FULL-LENGTH PRACTICE TESTS 17

English Test

35 Minutes — 50 Questions

Directions: Each passage has certain words and phrases that are underlined and numbered. The questions in the right column will provide alternatives for the underlined segments. Most questions require you to choose the answer that makes the sentence grammatically correct, concise, and relevant. If the word or phrase in the passage is already the correct, concise, and relevant choice, select Choice A, NO CHANGE. Some questions will ask a question about the underlined segment. When a question is presented, choose the best answer.

Some questions will ask about part or all of the passage. These questions do not refer to a specific underlined segment. Instead, these questions will accompany a number in a box.

For each question, choose your answer and fill in the corresponding bubble on your answer sheet. Read the passage once before you answer the questions. You will o en need to read several sentences beyond the underlined portion to be able to choose the correct answer. Be sure to read enough to answer each question.

Passage I

American Jazz

One of the earliest[1] music forms to originate in the United States was jazz. Known as truly Mid-American because of it's[2] having origins in several locations in middle America, this music developed almost simultaneously in New Orleans, Saint Louis, Kansas City, and Chicago.

At the start of the twentieth century, musicians all along the Mississippi River familiar with West African folk music [3] blended it with European classical music from the early nineteenth century. This combination adopted[4] by artists in the region who began to use minor chords and syncopation in their own music, ragtime and blues. At the same time, brass bands and gospel choirs adopted jazz music, and it became a true blend of cultures. Eventually, a unique music style developed; based on[5] a blend of the many different cultures in America at the time. It was American jazz and[6] became the first indigenous American style to affect music in the rest of the world.

[1] One of the true greats of American jazz was Cabell "Cab" Calloway III. [2] He was born in New York in 1907, but his family moved to Chicago

during his teen years. [3] Growing up, Cab made his living working as a shoe shiner and he was a waiter. [4] During these years, he also spent time at the racetrack, where he walked horses to keep them in good shape. [9] [5] After graduating from high school in Chicago, where Cab got his first performance job in a revue called "Plantation Days." [6] His strong and impressive voice soon gained him popularity in the top jazz circles of the United States. [12]

Many others have followed Cab's lead and have added to the richly tradition of American jazz. Like other folk music forms, American jazz has a rich history and unique sound that means it'll stick around for a while.

1. A. NO CHANGE
   B. One of the most earliest
   C. The most early
   D. The earliest

2. F. NO CHANGE
   G. its
   H. its's
   J. its,

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

—rich with syncopation—

Given that it is true, would this be a relevant addition to make here?

A. Yes, because it can help the reader have a better understanding of the music being discussed.
B. Yes, because it helps explain to the reader why this music became popular.
C. No, because it fails to explain the connection between this music and the button accordion.
D. No, because it is inconsistent with the style of this essay to mention specific musical forms.

4. F. NO CHANGE
G. was adopted
H. having been adopted
J. being adopted

5. A. NO CHANGE
B. style developed based on
C. style developed based on,
D. style, developed based on

6. F. NO CHANGE
   G. This style, known as American jazz,
   H. Being known as American jazz, it
   J. It being American jazz first

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

   A. earned his living by
   B. made his living from
   C. made his living on
   D. earned his living

8. F. NO CHANGE
   G. as well
   H. being
   J. DELETE the underlined portion

9. The writer is considering deleting the following clause from the preceding sentence (placing a period after the word *racetrack*):

   where he walked horses to keep them in good shape.

   Should the writer make this deletion?

A. Yes, because the information is unrelated to the topic addressed in this paragraph.
B. Yes, because the information diminishes the musical accomplishments and successes of Cab Calloway.
C. No, because the information explains the reference to the racetrack, which might otherwise puzzle readers.
D. No, because the information shows how far Cab Calloway came in his life.

10. F. NO CHANGE
G. it was there that
H. was where
J. DELETE the underlined portion

11. A. NO CHANGE
B. popularity: in the top jazz circles
C. popularity, in the top jazz circles,
D. popularity in the top jazz circles,

12. Upon reviewing this paragraph and finding that some information has been left out, the writer composes the following sentence incorporating that information:

> He became widely known as “The man in the zoot suit with the reet pleats.”

This sentence would most logically be placed after sentence:

F. 3.
G. 4.
H. 5.
J. 6.

13. A. NO CHANGE
B. rich
C. mostly rich
D. richest of

14. F. NO CHANGE
G. causes it to be an enduring institution with a timeless appeal.
H. makes many people enjoy it.
J. ensures its continued vitality.

Question 15 asks about the preceding passage as a whole.

15. Suppose the writer's goal was to write a brief essay focusing on the history and development of American jazz music. Would this essay successfully fulfill this goal?

A. Yes, because the essay describes the origins of American jazz music and one of its important figures.
B. Yes, because the essay mentions the contributions American jazz music has made to other folk music traditions.
C. No, because the essay refers to other musical forms besides American jazz music.
D. No, because the essay focuses entirely on one American jazz musician, Cab Calloway.

Passage II

My Grandfather's Internet

[1]

My grandfather is possibly the least technologically capable writer in the world. He refused[16] to use anything but his pen and paper to write until last year. (He said[17], he didn't need any keys or mouse pads between his words and himself.) Consequently, when he has went[18] to buy a computer—because of the knowledge that[19] his editor refused to read another hand-written novel—he resisted connecting it to the Internet for several months. He said he

had no need to find information

when he had a set of encyclopedias right there in his office on a World Wide Web. (20)

[2]

Grandpa is fascinated by all the things he can do on the World Wide Web. He has found that chat rooms are wonderful places to have long conversations with people interesting enough to be characters in his books. For example, (21) he says, by clicking the "close" button he can just ignore them (22) who aren't interesting. Grandpa's favorite website is Google.com. Google.com is a search engine that searches millions of sites for whatever word he types in, which is very convenient when (23) he needs to know how the native people of Africa developed the game mancala.

For him, Grandpa says that, in merely a few seconds, to be able to find anything he wants is a source of pure joy. (24)

[3]

Grandpa's editor, however, was clever and, knowing exactly how my grandfather could use it, described how the Internet would improve his life. However, Grandpa 25 could get instant feedback, and praise from the publishing company, read online reviews, and do research for his characters much faster. Finally, Grandpa connected to the Internet, and he hasn't logged off yet.

[4]

[1] As for his writings, Grandpa uses the Internet not only for research but also for making them more creative and checking his word choice. [2] Explaining his new vocabulary to his editor, Grandpa points 26 to his new computer and admits that an Internet connection was a good idea after all. [3] I am sure Grandpa hasn't explored the entire Internet yet, but I am sure he will continue to find new and better ways of using it. 27 28

16. F. NO CHANGE
    G. world he refused
    H. world refusing,
    J. world, and has been refