, however. Consequently,[48] they mark the former location of "nurse logs," fallen trees had[49] provided a friendly environment for tree seeds. This example of ecological succession makes it possible[50] the towering Sitka spruces, western hemlocks, and Douglas firs that dominate[51] this landscape.

The variety of vegetation in the region creates a breathtaking panorama.[52] These logs are crucial to new tree growth because the forest floor is otherwise inhospitable.[53]

**46.** Which choice would most effectively introduce the main topic of this essay?

- **F.** NO CHANGE
- **G.** have one of the most challenging hiking experiences of your life.
- **H.** never want to explore any other region in the country.
- **J.** get some great exercise in a beautiful setting.

**47.** Which of these punctuation choices would best communicate that *colonnades* is another term for straight rows of trees?

- **A.** NO CHANGE
- **B.** rows, or colonnades,
- **C.** rows or colonnades,
- **D.** rows or colonnades

**48.** 
- **F.** NO CHANGE
- **G.** Instead,
- **H.** As a result,
- **J.** Similarly,

**49.** 
- **A.** NO CHANGE
- **B.** that had
- **C.** was
- **D.** DELETE the underlined portion.

**50.** 
- **F.** NO CHANGE
- **G.** them possible
- **H.** possible
- **J.** possibly

**51.** 
- **A.** NO CHANGE
- **B.** are dominance over
- **C.** dominate around
- **D.** are dominant of

**52.** Given that all the choices are true, which one would provide the most effective introduction to this paragraph?

- **F.** NO CHANGE
- **G.** Spreading limbs of vine maples seek sunlight in the dense forest shade.
- **H.** Spring comes early to the rain forest in Olympic National Park.
- **J.** As their name implies, nurse logs serve as nurseries for young seedlings.

**53.** 
- **A.** NO CHANGE
- **B.** disagreeable.
- **C.** thoughtless.
- **D.** unsociable.

Seeds that fallen to the forest floor rarely survive, because they can't compete with the dense layers of ferns, shrubs, and other plants that carpet the forest. The decaying logs, in contrast; provide nutrients and moisture—

54. F. NO CHANGE
G. that have fallened
H. that fall
J. fallened

55. A. NO CHANGE
B. logs, in contrast
C. logs, in contrast,
D. logs in contrast,

a rich growing environment ideal for these seeds. Amid

56. Given that all the choices are true, which one provides information most relevant to the main focus of this paragraph?
F. NO CHANGE
G. which support vegetation consumed by the elk that thrive in this forest.
H. and this is one of the last old-growth forests in the Pacific Northwest.
J. nutrient-rich sustenance for bark beetles and wood borers.

the damp, spongy mosses that blanket and cover the bark of these nurse logs, new life germinates easily.

57. A. NO CHANGE
B. cover as if with a blanket
C. blanket by covering
D. blanket

Once sprouted, the seeds grow into young trees along the length of the log, drawing nourishment from the nutrients within the fallen tree. Because the climate in the Olympic Peninsula is mild, with cool summers and warm winters, the nurse logs decay very slowly. A fallen Douglas fir or western red cedar can easily take more than five hundred years to decay fully. As the young trees on the nurse logs matured, their roots gradually grow around the dead trunk to reach the ground, often years after the trees first sprouted.

58. F. NO CHANGE
G. were maturing,
H. had matured,
J. mature,

Of the hundreds of seedlings that once covered the nurse log, only a handful will survive to maturity. The root systems of those that endure often provide a kind of memorial for the nurse log that they had once straddled.

59. A. NO CHANGE
B. those whom
C. those who
D. them that

Throughout their long lives, these trees testify to the complex cycle of birth, death, and renewal in an old-growth forest ecosystem.

60. Which of the following alternatives to the underlined portion would NOT be acceptable?
F. Over the course of
G. All through
H. Along
J. Over

PASSAGE V

## The Roots of Self-Help Culture

An appetite of practical guides to handling
61

lifes challenges has long been a part of American
62

culture. Having been an early guide, the
63

*New England Primer*, debuted around 1690 and

sold more than five million copies over three centuries.
64

Through its various editions, the primer blended lessons
65

in reading with lessons in Christian morality.

[1] Writing under the pen name Richard Saunders and in a less religious vein, Benjamin Franklin became the most popular author in the American colonies. [2] *Poor Richard's Almanac*, which Franklin published annually from 1732 to 1757, offered tips on everything from courtship to cooking, including shrewd comments on how to succeed in business. [3] Franklin enlivened his
66

hardheaded advice with wit and charm, as evidence in
67

such proverbs as "A penny saved is a penny earned" and "Little strokes fell great oaks." [4] To better appeal to his audience, Franklin humanized his narrator. [5] He gave Richard enough quirks and problems, such as his constant
68

need of money to buy presents for his wife—that

61. A. NO CHANGE
B. for
C. to
D. in

62. F. NO CHANGE
G. life's challenges,
H. life's challenges
J. lifes challenges,

63. A. NO CHANGE
B. Being an
C. As an
D. An

64. Given that all the choices are true, which one most effectively establishes the *New England Primer*'s long-standing popularity?
F. NO CHANGE
G. taught children their ABCs using simple woodcut prints and rhymed verses.
H. was used in the schools of English settlers in North America.
J. was first printed in Boston by Benjamin Harris.

65. A. NO CHANGE
B. there
C. their
D. it's

66. F. NO CHANGE
G. provoked
H. stimulated
J. excited

67. A. NO CHANGE
B. evidently as
C. evidenced by
D. evidenced as

68. F. NO CHANGE
G. problems—
H. problems;
J. problems:

readers could accept Franklin's advice without feeling lectured. [70] (69)

Letter-writing guides were popular in the late nineteenth and early twentieth centuries. Typically, these guides gave different advice to men than to women. J. L. Nichols's *The Business Guide*, however, (71) stressed that men should write forthright, logical letters to succeed in commerce, while (72) women should write "from the heart" to help maintain friendships and family relations.

[1] More recent authors have presented new formulas for professional success and personal fulfillment. [2] Some advice manuals are dealt (73) with general topics, such as Dale Carnegie's classic book *How to Win Friends and Influence People*. [3] At least one author, Jean Marie Stine, has even wroted (74) a book on the very narrow subject of how to write self-help and how-to books. [4] Others are more specialized, such as Suze Orman's *9 Steps to Financial Freedom*. [5] It seems clear that the centuries-old self-improvement quest is alive and well. [75]

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

- **A.** talked down to.
- **B.** scolded.
- **C.** belittled.
- **D.** opposed.

**70.** After reviewing notes for this essay and finding information that has been left out, the writer composes the following sentence incorporating that information:

> Those sayings expressed Franklin's belief that qualities such as thrift, foresight, and hard work represented "the way to wealth."

If the sentence were added to the paragraph, it would most logically be placed after Sentence:

- **F.** 1.
- **G.** 3.
- **H.** 4.
- **J.** 5.

**71.**

- **A.** NO CHANGE
- **B.** on the other hand,
- **C.** for example,
- **D.** furthermore,

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

- **F.** commerce and that
- **G.** commerce, whereas
- **H.** commerce, those
- **J.** commerce, and

**73.**

- **A.** NO CHANGE
- **B.** are being dealt
- **C.** dealing
- **D.** deal

**74.**

- **F.** NO CHANGE
- **G.** written
- **H.** writed
- **J.** wrote

**75.** For the sake of the logic and coherence of this paragraph, Sentence 4 should be placed:

- **A.** where it is now.
- **B.** before Sentence 1.
- **C.** after Sentence 1.
- **D.** after Sentence 2.

**END OF TEST 1**

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

## MATHEMATICS TEST

*60 Minutes—60 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.

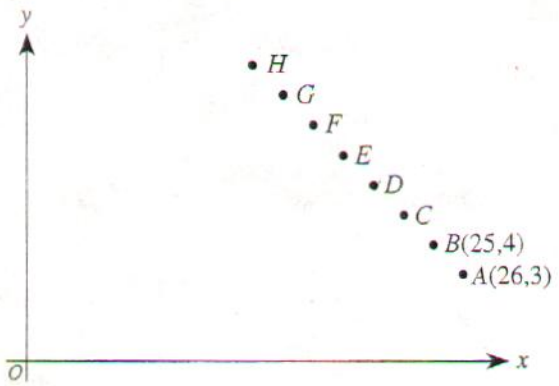
Note: Unless otherwise stated, all of the following should be assumed.

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.** In the standard $(x,y)$ coordinate plane below, the coordinates of the 8 points $A$ through $H$ form a pattern in which the $x$-coordinate of $B$ is 1 less than the $x$-coordinate of $A$, and the $y$-coordinate of $B$ is 1 more than the $y$-coordinate of $A$; the $x$-coordinate of $C$ is 1 less than the $x$-coordinate of $B$, and the $y$-coordinate of $C$ is 1 more than the $y$-coordinate of $B$; and so on. What are the coordinates of $H$ ?




**A.** (15,14)
**B.** (16,13)
**C.** (17,12)
**D.** (18,11)
**E.** (19,10)

**2.** There are 16 buttons in a bag: 9 are red, 4 are blue, and 3 are white. What is the probability that a button chosen at random from the bag is NOT white?

**F.** $\frac{1}{16}$

**G.** $\frac{1}{13}$

**H.** $\frac{1}{10}$

**J.** $\frac{1}{4}$

**K.** $\frac{13}{16}$

DO YOUR FIGURING HERE.

3. A certain frosting recipe calls for 3 tablespoons of cocoa and 2 tablespoons of water. Curt put 12 tablespoons of cocoa in his bowl. How many tablespoons of water should he add to maintain the ratio of cocoa to water in this frosting recipe?

   **A.** 4
   **B.** 8
   **C.** 9
   **D.** 11
   **E.** 18

4. For matrix $M = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$, its *transpose*, $M^t$, is $\begin{bmatrix} 1 & 3 \\ 2 & 4 \end{bmatrix}$. What is $M + M^t$ ?

   **F.** $\begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$
   **G.** $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$
   **H.** $\begin{bmatrix} 2 & 4 \\ 6 & 8 \end{bmatrix}$
   **J.** $\begin{bmatrix} 2 & 5 \\ 5 & 8 \end{bmatrix}$
   **K.** $\begin{bmatrix} 2 & 6 \\ 4 & 8 \end{bmatrix}$

5. The area of a square cement foundation of a shelter in a city park is 64 square yards. What is the length, in yards, of the cement foundation?

   **A.** 2
   **B.** 4
   **C.** 8
   **D.** 16
   **E.** 32

6. What is the largest value of $x$ for which there exists a real value of $y$ such that $x^2 + y^2 = 441$ ?

   **F.** 21
   **G.** $220\frac{1}{2}$
   **H.** 420
   **J.** 441
   **K.** 882



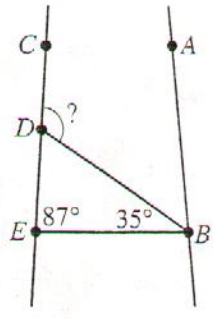
GO ON TO THE NEXT PAGE.

DO YOUR FIGURING HERE.

7. $3x^4 \cdot 5x^6$ is equivalent to:

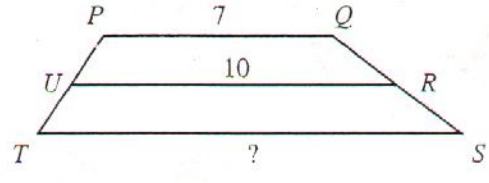
   A. $8x^2$
   B. $8x^{10}$
   C. $8x^{24}$
   D. $15x^{10}$
   E. $15x^{24}$

8. In the figure below, $D$ is on $\overleftrightarrow{CE}$, the measure of $\angle DBE$ equals 35°, and the measure of $\angle DEB$ equals 87°. What is the measure of $\angle CDB$ ?




   F. 93°
   G. 110°
   H. 116°
   J. 119°
   K. 122°

9. In trapezoid $PQST$ shown below, the midpoint of $\overline{PT}$ is $U$ and the midpoint of $\overline{QS}$ is $R$. The line segments $\overline{PQ}$, $\overline{TS}$, and $\overline{UR}$ are parallel. The given dimensions are in decimeters. How many decimeters long is $\overline{ST}$ ?




   A. $8\frac{1}{2}$
   B. $11\frac{1}{2}$
   C. 13
   D. 17
   E. $18\frac{1}{2}$

10. If $2x + 13 = 5$, then $4x + 13 = ?$

   F. −19
   G. −16
   H. −3
   J. 10
   K. 49



GO ON TO THE NEXT PAGE.

DO YOUR FIGURING HERE.

11. Lydia and Roberta are painting a room in the city recreation center. They started with 6 gallons of paint. On the first day, Lydia used $\frac{1}{2}$ gallon of paint and Roberta used $1\frac{1}{4}$ gallons of paint. How many gallons of paint were left after the first day?

A. $1\frac{3}{4}$

B. $4\frac{1}{4}$

C. $4\frac{3}{4}$

D. $5\frac{1}{4}$

E. $5\frac{1}{2}$

12. $\frac{14-2\cdot 6}{4+2\cdot 3} = ?$

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

G. 4

H. $6\frac{1}{2}$

J. 17

K. 60

13. The mass of Particle P is 0.000 000 000 084 7 grams. In scientific notation, what is the mass, in grams, of Particle P ?

A. $8.47 \times 10^{-11}$

B. $8.47 \times 10^{-10}$

C. $8.47 \times 10^{10}$

D. $8.47 \times 10^{11}$

E. $8.47 \times 10^{12}$

14. One number is 6 less than another. When the 2 numbers are added, their sum is 20. What is the smaller number?

F. 5

G. $6\frac{2}{3}$

H. 7

J. 10

K. 13

DO YOUR FIGURING HERE.

15. Shantiel left her home at 11:00 a.m. on Tuesday and traveled 602 miles. When she arrived at her destination it was 1:00 a.m. the next day. If her home and her destination are in the same time zone, which of the following is closest to her average speed, in miles per hour, for this trip?

A. 55
B. 50
C. 43
D. 26
E. 14

16. In the school cafeteria, students choose their lunch from 2 sandwiches, 4 soups, 2 salads, and 5 drinks. How many different lunches are possible for a student who chooses exactly 1 sandwich, 1 soup, 1 salad, and 1 drink?

F. 4
G. 5
H. 13
J. 40
K. 80

17. The regular price of a skirt is $30.00. The skirt is on sale for 10% off the regular price. An unadvertised discount, for today only, has reduced the sale price of the skirt by 10% of the sale price. What is the price of the skirt today?

(Note: Ignore sales tax.)

A. $10.00
B. $20.00
C. $24.00
D. $24.30
E. $26.73

18. What is the slope of the line through (4,7) and (−2,8) in the standard $(x,y)$ coordinate plane?

F. $-\frac{1}{2}$
G. $-\frac{1}{6}$
H. $\frac{1}{6}$
J. $\frac{3}{10}$
K. $\frac{10}{3}$

19. A function $f(x)$ is defined as $f(x) = -2x^2$. What is $f(-5)$ ?

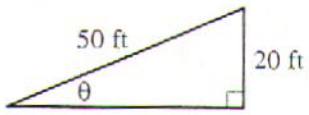
A. −100
B. −50
C. 20
D. 50
E. 100

DO YOUR FIGURING HERE.

20. When a ball is dropped from a height of $h$ feet, the average speed of the ball from the time it is dropped until it hits the ground is $\frac{h}{\frac{\sqrt{h}}{4}}$ feet per second. When the ball is dropped from a height of 400 feet, what is its average speed, in feet per second, from drop to hitting the ground?

F. 5
G. 10
H. 40
J. 80
K. 160

21. A BMX biker is using a ramp to perform jumps. The ramp is 50 feet long and 20 feet high, as shown in the figure below. The measure of the angle from the ground to the ramp is θ. Which of the following equations *must* be true about θ ?




A. $\sin \theta = \frac{20}{50}$
B. $\sin \theta = \frac{50}{20}$
C. $\cos \theta = \frac{20}{50}$
D. $\cos \theta = \frac{50}{20}$
E. $\tan \theta = \frac{20}{50}$

22. What is the solution set of $x^2 - 13x + 36 = 0$ ?

F. {1, 36}
G. {2, 18}
H. {3, 12}
J. {4, 9}
K. {6}

23. $|12(-4) + 3(8)| = ?$

A. −24
B. 19
C. 24
D. 32
E. 72

DO YOUR FIGURING HERE.

24. The senior class is having a soup-and-sandwich supper to raise money for a graduation party. The menu is shown below.

| Soups | | Sandwiches | |
|---|---|---|---|
| Tomato | $0.75 | Grilled Cheese | $1.50 |
| Vegetable | $1.00 | Ham | $1.25 |
| Clam Chowder | $1.25 | Turkey | $1.25 |
| | | Roast Beef | $1.25 |

If a supper consists of 1 soup and 1 sandwich, about what percent of the supper choices cost $2.50 ?

F. 8%
G. 14%
H. 17%
J. 25%
K. 33%

25. To receive a grade of C in Mrs. Inoue's Algebra class, a student's class score, $s$, must differ from 75 points by no more than 8 points. Which of the following number line graphs represents the range of all class scores for which a student would receive a C ?

A.



B.



C.



D.



E.



26. An empty rectangular swimming pool is 12 ft wide and 30 ft long and has a uniform depth of 9 ft. Water will be pumped into the pool at the rate of 3 cubic feet per second. About how many *minutes* will it take to completely fill the pool?

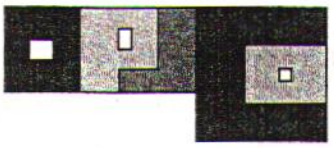
F. 4
G. 17
H. 18
J. 54
K. 162

27. A-1 Cab Company's fare is a base fee of $3.00 per ride plus a fee of $0.15 per mile or part thereof. Jill's Taxi Company's fare has no base fee, only a fee of $0.25 per mile or part thereof. For which of the following numbers of miles is the fare equal for both companies?

A. 12.6
B. 15
C. 20
D. 25
E. 30

DO YOUR FIGURING HERE.

28. The company logo for Oroszco Pemberton Jiron Company (OPJ Co), shown below, is displayed on the doors of the company's headquarters. The letters "OPJ" form a rectangle, and the letters "Co" form a square. The square has a perimeter of 60 inches. The rectangle has a width that is 6 inches shorter than a side of the square and a length that is 5 inches longer than a side of the same square. What is the area, in square inches, of the "OPJ" rectangle?



F. 180
G. 210
H. 225
J. 300
K. 360

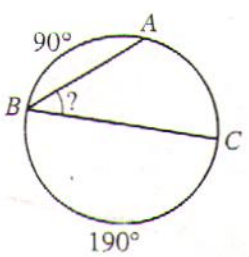
29. The inequality $7(x + 4) > 8(x - 6)$ is equivalent to which of the following inequalities?

A. $x < -20$
B. $x < 10$
C. $x < 34$
D. $x < 52$
E. $x < 76$

30. A positive integer is multiplied by 3, and that result is multiplied by 4. Which of the following numbers could be the result after the second multiplication?

F. 64
G. 244
H. 324
J. 714
K. 742

31. The measure of any angle inscribed in a circle is $\frac{1}{2}$ the measure of the intercepted arc. Points $A$, $B$, and $C$ are on the circle shown below. What is the measure of $\angle ABC$?




A. 40°
B. 60°
C. 80°
D. 140°
E. 160°

DO YOUR FIGURING HERE.

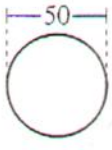
32. For what value of $a$ would the system of equations below have infinitely many solutions?

$$2x - y = 6$$
$$4x - 2y = 2a$$

F. 2
G. 4
H. 6
J. 12
K. 18

33. The diameter of a circle is 50 feet, as shown in the figure below. What is the circumference of the circle, in feet?

A. $25\pi$
B. $50\pi$
C. $100\pi$
D. $625\pi$
E. $2{,}500\pi$




34. A particular circle in the standard $(x,y)$ coordinate plane has an equation of $(x - 6)^2 + y^2 = 47$. What are the radius of the circle, in coordinate units, and the coordinates of the center of the circle?

| | radius | center |
|---|---|---|
| F. | $\sqrt{47}$ | $(-6,0)$ |
| G. | $\sqrt{47}$ | $(6,0)$ |
| H. | 23.5 | $(-6,0)$ |
| J. | 23.5 | $(6,0)$ |
| K. | 47 | $(6,0)$ |

35. Whenever $x \neq -1$, $\dfrac{2x^2 + x - 1}{x + 1} = ?$

A. $x - 1$
B. $x - 2$
C. $2x$
D. $2x - 1$
E. $2x^2 - 1$

36. Jesse had $m$ marbles. He received 30 more marbles for doing his chores at home. After that, he gave 25 marbles to his younger sister. Jesse now decides to store his marbles in 5 small jars, so he divides his marbles so he has the same number of marbles in each jar. Which of the following expressions gives the number of marbles in each jar?

F. $(m + 30) - 25 \div 5$
G. $m + (30 - 25) \div 5$
H. $m + 30 - (25 \div 5)$
J. $m + (30 - 25 \div 5)$
K. $(m + 30 - 25) \div 5$

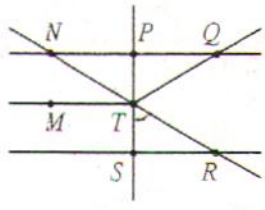


GO ON TO THE NEXT PAGE.

DO YOUR FIGURING HERE.

Use the following information to answer questions 37–40.

In the figure below, $T$ is the midpoint of $\overline{NR}$ and of $\overline{PS}$, $\overline{MT}$ and $\overline{NP}$ are perpendicular to $\overline{PS}$, and $\overline{NQ}$ is parallel to $\overline{MT}$ and $\overline{RS}$.




37. The measures of which of the following pairs of angles necessarily sum to 90° ?

A. $\angle MTN$ and $\angle NTP$
B. $\angle MTP$ and $\angle MTS$
C. $\angle NTP$ and $\angle PTQ$
D. $\angle PTQ$ and $\angle QTR$
E. $\angle PTQ$ and $\angle RTS$

38. The measure of $\angle PTR$ is 2 times the measure of $\angle NTP$. What is the measure of $\angle PTR$ ?

F. 60°
G. 80°
H. 90°
J. 100°
K. 120°

39. Which of the following is an expression for $\frac{RT}{ST}$ in terms of $\angle RTS$ ?

A. $\frac{1}{\sin \angle RTS}$
B. $\frac{1}{\cos \angle RTS}$
C. $\frac{1}{\tan \angle RTS}$
D. $\cos \angle RTS$
E. $\tan \angle RTS$

40. Which of the following statements is NOT necessarily true?

F. $\overline{MT} \parallel \overline{RS}$
G. $\overline{NT} \cong \overline{QT}$
H. $\overline{NT} \cong \overline{RT}$
J. $\overline{PT} \cong \overline{ST}$
K. $\angle PNT \cong \angle SRT$

DO YOUR FIGURING HERE.

**41.** The coordinates of the endpoints of $\overline{AB}$, in the standard $(x,y)$ coordinate plane, are $(-3,-9)$ and $(7,9)$. What is the $x$-coordinate of the midpoint of $\overline{AB}$ ?

**A.** 0
**B.** 2
**C.** 4
**D.** 5
**E.** 9

**42.** In $\triangle ABC$, the length of $\overline{AC}$ is 10 mm, $\angle B$ is a right angle, and $\angle A$ measures 30°. What is the length, in millimeters, of $\overline{BC}$ ?

**F.** 5

**G.** $5\sqrt{2}$

**H.** $5\sqrt{3}$

**J.** $\frac{10}{3}$

**K.** $\frac{20}{\sqrt{3}}$

Use the following information to answer questions 43 and 44.

Miguel conducted a telephone poll of a random sample of 150 of the 63,000 high school seniors in his state. Each responded to:

1. Do you have a grade average of B or above?
2. Have you ever been stopped for speeding?

He organized his data into the table below.

| | | B or above? | | |
|---|---|---|---|---|
| | | Yes | No | |
| Stopped for speeding? | Yes | 11 | 48 | 59 |
| | No | 46 | 45 | 91 |
| | | 57 | 93 | 150 |

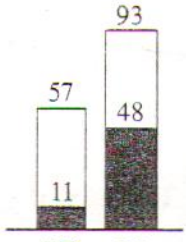
**43.** Which of the following is closest to the percent of seniors in the sample who answered "Yes" to having a grade average of B or above and "No" to being stopped for speeding?

**A.** 30%
**B.** 31%
**C.** 32%
**D.** 51%
**E.** 81%

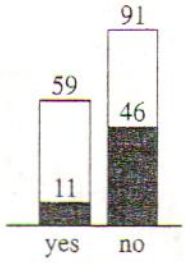
DO YOUR FIGURING HERE.

44. Miguel drew a graph with 2 bars representing the responses about grade average. On top of each bar, he wrote how many seniors it represented. He shaded the lower portion of each bar to represent "Yes" to being stopped for speeding. On top of each shaded portion, he wrote how many seniors it represented. He left the rest of each bar unshaded to represent "No" to being stopped for speeding. Which of the following is Miguel's bar graph?

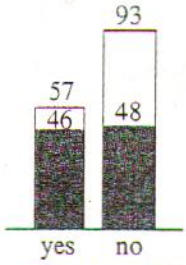
F.



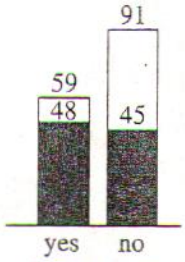

J.



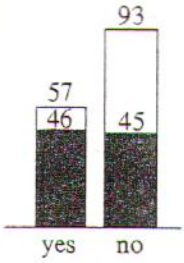

G.




K.

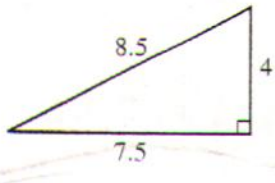



H.




45. A carpenter has 24 triangular sheets of wood flooring, each a right triangle with dimensions in feet, as shown below. What is the maximum length, in feet, of a rectangular floor 12 feet wide that can be completely covered with these 24 sheets of flooring?

A. 24
B. 30
C. 48
D. 60
E. 68



DO YOUR FIGURING HERE.

**46.** If $5 - (5 + y) = 5 - (5 - x)$ and $y \neq 0$, what is the value of $\frac{x}{y}$?

F. $-1$
G. $0$
H. $1$
J. $5$
K. $10$

**47.** The ratio of the side lengths of 2 squares is 2:3. What is the ratio of the length of the diagonal of the smaller square to the length of the diagonal of the larger square?

A. 2:3
B. $2:3\sqrt{2}$
C. $2\sqrt{2}:3$
D. 3:2
E. 4:9

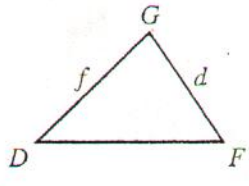
**48.** Which of the following inequalities gives $1.3\overline{12}$, $1.3\overline{12}$, $1.31\overline{2}$ in increasing order?

(Note: In this notation, the bar over a digit or block of digits signifies that the digit or block of digits repeats endlessly.)

F. $1.31\overline{2} < 1.3\overline{12} < 1.\overline{312}$
G. $1.31\overline{2} < 1.\overline{312} < 1.3\overline{12}$
H. $1.3\overline{12} < 1.31\overline{2} < 1.\overline{312}$
J. $1.3\overline{12} < 1.\overline{312} < 1.31\overline{2}$
K. $1.\overline{312} < 1.3\overline{12} < 1.31\overline{2}$

**49.** For $\triangle DGF$ shown below, the only known measures are length $f$ and the angle measures for $\angle D$, $\angle G$, and $\angle F$. Which of the following gives length $d$?

(Note: The law of sines gives the equation $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$.)




A. $f \sin D \sin F$
B. $f \sin D \sin G$
C. $\frac{f \sin D}{\sin F}$
D. $\frac{f \sin G}{\sin F}$
E. $\frac{\sin F}{f \sin D}$

DO YOUR FIGURING HERE.

50. A line segment has endpoints $(a,b)$ and $(c,d)$ in the standard $(x,y)$ coordinate plane, where $a$, $b$, $c$, and $d$ are distinct positive integers. The segment is reflected across the $x$-axis. After this reflection, what are the coordinates of the endpoints of the image?

F. $(-a,b)$ and $(-c,d)$
G. $(a,-b)$ and $(c,-d)$
H. $(-a,-b)$ and $(-c,-d)$
J. $(a,b)$ and $(c,d)$
K. $(a,0)$ and $(c,0)$

51. What is the distance, in coordinate units, between the points $(1,3)$ and $(-1,-3)$ in the standard $(x,y)$ coordinate plane?

A. $\sqrt{8}$
B. $8$
C. $\sqrt{10}$
D. $\sqrt{40}$
E. $40$

52. Given the complex number $a + bi$, where $a$ and $b$ are real numbers and $i^2 = -1$, the *absolute value* of $a + bi$ is given by $\sqrt{a^2 + b^2}$. Which of the following has the greatest absolute value?

F. $i$
G. $-i$
H. $2i$
J. $-3i$
K. $i^2$

53. Suppose the operation $\oplus$ is defined by $a \oplus b = \frac{a+b}{7}$. What is the value of $(98 \oplus 77) \oplus (21 \oplus 49)$ ?

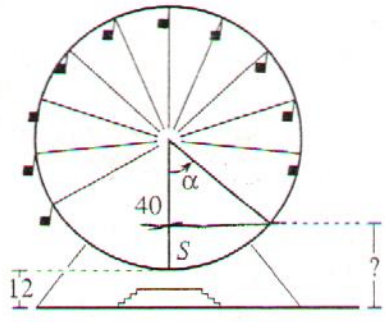
A. 5
B. 35
C. 113
D. 245
E. 250

DO YOUR FIGURING HERE.

54. What is the area, in square coordinate units, of the region bounded by the lines $3x - 8y = 0$, $x = 8$, and $y = 0$ in the standard $(x,y)$ coordinate plane?

F. $5\frac{1}{2}$
G. 11
H. 12
J. $21\frac{1}{3}$
K. 24

55. The Ferris wheel shown below rotates counterclockwise around the center and has a radius of 40 feet. Riders get on at the wheel's lowest point, $S$, 12 feet above the ground. An angle is measured counterclockwise from $S$ to a random point on the wheel. In terms of $\alpha$, which of the following expressions gives the height, in feet, of that point above the ground?




A. $40 \cos \alpha$
B. $40 \sin \alpha$
C. $12 - 40 \cos \alpha$
D. $12 + 40 - 40 \cos \alpha$
E. $12 + 40 - 40 \sin \alpha$

56. The distance, in feet, a ball is from the ground $t$ seconds after being thrown upward is modeled by $f(t) = -16t^2 + 24t + 32$. The number 32 in this equation represents which of the following?

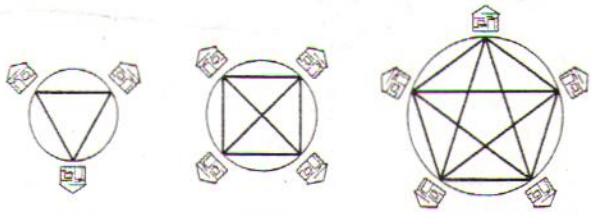
F. The number of seconds the ball will take to reach the ground
G. The velocity of the ball when it is thrown
H. The velocity of the ball when it hits the ground
J. The distance the ball is from the ground when it is at its highest point
K. The distance the ball is from the ground when it is thrown

57. If $f(x) = 3x - 5$, then $f(f(x)) = ?$

A. $9x^2 - 30x + 25$
B. $9x - 10$
C. $9x - 15$
D. $9x - 20$
E. $9x - 30$

DO YOUR FIGURING HERE.

58. A vacation resort consists of several housing groups, each composed of at least 3 cabins arranged around a circle as shown below. Within a group, each pair of cabins is connected by a straight concrete path. A new 10-cabin group is being planned for the resort. How many paths would have to be built for this group?



3 cabins
3 paths

4 cabins
6 paths

5 cabins
10 paths

F. 20
G. 24
H. 30
J. 45
K. 50

59. Every year, Marmot Creek Forest Preserve issues to individuals these types of activity permits: hiking, canoeing, and biking. Each individual can be issued 1 type, 2 types, or all 3 types of these permits. All permits expire on the last day of the year. The preserve issues their limit of 1,000 hiking permits, 700 canoeing permits, and 200 biking permits every year. For a year, what is the minimum number of individuals that can be issued a hiking permit only?

A. 100
B. 300
C. 500
D. 600
E. 800

60. Cassandra has a collection of animal figurines of various solid colors. She makes the following true statement about the collection: "If a figurine is blue, then the figurine is a cat." Which of the following statements about the collection is logically equivalent to Cassandra's statement?

F. "A figurine is a cat if and only if it is blue."
G. "If a figurine is a cat, then the figurine is blue."
H. "If a figurine is a cat, then the figurine is NOT blue."
J. "If a figurine is NOT blue, then the figurine is NOT a cat."
K. "If a figurine is NOT a cat, then the figurine is NOT blue."

END OF TEST 2

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

DO NOT RETURN TO THE PREVIOUS TEST.

## READING TEST

*35 Minutes—40 Questions*

**DIRECTIONS:** There are four 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.

### Passage I

**PROSE FICTION:** This passage is adapted from "At Schindler's," a short story from David Malouf's collection *Dream Stuff* (©2000 by David Malouf).

Among Jack's special friends this year were two brothers, Gerald and Jamie Garrett, who were new down here. What gave them a special glamour in Jack's eyes was their father's occupation. Back home in Brisbane, Mr. Garrett was the projectionist at the Lyric Pictures where Jack went on Saturday afternoons, and was responsible as well for putting up the posters that appeared in three places on Jack's way to school and which on Monday mornings he read, right down to the smallest print, with an excitement that cast a glow over the whole week ahead.

What they proclaimed, these posters, was the existence of another world, of such modernity, such intensified energy and speed, of danger too, that their local one of weatherboard houses and bakers' carts, unweeded pavements and trams that filled the night sky with electric sparks, seemed by comparison flimsy and becalmed. America, that world was called. It moved on numbered highways at a hundred miles an hour. It was twenty storeys high, all steel and glass. It belonged to a century that for them was still to come. Jack hungered for it, and for the dramas that it would unfold, as for his own manhood.

In Mr. Garrett the power of that projected world was primary, and Jack found it undiminished in Gerald and Jamie as well, who would have been astonished to know that in Jack's eyes they were touched with distinction.

There was a third brother. Arnold he was called. A year older than Jack, he was spending the first three weeks of the holidays at their grandfather's, out west. Gerald and Jamie, as if they needed his being there to know quite how they stood with one another and the world, were forever evoking his opinion or using his approval or disapproval to justify their own. Before long the tantalizing absence of this middle brother had become a vital aspect of the Garretts as Jack saw them, and he too found himself looking forward to Arnold's arrival. "Arnold'll be here next week, eh?" Then it was "Saturday." Then "this afternoon."

But Arnold, when he got off the green bus and was there at last, was not at all what Jack had expected. The quality he found in the others, of menace and tough allure, far from being intensified in this third member of the family, appeared to have missed him altogether. Blond where the others were dark, and tanned and freckled, he seemed dreamy, distant. When they told him stories of what had been, for them, the high points of these last weeks, he listened, but in the way, Jack thought, that adults listen to kids. Not disdainfully, he was too easygoing to be disdainful, but as if he could no longer quite recall what it was like to be involved in adventures or crazes. When he left school next year he would be out west permanently. On the land.

His most prized possessions were a pair of scuffed riding boots that sat side by side under his camp-bed and a belt of plaited kangaroo hide that cinched in the waist of his shorts with a good seven or eight inches to spare. He had ridden buckjumpers. He could skin a rabbit.

He did not boast of these things. He was not the sort to draw attention to himself or be loud. But the assurance they gave him, the adult skills they represented, set in a different light the excitements that had marked their weeks down here; even the abandoned fuel tank that had drifted in one afternoon and which they had believed, for a long, breathtaking moment while it bobbed about just out of reach, might be a midget sub.

"Anyway," Arnold assured them, "the enemy wouldn' get far, even if they did land. Not out there." And he evoked such horizons when he lifted his eyes in the following silence that the walk to Redcliffe or Deception, even the bush way, seemed like nothing.

Arnold Garrett had the slowest, drawliest voice Jack had ever heard. Secretly, high up on the diving-board or in the privacy of his room, he would reach for the growling flatness of it, "Aout theere," in the belief that if he could get the tone right he might catch a glimpse, through the other boy's eyes, of what it was.

There were times, listening to Arnold and narrowing his eyes in the same heat-struck gaze, when Jack felt turned about. Away from the Bay and its red rocks, away from their gangs, their games, this particular

school holidays and everything to do with being eleven, or twelve even, towards—

But there he came to a barrier that Arnold Garrett, he felt, had already crossed.

1. This passage is told from the point of view of:
   - A. an unidentified narrator who reveals the thoughts of all the characters.
   - B. an unidentified narrator who focuses on Jack's thoughts.
   - C. Jack describing events as they happen to him during the summer when he turned eleven.
   - D. Jack describing a summer many years later, when he had a chance to reflect on the significance of the relationships he had then.

2. Which of the following can most logically be ruled out as the setting for this passage?
   - F. Australia
   - G. England
   - H. Scotland
   - J. The United States

3. The passage implies that Jack has all of the following desires EXCEPT the desire to:
   - A. travel far away.
   - B. meet Arnold.
   - C. operate a tram.
   - D. learn adult skills.

4. As they are described in the passage, Jamie and Gerald are:
   - F. virtually identical in their appearance, attitudes, and behavior.
   - G. opposites in every way except in their respect for Arnold.
   - H. older than their brother Arnold even though, in Jack's opinion, they act younger.
   - J. more like Jack in appearance but more like their brother in behavior.

5. It can reasonably be inferred that lines 83–86 end in midsentence to emphasize all of the following EXCEPT:
   - A. Jack's frustration with his own inexperience.
   - B. Arnold's habit of interrupting Jack.
   - C. the distance between Jack and Arnold.
   - D. Arnold's effect on Jack's self-image.

6. Compared to where Jack lives, the cities he sees in the movies strike him as primarily:
   - F. bleak.
   - G. exciting.
   - H. friendly.
   - J. frightening.

7. As it functions in the passage, the sentence "It was twenty storeys high, all steel and glass" (lines 19–20) refers to:
   - A. a forbidding-looking building on Jack's route to school.
   - B. the office building where Mr. Garrett works.
   - C. a place Arnold describes to impress Jack.
   - D. an entire nation in Jack's imagination.

8. According to the passage, after Arnold arrives Jack begins to view his previous holiday activities as:
   - F. exciting.
   - G. dangerous.
   - H. childish.
   - J. mean-spirited.

9. When Jack says "Aout theere" (line 78), he is most likely in the process of:
   - A. making fun of someone's accent.
   - B. attempting to imagine a compelling place.
   - C. lying about his whereabouts.
   - D. trying to control his impatience.

10. The passage suggests that prior to meeting Arnold, Jack had most likely expected him to be:
    - F. meaner and tougher than Jamie and Gerald.
    - G. smaller and smarter than Jamie and Gerald.
    - H. dreamy and distant.
    - J. intelligent and kind.

## Passage II

**SOCIAL SCIENCE:** This passage is adapted from the article "The Terrazzo Jungle" by Malcolm Gladwell (©2004 by The Condé Nast Publications Inc.).

In the office, Victor Gruen was famous for keeping two or three secretaries working full time, as he moved from one to the next, dictating non-stop in his thick Viennese accent. He emigrated to New York with his wife in 1938. In the early fifties, he designed an outdoor shopping center called Northland outside Detroit. It covered a hundred and sixty-three acres and had nearly ten thousand parking spaces. This was little more than a decade and a half since he stepped off the boat.

But Gruen's most famous creation was his next project, in the town of Edina, just outside Minneapolis. It was called Southdale. Until then, most shopping centers had been what architects like to call "extroverted," meaning that store windows and entrances faced both the parking area and the interior pedestrian walkways. Southdale was introverted: the exterior walls were blank, and all the activity was focussed on the inside. Suburban shopping centers had always been in the open, with stores connected by outdoor passageways. Gruen had the idea of putting the whole complex under one roof, with air-conditioning for the summer and heat for the winter. Almost every other major shopping center had been built on a single level, which made for punishingly long walks. Gruen put stores on two levels, connected by escalators and fed by two-tiered parking. In the middle he put a kind of town square, a "garden court" under a skylight, with a fishpond, enormous sculpted trees, a twenty-one-foot cage filled with bright-colored birds, balconies with hanging plants, and a café.

Southdale Mall still exists. It does not seem like a historic building, which is precisely why it is one. Victor Gruen didn't design a building; he designed an archetype. Victor Gruen may well have been the most influential architect of the twentieth century. He invented the mall.

Planning and control were of great importance to Gruen. In the middle of the nineteenth century, Vienna had demolished the walls and other fortifications that had ringed the city since medieval times, and in the resulting open space built the Ringstrasse—a meticulously articulated addition to the old city. Architects and urban planners solemnly outlined their ideas. There were apartment blocks, and public squares and government buildings, and shopping arcades, each executed in what was thought to be the historically appropriate style. And, most important, a ring road, or Ringstrasse—a grand mall—was built around the city, with wide sidewalks and expansive urban views, where Viennese of all backgrounds could mingle freely on their Sunday afternoon stroll. To the Viennese reformers of the time, the quality of civic life was a function of the quality of the built environment, and Gruen thought that principle applied just as clearly to the American suburbs.

To Gruen, American suburbia was chaos, and the only solution to chaos was planning. When Gruen first drew up the plans for Southdale, he placed the shopping center at the heart of a tidy four-hundred-and-sixty-three-acre development, complete with apartment buildings, houses, schools, a medical center, a park, and a lake.

Victor Gruen's grand plan for Southdale was never realized. There were no parks or schools or apartment buildings—just that big box in a sea of parking. Nor, with a few exceptions, did anyone else plan the shopping mall as the centerpiece of a tidy, dense, multi-use development. Gruen was right about the transformative effect of the mall on retailing. But in thinking that he could reënact the lesson of the Ringstrasse in American suburbia he was wrong.

When, late in life, Gruen came to realize this, it was a powerfully disillusioning experience. He revisited one of his old shopping centers, and saw all the sprawling development around it, and pronounced himself in "severe emotional shock." Malls, he said, had been disfigured by "the ugliness and discomfort of the land-wasting seas of parking" around them. Developers were interested only in profit. He turned away from his adopted country. He had fixed up a country house outside of Vienna, and soon he moved back home for good. But what did he find when he got there? Just south of old Vienna, a mall had been built—in his anguished words, a "gigantic shopping machine." It was putting the beloved independent shopkeepers of Vienna out of business. It was crushing the life of his city. He was devastated. Victor Gruen invented the shopping mall in order to make America more like Vienna. He ended up making Vienna more like America.

**11.** Details in the passage most strongly suggest that the author views Gruen as a:

**A.** continual optimist.
**B.** frustrated visionary.
**C.** greedy entrepreneur.
**D.** rash decision maker.

12. Based on the passage, an irony about Gruen's malls is that he designed:

F. Northland with nearly ten thousand parking spaces, but he later said that parking lots disfigured the land.
G. Northland as an outdoor shopping center, but it was later enclosed.
H. Southdale with windows facing an indoor courtyard, but instead people wanted to be able to see outdoors.
J. Southdale as a two-level mall, but it proved to be too difficult to heat and air-condition.

13. Based on the passage, when Gruen planned Southdale, he placed the shopping center at the heart of a 463-acre development most likely because he wanted to:

A. adapt nineteenth-century Viennese principles of urban planning.
B. prevent residential and recreational developments from encroaching on the land.
C. minimize the social influence of retail businesses.
D. make developments more expansive and unregulated by local governments.

14. The first paragraph primarily characterizes Gruen as:

F. someone who resisted change.
G. a well-known historical figure.
H. an ambitious person of action.
J. an insolent person while working.

15. According to Gruen, as he is presented in the passage, his "grand plan for Southdale was never realized" (lines 64–65) because:

A. developers were interested only in profit.
B. real estate agents could not sell homes in multi-use developments.
C. Southdale would have put the smaller independent shops out of business.
D. enough land could not be found for such a huge development.

16. According to the author, Gruen's architectural contribution to civic life in both Vienna and the United States had what effect on him late in life?

F. It made him proud; he knew his designs were historic creations.
G. It satisfied him; he felt that he had positively changed the retail shopping industry.
H. It saddened him; he wished he could live longer to see further long-term effects of his contributions.
J. It devastated him; he believed shopping malls hurt communities' quality of life.

17. According to the passage, Southdale differed from shopping centers that had come before it in part because Southdale's stores were:

A. in the open and connected by outdoor passageways.
B. built on a single level, which made for punishingly long walks.
C. contained under one roof, with the whole complex climate controlled.
D. facing both the parking area and the interior pedestrian walkways.

18. The statement that Southdale "does not seem like a historic building, which is precisely why it is one" (lines 32–33) most nearly means that:

F. Southdale looks historic even though it is relatively new.
G. Southdale was built in a beautiful historic setting outside of Minneapolis.
H. Gruen wanted Southdale to be like old Vienna, but it wasn't.
J. Gruen designed an innovative building so influential that it still feels contemporary.

19. As it is used in line 43, the word *articulated* most nearly means:

A. spoken.
B. reiterated.
C. designed.
D. isolated.

20. Based on the passage, it is ironic that, contrary to his desires, Gruen had:

F. moved back to a country house near Vienna.
G. made Vienna more like the United States.
H. created multi-use areas in the United States.
J. lost a great deal of money building malls.

## Passage III

**HUMANITIES:** This passage is adapted from the memoir *Something to Declare* by Julia Alvarez (©1998 by Julia Alvarez).

The narrator of the passage is from the Dominican Republic, an island country in the Caribbean Sea.

Ever since I became a published writer, my family has been trying to figure out where the writing talent came from. The Espaillats have always been poets, one uncle (on the Espaillat side) noted. Another uncle believed that I probably got the writing genes from my father's side of the family.

I can't help thinking that maybe my writing genes, in fact, come directly from my father. When we emigrated to this country and my father had to start over as a doctor, he gave up his other life's ambition of writing books. Instead, he wrote weekly letters to my sisters and me in boarding school in which he detailed the adventures of a young boy, Babinchi, an autobiographical version of himself. At the end of each letter was the little moral we should learn from this recent scrape Babinchi had gotten himself into.

My sisters and I would roll our eyes, but in fact, we cared very much for those letters, "the favorite" bragging that she had gotten the original as opposed to one of three carbon copies. (Papi finally figured out how to sidestep our jealousy by regularly rotating the carbons.) Obviously, I have gotten a touch of the poet from him.

It's nice to have the family finally arguing over who can lay claim to me. In fact, it's the fulfillment of the childhood desire in the playground to be picked for one of the teams instead of left over to be taken on as a handicap: "Okay, we'll take Alvarez, but we get to have four outs instead of three."

For so many years, I was an embarrassment that my parents had to explain to the rest of the Dominican family. The thing that had gone wrong with my sisters and myself, according to the extended family back home, was that we had settled in the United States of America where people got lost because they didn't have their family around to tell them who they were. Instead, they spent their lives, wandering around, doing crazy things trying "to find themselves."

The family was partly right, of course. My sisters and I entered this country *and* our teens at the height of the sixties, in the company of friends who were, many of them, dropping out of their families, joining communes, demonstrating against the war, and spending the night in jail. Meanwhile, back home, our female cousins were having their quinceañera (fifteenth birthday) parties in which they waltzed with their papis in sight of all their relatives. By twenty-five, many were leading settled lives with children and households. They knew who they were, Alvarez or Tavares, Bermúdez or Espaillat. But in America, you didn't go by what your family had been in the past, you created yourself anew. This was part of the excitement as well as the confusing challenge of America.

Well, at long last, after almost thirty years of self-creation, I began publishing novels, which were well received. Now my family saw those endless years of struggle in a whole new light. I had shown this poetic talent from the beginning, and they had always known it. I had never let mishaps or misfortunes and unemployment get in my way.

The change in their attitude proves, if nothing else, how even our memories favor the classic Aristotelian structure of narrative—with a beginning, middle, and end. If the ending is "happy," then the events that precede it suddenly light up with meaningful significance.

But where *did* it come from, this writing talent? It is a family habit, after all, to trace the features of its present members back to the faces of the ancestors. Every time a new grandchild or grand niece arrives, the old tías (aunts) stand around the crib, trying to decide whose nose little Gaby is wearing. Those hands are pure Rochet. The ears are González. As for the dark skin, that comes from the Gómez side.

It gratifies me that whatever talent I do have might have come from somewhere else. For one thing, it clears me of blame for upsetting those same members of my family when they actually sit down and read what I've written. But also it reminds me that I am just one more embodiment of that force for expression and clarity and comprehension which has nothing specifically to do with me, or just with me. As Jean Rhys, another writer with a strong connection to the Caribbean, once said to a young writer wanting some advice, "Feed the sea, feed the sea. The little rivers dry up, but the sea continues." All that we write and achieve as individuals means finally very little compared to the great body of work—books, music, dance, art, inventions, ideas—that forms the culture and context of our human family.

**21.** The passage's tone is best described as:

- **A.** subdued, technical, and formal.
- **B.** accusatory, dismal, and critical.
- **C.** candid, reflective, and warm.
- **D.** boisterous, anxious, and arrogant.

22. Which of the following statements best expresses one of the main purposes the passage serves for the narrator?

F. She explains her belief that her writing talent most likely comes directly from her father and one of her tías.
G. Now that she has published several novels, she contemplates her next major writing project.
H. Now a highly regarded novelist, she explains how her family has reacted to her success as a writer.
J. She describes how her fictional plots usually follow the classic Aristotelian structure of narrative.

23. It can reasonably be inferred from the passage that the narrator's immediate family didn't consider her a talented writer until her writing was:

A. published and well received.
B. enthusiastically praised by writer Jean Rhys.
C. declared to be in excellent form by the narrator herself.
D. read and appreciated by her extended family living in the Dominican Republic.

24. The narrator indicates that, unlike in the United States, in the Dominican Republic a person didn't:

F. diverge from his or her family's beliefs, traditions, or habits.
G. consider from which ancestors the traits of family members might have come.
H. pay close attention to subtle differences in physical features among families.
J. judge another family member's aspirations.

25. One of the main purposes of the second paragraph (lines 7–16) is to allow the narrator to:

A. prove that as a young girl she had a good relationship with her father.
B. describe why her father based the character of Babinchi on himself.
C. make clear why her family emigrated to the United States.
D. illustrate her father's interest in and enjoyment of writing.

26. It can reasonably be inferred from the passage that after emigrating to the United States, the narrator's father gave up his ambition of writing books in part because he:

F. couldn't decide how to finish the books he had started writing while living in the Dominican Republic.
G. felt an obligation to use his talent as a writer to entertain and teach children.
H. no longer had the time he felt he needed to write books.
J. had been unable to publish one of his books in the Dominican Republic.

27. The narrator states that her extended family living in the Dominican Republic blamed her difficulties directly on the fact that she:

A. was a writer.
B. lived in the United States.
C. was her father's "favorite" daughter.
D. had parents who were lenient, even by U.S. standards.

28. The sixth paragraph (lines 39–53) mainly helps the narrator illustrate her point that:

F. to live in the Dominican Republic as a young woman would have been more rewarding for her than living in the United States.
G. young women in the Dominican Republic have too many responsibilities.
H. her female cousins didn't appreciate their family traditions as much as they should have.
J. her female cousins' experiences as young women were fundamentally different from her own.

29. The narrator suggests that the idea that her talent for writing came from "somewhere else" (line 75) provides her with all of the following EXCEPT a:

A. reminder of the power of the force for expression.
B. feeling of relief.
C. sense of gratification.
D. clear reason for why her sisters aren't writers.

30. As it is used in lines 54–55, the phrase *years of self-creation* most nearly refers to years during which the narrator:

F. wasn't publishing novels and didn't have a particularly stable life.
G. realized that being a writer was an impractical goal and thus had to change her plans.
H. had little to no contact with her immediate family as she tried to "find herself."
J. deliberately put her interest in writing aside and explored other careers.

## Passage IV

**NATURAL SCIENCE:** This passage is adapted from the article "Shaggy, or Not So Shaggy: A New Look at Lions' Manes" by Anahad O'Connor (©2002 by The New York Times Company).

When people think of lions, many probably picture a regal creature with a luxuriant mane of blond hair covering its neck and shoulders. But a study suggests that the widespread image is misleading—that among male lions, a baldish head with sideburns may have been as prevalent in Africa as heavy manes, at least until recent years. The size of a lion's mane, the researchers concluded, appears to be a function of elevation and climate.

In 2001, Thomas Gnoske, a zoologist at Chicago's Field Museum of Natural History, spent his summer in the mountains along the equator in Tsavo, Kenya. Accompanied by Harald Schuetz, a photographer, Gnoske had set out to document the physical characteristics of lions living at different altitudes.

Gnoske and Julian C. Kerbis Peterhans, a professor of natural sciences at Roosevelt University in Chicago, had previously studied museum specimens, 19th-century accounts from hunters, historical photographs and scientific descriptions of lions. All of these things led them to suspect that manelessness was typical in some parts of Kenya and might have been widespread in Africa many decades ago. Gnoske and Dr. Kerbis Peterhans had learned of many accounts of elevation and latitude influencing mane development, so they set out to record the locations of more than 60 maneless lions.

In hot equatorial climates that are within 1,000 feet of sea level, they found, the lions often had hardly any mane at all. By contrast, lions at higher elevations and in colder climates had full, thick manes. At middle elevations, mane size tended to be intermediate, resembling a wreath extending from cheeks to shoulders. "Recently, lions that don't have manes have been described as freaks and isolated anomalies or were dismissed as young, juvenile lions," Dr. Kerbis Peterhans said. "But Tom was the first recent investigator to recognize that there is a complete range of variability in mane development and that a huge factor is climate."

Gnoske and Dr. Kerbis Peterhans believe that maneless lions have been depicted as anomalies because much of the earlier research was limited to a few habitats. Heavily maned lions usually live in well-protected tourist areas or parks, while the habitats of maneless lions are generally unprotected. As a result, maneless lion numbers have steadily dropped over the years. "The large-maned lions we think of as typical probably are mostly limited to the high-elevation plateau areas," Gnoske said. "Those are the places where most research has been done. So the public's idea of what socially and physically a lion is is not what the lion has been through history."

Scientists not connected with the study say they are not surprised by its findings. Dr. Graeme Patterson, assistant director of the Africa program at the Wildlife Conservation Society in the Bronx, points to cases where African lions that were taken to other continents adjusted to their new environments by changing physically. "Throughout history, lions that have been brought to Europe and North America adapted to the cold by growing thicker coats and additional hair," he said. "And in Africa, we've seen that lions in really high elevations have to adapt to that climate as well by growing more hair."

The study challenges several popular notions about mane development—for example, that the healthier a lion, the lusher its mane.

In addition to climate and elevation, hormones may also play a role in mane development. There are some cases of maneless nomadic lions living on high plateaus that do not defend territories, Gnoske said, and the reason seems to be low levels of male hormones.

But not having a mane may actually be a benefit. Recent studies show that in some primate species, like orangutans and mandrills, adult males may actually inhibit development of their masculine physical characteristics—through suppression of testosterone—to be less conspicuous and escape conflict with rival males. Dr. Kerbis Peterhans speculates that this also applies to some lions. One with a reduced mane, he said, can sneak around another's territory virtually undetected and decide if it wants to challenge the pride male or remain on the periphery. "When a lion sees another with a mane he sees it as a threat," he said. "But if it is maneless he'll think it is immature and will ignore it. So the strategy is to look like a juvenile to avoid potentially deadly confrontation."

**31.** As described in the passage, Gnoske and Kerbis Peterhans's study suggests that male lions with baldish heads and sideburns may in the past have been:

- **A.** common in Africa but are now much less common on that continent.
- **B.** rare in Africa but are now increasingly common in some regions of that continent.
- **C.** uncommon in Africa but were predominant throughout the rest of the world.
- **D.** predominant in Africa but were rare in other parts of the world.

32. What effect, if any, does the passage's information about hormones and mane development have on the conclusion in lines 7–9?

F. It strengthens the conclusion, because the information about hormones reinforces the idea that mane size varies.
G. It weakens the conclusion, because the information about hormones implies that more than two factors affect mane size.
H. It has no effect on the conclusion, because the passage supports the notion that climate and elevation affect mane size.
J. It has no effect on the conclusion, because Gnoske and Kerbis Peterhans have shown that the information on hormones is inaccurate.

33. The author most likely describes what many people "probably picture" (line 1) when thinking of lions in order to introduce the idea that the manes of real lions:

A. closely match this image in terms of both mane color and size.
B. can deviate from this image in terms of mane color.
C. can deviate from this image in terms of mane size.
D. rarely match this image in terms of either mane color or size.

34. It can reasonably be inferred that Kerbis Peterhans uses the phrase *isolated anomalies* (line 35) to express the view of maneless male lions held by:

F. Kerbis Peterhans himself.
G. Schuetz.
H. Patterson.
J. most researchers prior to the study described in the passage.

35. Based on the passage, Gnoske and Kerbis Peterhans would most likely say that basing conclusions about lions' manes on the study of lions in well-protected tourist areas and parks in Africa was:

A. a regrettable but necessary step for safety reasons.
B. a bold and innovative undertaking that was long overdue.
C. a useful way to engage the public in lion research.
D. an insufficient approach producing misleading results.

36. In the passage, Patterson mentions lions brought to Europe and North America primarily to support the point that:

F. such lions have had a hard time adapting to the cold.
G. the size of lions' manes is in large part a function of climate.
H. lions native to those continents need more intensive study.
J. lions gain and lose hair as the weather changes each season.

37. In the context of the last paragraph, lines 79–87 mainly focus on how Kerbis Peterhans:

A. plans to test his hypothesis about lions' manes and testosterone.
B. intends to shift from studying lions to studying primates.
C. tries to connect some primate research to his work on lions' manes.
D. seeks to conduct experiments with scientists in other fields.

38. According to the passage, the idea that the lushness of a lion's mane is directly related to the lion's health is one that Gnoske and Kerbis Peterhans's study has:

F. popularized.
G. ignored.
H. challenged.
J. affirmed.

39. The last paragraph argues that the inhibited development of masculine physical characteristics in some adult male primates may be:

A. purposeful.
B. unhealthy.
C. unnecessary.
D. permanent.

40. In the passage, Kerbis Peterhans indicates that upon seeing a maneless male lion, another male lion will:

F. act immaturely.
G. run away.
H. ignore it.
J. threaten it.

**END OF TEST 3**

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

**DO NOT RETURN TO A PREVIOUS TEST.**

## SCIENCE TEST

*35 Minutes—40 Questions*

**DIRECTIONS:** There are seven 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

In 3 studies, students found the rate, $R$, at which water flowed through each of several holes in a water-filled cylinder. They also measured the horizontal distance, $L$, spanned by each stream of water (see Figure 1).

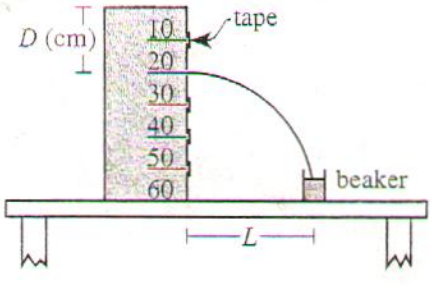



Figure 1

The students tested 3 cylinders, X, Y, and Z, each having the same diameter and height. Each cylinder had a hole at each of 5 depths, $D$, measured from the top of the cylinder. All of the holes in a given cylinder had the same cross-sectional area, $A$. Holes other than the one being tested were covered with tape.

In each trial, $R$ and $L$ were determined for one value of $D$. Throughout each trial, a student kept the cylinder being tested filled to the brim with water. Another student positioned a beaker to capture the stream of water. Using a stopwatch, the students measured the time, $t$, in seconds (sec), required for 100 $cm^3$ of water to accumulate in the beaker. Using the formula $R = 100\ cm^3 \div t$ sec, they calculated $R$ in $cm^3$/sec. Finally, using a tape measure, they found $L$ in cm.

*Study 1*

Using Cylinder X, the students found $R$ and $L$ for each $D$. The cross-sectional area $A$ of each hole in Cylinder X equaled 0.0100 $cm^2$ (see Table 1).

Table 1

| Trial | $D$ (cm) | $t$ (sec) | $R$ ($cm^3$/sec) | $L$ (cm) |
|---|---|---|---|---|
| 1 | 10 | 71.4 | 1.40 | 44.7 |
| 2 | 20 | 50.5 | 1.98 | 56.6 |
| 3 | 30 | 41.2 | 2.43 | 60.0 |
| 4 | 40 | 35.7 | 2.80 | 56.6 |
| 5 | 50 | 31.9 | 3.13 | 44.7 |

*Study 2*

Using Cylinder Y, the students found $R$ and $L$ for each $D$. The area $A$ of each hole in Cylinder Y equaled 0.0200 $cm^2$ (see Table 2).

Table 2

| Trial | $D$ (cm) | $t$ (sec) | $R$ ($cm^3$/sec) | $L$ (cm) |
|---|---|---|---|---|
| 6 | 10 | 35.7 | 2.80 | 44.7 |
| 7 | 20 | 25.3 | 3.96 | 56.6 |
| 8 | 30 | 20.6 | 4.86 | 60.0 |
| 9 | 40 | 17.9 | 5.60 | 56.6 |
| 10 | 50 | 16.0 | 6.26 | 44.7 |

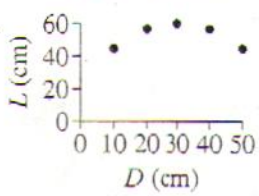
*Study 3*

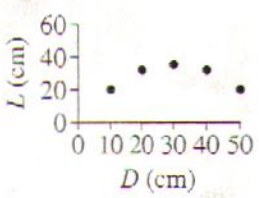
Using Cylinder Z, the students found $R$ and $L$ for each $D$. The area $A$ of each hole in Cylinder Z equaled 0.0300 $cm^2$ (see Table 3).

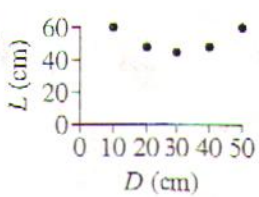
Table 3

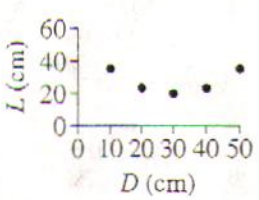
| Trial | $D$ (cm) | $t$ (sec) | $R$ ($cm^3$/sec) | $L$ (cm) |
|---|---|---|---|---|
| 11 | 10 | 23.8 | 4.20 | 44.7 |
| 12 | 20 | 16.8 | 5.94 | 56.6 |
| 13 | 30 | 13.7 | 7.29 | 60.0 |
| 14 | 40 | 11.9 | 8.40 | 56.6 |
| 15 | 50 | 10.6 | 9.39 | 44.7 |

1. Which of the following graphs best represents how $L$ varied with $D$ in Trials 1–5 ?

A.



C.



B.



D.



2. In Trial 10, to keep Cylinder Y filled to the brim with water without the water overflowing the cylinder, the student had to pour water into the cylinder at a rate of:

F. 1.56 $cm^3$/sec.
G. 3.13 $cm^3$/sec.
H. 6.26 $cm^3$/sec.
J. 12.52 $cm^3$/sec.

3. According to the results of Trials 1, 6, and 11, as $A$ increased, $t$:

A. increased only.
B. decreased only.
C. varied, but with no general trend.
D. remained constant.

4. What was the height of each of the cylinders tested in Studies 1–3 ?

F. 50 cm
G. 60 cm
H. 70 cm
J. 80 cm

5. Suppose, at the beginning of a trial, a student had filled a cylinder to the brim with water, but, as the trial proceeded, the student had not added any more water to the cylinder. As the trial proceeded, $R$ most likely would have:

A. increased, because the water pressure at the hole being tested would have increased.
B. increased, because the water pressure at the hole being tested would have decreased.
C. decreased, because the water pressure at the hole being tested would have increased.
D. decreased, because the water pressure at the hole being tested would have decreased.

6. Based on the results of the 3 studies, for a given $D$, did $L$ depend on $A$ ?

F. Yes, because as $A$ increased, $L$ increased.
G. Yes, because as $A$ increased, $L$ remained constant.
H. No, because as $A$ increased, $L$ increased.
J. No, because as $A$ increased, $L$ remained constant.

## Passage II

*Asemichthys taylori* is a predatory saltwater fish that sometimes uses its teeth to punch holes in the shells of its prey, which are *ingested* (eaten) shell and all. Scientists collected 176 *A. taylori* and placed them in a holding tank. All shells from the fecal waste of the *A. taylori* were collected for the next 48 hr. Table 1 shows the number of shells ingested by the *A. taylori*, the number of survivors (ingested shells that contained living, undigested organisms), and the percent of shells with punched holes for 3 main groups of prey: gastropods, bivalves, and hermit crabs. Table 2 shows the same information for 4 types of gastropods.

Table 1

| Prey | Shells ingested | Survivors* | Shells punched (%) |
|---|---|---|---|
| Gastropods | 238 | 23 | 76.5 |
| Bivalves | 72 | 2 | 7.0 |
| Hermit crabs | 22 | 0 | 9.1 |

*All survivors had unpunched shells.

Table 2

| Prey (gastropods) | Shells ingested | Survivors* | Shells punched (%) |
|---|---|---|---|
| *Alvinia* | 101 | 11 | 79.2 |
| *Lacuna* | 72 | 7 | 86.1 |
| *Margarites* | 31 | 3 | 77.4 |
| Limpets | 13 | 0 | 0 |

*All survivors had unpunched shells.

Tables adapted from Stephen F. Norton, "Role of the Gastropod Shell and Operculum in Inhibiting Predation by Fishes." ©1988 by the American Association for the Advancement of Science.

7. According to Table 2, the highest percent of shells was punched for which type of gastropod?

   A. *Alvinia*
   B. *Lacuna*
   C. *Margarites*
   D. Limpets

8. Which of the following lists the gastropods from Table 2 in order from the greatest number ingested to the smallest number ingested?

   F. *Alvinia*, *Lacuna*, *Margarites*, limpets
   G. *Lacuna*, *Alvinia*, *Margarites*, limpets
   H. *Margarites*, limpets, *Lacuna*, *Alvinia*
   J. Limpets, *Margarites*, *Lacuna*, *Alvinia*

9. The scientists hypothesized that *A. taylori* would not punch holes in the shells of prey if digestion was possible without punching. Are the data for any of the gastropods listed in Table 2 consistent with this hypothesis?

   A. Yes; none of the limpet shells were punched, and none of the ingested limpets survived.
   B. Yes; 79.2% of *Alvinia* shells were punched, and some of the ingested *Alvinia* survived.
   C. No; none of the limpet shells were punched, and none of the ingested limpets survived.
   D. No; 79.2% of *Alvinia* shells were punched, and none of the ingested *Alvinia* survived.

10. Which of the following statements concerning hermit crabs is most consistent with Table 1 ?

F. *A. taylori* punch the shells of most hermit crabs that are eaten, but the hermit crabs usually survive ingestion.
G. *A. taylori* punch the shells of most hermit crabs that are eaten, and the hermit crabs are usually digested.
H. *A. taylori* do NOT punch the shells of most hermit crabs that are eaten, and the hermit crabs usually survive ingestion.
J. *A. taylori* do NOT punch the shells of most hermit crabs that are eaten, and the hermit crabs are usually digested.

11. Based on Table 2, is it possible that all of the *Alvinia* with unpunched shells survived ingestion?

A. Yes, because approximately 20% of *Alvinia* shells were unpunched, and approximately 20% of ingested *Alvinia* survived.
B. Yes, because approximately 10% of *Alvinia* shells were unpunched, and approximately 20% of ingested *Alvinia* survived.
C. No, because approximately 20% of *Alvinia* shells were unpunched, and approximately 10% of ingested *Alvinia* survived.
D. No, because approximately 80% of *Alvinia* shells were unpunched, and approximately 20% of ingested *Alvinia* survived.

## Passage III

The chemical equations in Figure 1 show what occurs when 1 formula unit of each of 3 salts dissolves in $H_2O$.

$$NaCl \xrightarrow{H_2O} Na^+ + Cl^-$$
$$Na_2SO_4 \xrightarrow{H_2O} 2\,Na^+ + SO_4^{2-}$$
$$Na_3PO_4 \xrightarrow{H_2O} 3\,Na^+ + PO_4^{3-}$$

Figure 1

The *conductivity* of a solution is a measure of its ability to conduct electricity. Figure 2 shows how the conductivity (in millisiemens per centimeter, mS/cm) of an 18°C aqueous solution of each of the 3 salts varies with concentration. Concentration is measured as *millimoles* of salt per liter of solution (mmol/L). A millimole is $6 \times 10^{20}$ formula units of any salt.

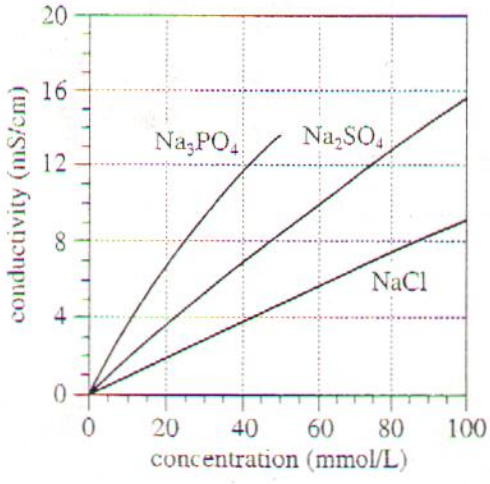



Figure 2

Figure 2 adapted from John A. Dean, *Lange's Handbook of Chemistry*. ©1992 by McGraw-Hill, Inc.

Figure 3 shows how the conductivity of an aqueous NaCl solution at 4 temperatures varies with concentration (measured as % NaCl by mass).

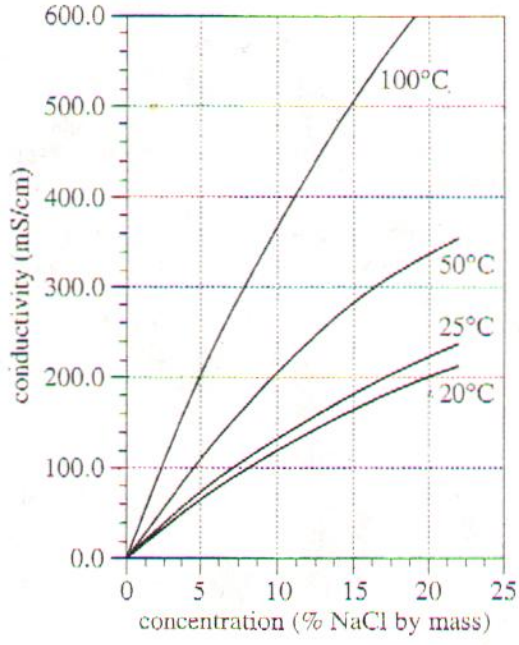



Figure 3

12. An aqueous $Na_2SO_4$ solution at 18°C has a conductivity of 12 mS/cm. According to Figure 2, the $Na_2SO_4$ concentration of this solution is closest to which of the following?

F. 40 mmol/L
G. 65 mmol/L
H. 75 mmol/L
J. 90 mmol/L

13. Based on Figure 3, the conductivity of an aqueous solution at 100°C that is 20% NaCl by mass would be:

A. less than 200 mS/cm.
B. between 200 mS/cm and 400 mS/cm.
C. between 400 mS/cm and 600 mS/cm.
D. greater than 600 mS/cm.

14. The conductivity of an aqueous solution that is 15% NaCl by mass was 100 mS/cm. The temperature of the solution was most likely:

F. less than 20°C.
G. between 20°C and 50°C.
H. between 50°C and 100°C.
J. greater than 100°C.

15. A chemist claimed that if any 2 aqueous solutions, each containing a different salt, are at the same temperature and have the same salt concentration (in mmol/L), they will have the same conductivity. Does the data presented in the passage support this claim?

A. No; Figure 2 refutes this claim.
B. No; Figure 3 refutes this claim.
C. Yes; Figure 2 confirms this claim.
D. Yes; Figure 3 confirms this claim.

16. According to Figure 3, which of the following NaCl solutions would have a conductivity of 200 mS/cm at 100°C ?

F. 5 g of NaCl dissolved in 20 g of $H_2O$
G. 5 g of NaCl dissolved in 50 g of $H_2O$
H. 10 g of NaCl dissolved in 90 g of $H_2O$
J. 10 g of NaCl dissolved in 190 g of $H_2O$

## Passage IV

Two types of friction affecting bicycle riders are:

- air resistance
- *rolling resistance* between the tires and the ground

Table 1 gives the air resistance, $R_A$, affecting a rider moving at speed $V$ when the cross-sectional area of the rider plus bicycle equaled $X$. Table 1 also gives the power, $P_A$, in watts (W), the rider had to generate to compensate for $R_A$ to maintain $V$. Figure 1 gives the power, $P_{A+R}$, in horsepower (hp), a rider had to generate to compensate for $R_A$ plus rolling resistance to maintain $V$ = 5.6 m/sec or 11.2 m/sec for a wheel diameter of 16 inches or 27 inches and various tire pressures. Figure 2 is a graph of power in W versus power in hp.

Table 1

| Speed $V$ (m/sec) | Cross-sectional area $X$ ($m^2$) | Air resistance $R_A$ (N*) | Power rider had to generate $P_A$ (W) |
|---|---|---|---|
| 1.0 | 0.33 | 0.18 | 0.18 |
| 2.0 | 0.33 | 0.74 | 1.5 |
| 3.0 | 0.33 | 1.7 | 5.1 |
| 5.6 | 0.33 | 5.8 | 32 |
| 11.2 | 0.33 | 23 | 260 |
| 11.2 | 0.30 | 21 | 240 |
| 11.2 | 0.40 | 28 | 310 |
| 11.2 | 0.50 | 35 | 390 |

*N is the abbreviation for newton, a unit of force.

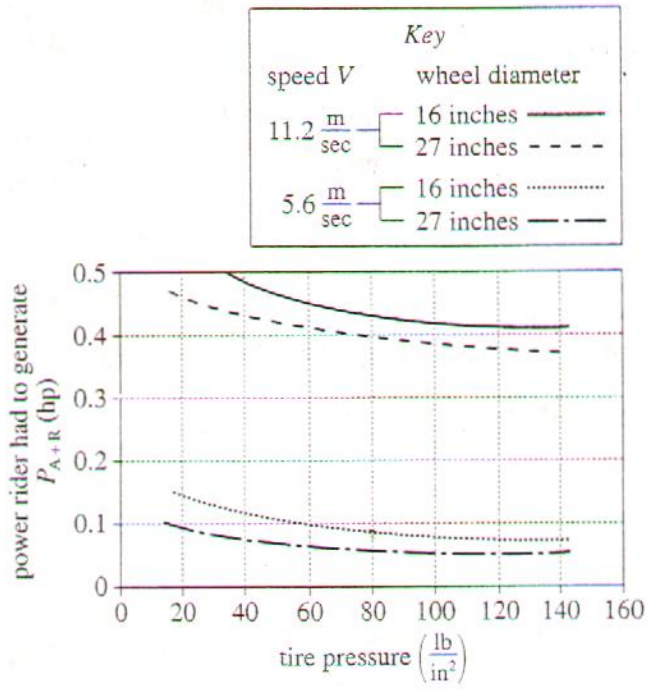



Figure 1

Figure 1 adapted from Frank Roland Whitt and David Gordon Wilson, "Bicycling Science." ©1974 by The Massachusetts Institute of Technology.

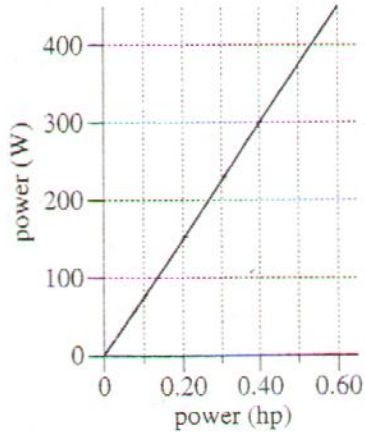



Figure 2

17. Suppose that for a particular bicycle and rider, $X$ equals 0.33 $m^2$. Based on Table 1, $R_A$ for this bicycle and rider will equal 2.9 N if $V$ equals:

A. 2.0 m/sec.
B. 4.0 m/sec.
C. 6.0 m/sec.
D. 8.0 m/sec.

18. Based on Table 1, for which of the following $R_A$ was the kinetic energy of the rider the greatest?

F. 0.18 N
G. 0.74 N
H. 1.7 N
J. 5.8 N

19. According to Figures 1 and 2, for the rider to maintain a $V$ of 11.2 m/sec on a bicycle with 27 inch wheels and a tire pressure of 80 lb/in$^2$, $P_{A+R}$, in W, had to be closest to which of the following?

A. 100 W
B. 200 W
C. 300 W
D. 400 W

20. According to Figure 2, for every change in power of exactly 1 hp, the change in power in W is closest to which of the following?

F. 40 W
G 190 W
H 750 W
J. 1,490 W

21. A student suggested that for the rider to maintain a speed of 11.2 m/sec on a bicycle with 27 inch wheels, $P_{A+R}$ would be less if the tire pressure were 80 lb/in$^2$ than if the tire pressure were 140 lb/in$^2$. Does Figure 1 support the student's suggestion?

A Yes; according to Figure 1, as tire pressure increased, $P_{A+R}$ increased.
B Yes; according to Figure 1, as tire pressure increased, $P_{A+R}$ decreased.
C. No; according to Figure 1, as tire pressure increased, $P_{A+R}$ increased.
D. No; according to Figure 1, as tire pressure increased, $P_{A+R}$ decreased.

## Passage V

A solution containing *neutral red* (an acid-base indicator) is yellow if the pH is greater than 8.0 or red if the pH is less than 6.8. In solution, a neutral red molecule is either uncharged (NR) or charged ($NRH^+$). The color of a neutral red solution depends on the NR and $NRH^+$ concentrations (see Figure 1).

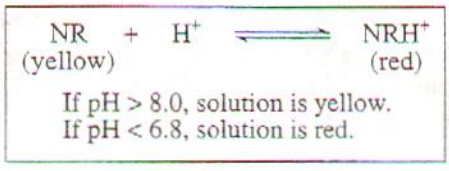



Figure 1

A colored component of a solution will strongly absorb visible light over a certain range of wavelengths (measured in *nanometers*, nm). At any wavelength in that range, the concentration of the component will be directly proportional to the solution's *absorbance*. Absorbance is measured by using a *spectrophotometer*. In a spectrophotometer, a certain wavelength of light is directed through a sample of the solution onto a detector that determines what fraction of the light is absorbed by the solution.

*Experiment 1*

Two 1.00 L *buffer solutions* (solutions that maintain a constant pH) that were pH = 3.0 and pH = 9.0, respectively, were prepared. Then, 15.00 mg of neutral red was added to each solution. At pH = 3.0, virtually all neutral red molecules are charged. At pH = 9.0, virtually all neutral red molecules are uncharged. Next, 5.00 mL of the pH = 3.0 solution was added to a *cuvette* (a transparent container). The cuvette was placed in the spectrophotometer. The absorbance over the visible spectrum was measured. The procedure was repeated with the pH = 9.0 buffer solution (see Figure 2).

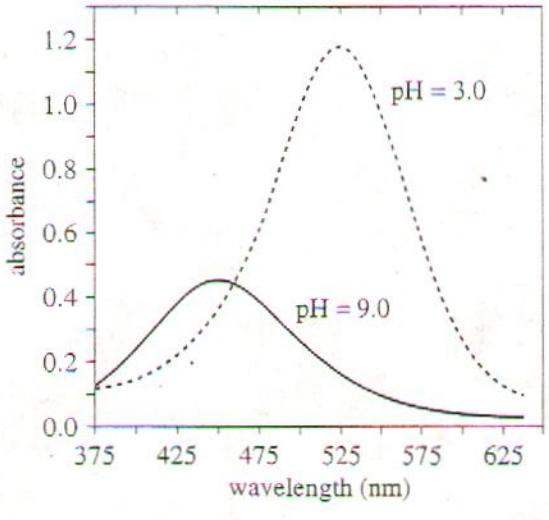



Figure 2

*Experiment 2*

The procedure in Experiment 1 was used to study neutral red at 5 other pHs (see Figure 3).

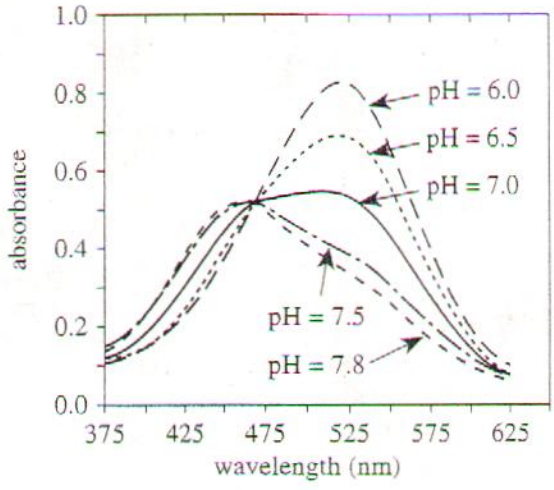



Figure 3

(Note: Without neutral red present, the buffer solutions used in Experiments 1 and 2 do not measurably absorb visible light.)

Figures 2 and 3 adapted from Krystin P. Alter, John L. Molloy, and Emily D. Niemeyer, "Spectrophotometric Determination of the Dissociation Constant of an Acid-Base Indicator Using a Mathematical Deconvolution Technique." ©2005 by Division of Chemical Education, Inc., American Chemical Society.

**22.** Based on the results of Experiment 1, from 375 nm to 625 nm, how does the absorbance of a neutral red solution at pH = 9.0 vary with wavelength? The absorbance:

**F.** decreases only.
**G.** increases only.
**H.** decreases, then increases.
**J.** increases, then decreases.

**23.** Suppose an additional trial had been done in Experiment 2 at pH = 7.25. The absorbance of the solution at 525 nm would most likely have been:

**A.** lower than 0.25.
**B.** between 0.25 and 0.40.
**C.** between 0.40 and 0.55.
**D.** higher than 0.55.

24. Which of the following best describes the solutions that were measured using the spectrophotometer in Experiments 1 and 2 ? In Experiment 1:

F. one buffer solution was measured at two different pHs; in Experiment 2, one buffer solution was measured at five different pHs.
G. one buffer solution was measured at five different pHs; in Experiment 2, one buffer solution was measured at two different pHs.
H. two buffer solutions of different pH were measured; in Experiment 2, five buffer solutions of different pH were measured.
J. five buffer solutions of different pH were measured; in Experiment 2, two buffer solutions of different pH were measured.

25. Solution A contains neutral red and is red. Solution B is colorless. Solution B is added to Solution A, and the resulting solution is yellow. Is Solution A acidic or basic, and is Solution B acidic or basic?

| | Solution A | Solution B |
|---|---|---|
| A. | acidic | basic |
| B. | basic | acidic |
| C. | acidic | acidic |
| D. | basic | basic |

26. In Experiment 2, at 525 nm, compared to the absorbance of the pH = 6.0 solution, the absorbance of the pH = 7.0 solution was:

F. higher, because it had the higher $NRH^+$ concentration.
G. lower, because it had the lower $NRH^+$ concentration.
H. higher, because it had the lower $NRH^+$ concentration.
J. lower, because it had the higher $NRH^+$ concentration.

27. In Experiment 1, the solution of neutral red at pH = 9.0 was:

A. yellow, because virtually all neutral red molecules were charged.
B. yellow, because virtually all neutral red molecules were uncharged.
C. red, because virtually all neutral red molecules were charged.
D. red, because virtually all neutral red molecules were uncharged.

## Passage VI

Three studies examined the effects of adding *fly ash* (fine-grained ash from burning coal) to a sandy soil. In the studies, 4 samples were analyzed: Sample 1 was pure sandy soil, Samples 2 and 3 each had a different amount of fly ash thoroughly mixed with sandy soil, and Sample 4 was pure fly ash.

*Study 1*

To determine the relative water-holding capacity of the 4 samples, the percent by mass of sand-size, silt-size, and clay-size particles in each sample was measured (see Table 1). As the total percent by mass of silt-size and clay-size particles in a sample increases, the water-holding capacity of the sample increases.

Table 1

| Sample | % by mass of fly ash in sample | % by mass of particles: | | |
|---|---|---|---|---|
| | | sand-size | silt-size | clay-size |
| 1 | 0 | 86 | 7 | 7 |
| 2 | 20 | 71 | 21 | 8 |
| 3 | 40 | 59 | 30 | 11 |
| 4 | 100 | 1 | 78 | 21 |

*Study 2*

Sample 1 was analyzed for boron (B), an element that inhibits plant growth. Next, 4 kg of Sample 1 was placed in each of 3 identical pots. Eight corn seeds were planted in each pot. Identical amounts of water were added to the pots regularly. Fifty-five days after planting, the corn plants in each pot were harvested, dried completely, and weighed. These procedures were repeated with Samples 2 and 3 (see Table 2).

Table 2

| Sample | % by mass of fly ash in sample | B content (mg B/kg sample) | Plant dry mass (g/pot) |
|---|---|---|---|
| 1 | 0 | 0.2 | 18.2 |
| 2 | 20 | 7.4 | 14.1 |
| 3 | 40 | 19.6 | 11.3 |

*Study 3*

Equal-volume portions of Samples 1–3 were leached by running an amount of water equivalent to 100 cm of rainfall through them to reduce the B content. (The B compounds that were present are water-soluble.) Then, all the procedures of Study 2 were repeated with those leached portions (see Table 3).

Table 3

| Sample (leached) | % by mass of fly ash in sample | B content (mg B/kg sample) | Plant dry mass (g/pot) |
|---|---|---|---|
| 1 | 0 | 0.1 | 18.3 |
| 2 | 20 | 1.3 | 16.6 |
| 3 | 40 | 3.5 | 15.2 |

Tables adapted from M. Ghodrati et al., "Enhancing the Benefits of Fly Ash as a Soil Amendment by Pre-Leaching." ©1995 by Williams and Wilkins.

**28.** In Study 3, from sample to sample, as the percent by mass of fly ash increased, the plant dry mass:

- **F.** decreased only.
- **G.** increased only.
- **H.** decreased, then increased.
- **J.** remained the same.

**29.** Suppose an amount of fly ash had been thoroughly mixed with the sandy soil to create a fifth sample that was 30% fly ash by mass. Based on the results of Study 1, the percent by mass of sand-size particles in that sample would most likely have been:

- **A.** less than 1%.
- **B.** between 1% and 59%.
- **C.** between 59% and 71%.
- **D.** greater than 71%.

30. Suppose an additional sample had been found to have a B content of 5.0 mg B/kg sample in Study 2. The plant dry mass for that sample would most likely have been:

F. less than 11.3 g/pot.
G. between 11.3 g/pot and 14.1 g/pot.
H. between 14.1 g/pot and 18.2 g/pot.
J. greater than 18.2 g/pot.

31. Suppose that in Study 3 none of the corn plants had been completely dried before the plant dry mass was measured. Compared to the values for plant dry mass in Table 3, the measured values for plant dry mass in this case would have been:

A. lower for all 3 samples.
B. higher for all 3 samples.
C. lower for Samples 1 and 2, but higher for Sample 3.
D. higher for Samples 1 and 2, but lower for Sample 3.

32. The results of Study 1 indicate that pure fly ash contains:

F. equal percents by mass of sand-size and of silt-size particles.
G. equal percents by mass of sand-size and of clay-size particles.
H. a greater percent by mass of sand-size particles than of silt-size particles.
J. a greater percent by mass of silt-size particles than of sand-size particles.

33. Based on the results of Study 2, the B content of pure, unleached fly ash is most likely:

A. less than 0.2 mg B/kg sample.
B. between 0.2 mg B/kg sample and 7.4 mg B/kg sample.
C. between 7.4 mg B/kg sample and 19.6 mg B/kg sample.
D. greater than 19.6 mg B/kg sample.

## Passage VII

Figure 1 depicts *meiosis*. Meiosis consists of 2 cell divisions, Meiosis I and Meiosis II. During Meiosis I, 1 cell (Cell A) divides into 2 new cells (Cells AA and AB). Then each new cell divides during Meiosis II.

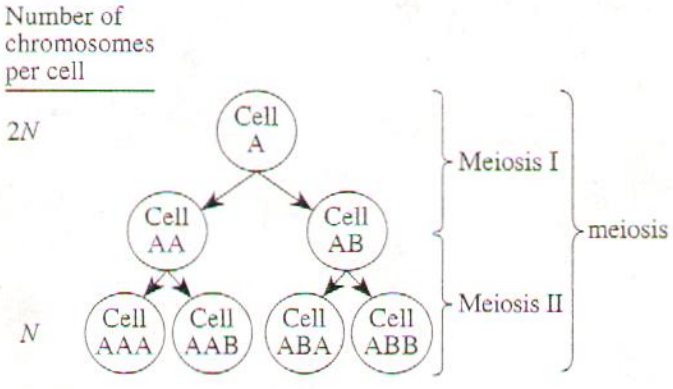



Figure 1

A cell entering meiosis contains $2N$ chromosomes ($N$ homologous pairs). After meiosis, the number of chromosomes in each cell is $N$. Table 1 lists $N$ and $2N$ for various animals.

Table 1

| Animal | $N$ | $2N$ |
|---|---|---|
| Alligator | 16 | 32 |
| American mink | 15 | 30 |
| Buffalo | 30 | 60 |
| Cat | 19 | 38 |
| Dog | 39 | 78 |
| Horse | 32 | 64 |
| Human | 23 | 46 |

Two types of chromosomes are shown in Figure 2: chromosomes that contain 2 *double-stranded DNA* (dsDNA) molecules (referred to here as *double* chromosomes) and chromosomes that contain 1 dsDNA molecule (referred to here as *single* chromosomes). When 1 double chromosome splits, 2 single chromosomes are formed.

Figure 2 also shows that as a result of meiosis, each of the 4 cells produced during Meiosis II contains 1 of the single chromosomes from each homologous pair of double chromosomes. (The cells depicted in Figure 2 represent cells from an organism that has 1 pair of homologous chromosomes.)

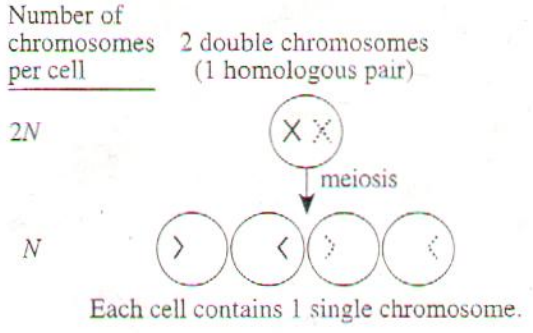



Figure 2

Two students present opposing models predicting when each double chromosome splits during meiosis.

*Student 1*

During Meiosis I, the 2 double chromosomes from each homologous pair segregate into different cells. During Meiosis II, each double chromosome splits into 2 single chromosomes, which then segregate into different cells (see Figure 3).

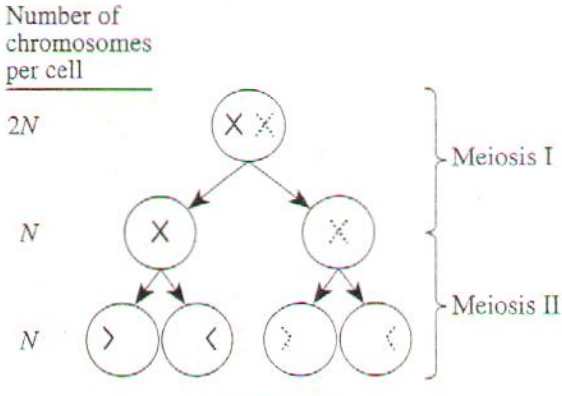



Figure 3

*Student 2*

During Meiosis I, each double chromosome splits into 2 single chromosomes, which then segregate into different cells. During Meiosis II, in each cell, the 2 single chromosomes from each homologous pair segregate into different cells (see Figure 4).

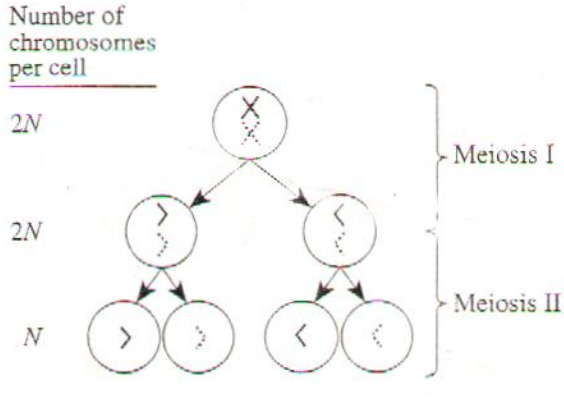



Figure 4

34. A cell from 1 of the animals listed in Table 1 was isolated. The cell underwent meiosis. After completing meiosis, each of the new cells produced during Meiosis II contained 32 chromosomes. This cell most likely came from which animal?

F. Alligator
G. Buffalo
H. Horse
J. Human

35. Based on Student 1's model, if a cell enters meiosis with 4 double chromosomes, each of the 2 new cells produced during Meiosis I will have how many double chromosomes before these cells enter Meiosis II ?

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

36. If 1 cell is placed in a test tube and the cell then undergoes meiosis, how many cells will be contained in the test tube immediately following the completion of meiosis?

F. 1
G. 2
H. 4
J. 6

37. Based on the information presented, which of the following cells would most likely have the greatest number of chromosomes?

A. A dog cell entering meiosis
B. A dog cell produced during Meiosis II
C. A human cell entering meiosis
D. A human cell produced during Meiosis II

38. Which of the following cell types forms by the process depicted in Figure 1 ?

F. Muscle
G. Blood
H. Nerve
J. Sperm

39. Both students would agree that if Cell A in Figure 1 has 4 copies of Gene X, Cell AAA will most likely have how many copies of Gene X ?

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

40. Suppose that Cell A in Figure 1 enters meiosis with 6 double chromosomes. Based on Student 2's model, upon entering Meiosis II, how many single chromosomes will be contained in Cell AA ?

F. 3
G. 6
H. 9
J. 12

**END OF TEST 4**

**STOP! DO NOT RETURN TO ANY OTHER TEST.**

# ACT Writing Test Prompt

Educators debate whether students should be encouraged to have internships or jobs related to their specific career interests while in high school. Some educators think such internships and jobs are useful because they help students explore their interests and evaluate career choices. Other educators think such internships and jobs push students to make career decisions too early in life, before they have fully explored all their other options. In your opinion, should students be encouraged to have internships or jobs related to their specific career interests while in high school?

In your essay, take a position on this question. You may write about either one of the two points of view given, or you may present a different point of view on this question. Use specific reasons and examples to support your position.

| English | | | | Mathematics | | | | Readling | | Science | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | C | | | 1 | E | 31 | A | 1 | B | 1 | A |
| 2 | J | | | 2 | K | 32 | H | 2 | J | 2 | H |
| 3 | D | | | 3 | B | 33 | B | 3 | C | 3 | B |
| 4 | G | | | 4 | J | 34 | G | 4 | F | 4 | G |
| 5 | A | | | 5 | C | 35 | D | 5 | B | 5 | D |
| 6 | J | 41 | B | 6 | F | 36 | K | 6 | G | 6 | J |
| 7 | D | 42 | G | 7 | D | 37 | A | 7 | D | 7 | B |
| 8 | G | 43 | D | 8 | K | 38 | K | 8 | H | 8 | F |
| 9 | C | 44 | F | 9 | C | 39 | B | 9 | B | 9 | A |
| 10 | G | 45 | A | 10 | H | 40 | G | 10 | F | 10 | J |
| 11 | C | 46 | F | 11 | B | 41 | B | 11 | B | 11 | C |
| 12 | J | 47 | B | 12 | F | 42 | F | 12 | F | 12 | H |
| 13 | C | 48 | G | 13 | A | 43 | B | 13 | A | 13 | D |
| 14 | H | 49 | B | 14 | H | 44 | F | 14 | H | 14 | F |
| 15 | B | 50 | H | 15 | C | 45 | B | 15 | A | 15 | A |
| 16 | H | 51 | A | 16 | K | 46 | F | 16 | J | 16 | J |
| 17 | B | 52 | J | 17 | D | 47 | A | 17 | C | 17 | B |
| 18 | J | 53 | A | 18 | G | 48 | H | 18 | J | 18 | J |
| 19 | B | 54 | H | 19 | B | 49 | C | 19 | C | 19 | C |
| 20 | G | 55 | C | 20 | J | 50 | G | 20 | G | 20 | H |
| 21 | A | 56 | F | 21 | A | 51 | D | 21 | C | 21 | D |
| 22 | F | 57 | D | 22 | J | 52 | J | 22 | H | 22 | J |
| 23 | C | 58 | J | 23 | C | 53 | A | 23 | A | 23 | C |
| 24 | H | 59 | A | 24 | K | 54 | H | 24 | F | 24 | H |
| 25 | C | 60 | H | 25 | C | 55 | D | 25 | D | 25 | A |
| 26 | G | 61 | B | 26 | H | 56 | K | 26 | H | 26 | G |
| 27 | C | 62 | H | 27 | E | 57 | D | 27 | B | 27 | B |
| 28 | J | 63 | D | 28 | F | 58 | J | 28 | J | 28 | F |
| 29 | D | 64 | F | 29 | E | 59 | A | 29 | D | 29 | C |
| 30 | F | 65 | A | 30 | H | 60 | K | 30 | F | 30 | H |
| 31 | D | 66 | F | | | | | 31 | A | 31 | B |
| 32 | G | 67 | C | | | | | 32 | G | 32 | J |
| 33 | B | 68 | G | | | | | 33 | C | 33 | D |
| 34 | H | 69 | D | | | | | 34 | J | 34 | H |
| 35 | D | 70 | G | | | | | 35 | D | 35 | B |
| 36 | F | 71 | C | | | | | 36 | G | 36 | H |
| 37 | A | 72 | H | | | | | 37 | C | 37 | A |
| 38 | H | 73 | D | | | | | 38 | H | 38 | J |
| 39 | B | 74 | G | | | | | 39 | A | 39 | A |
| 40 | J | 75 | D | | | | | 40 | H | 40 | G |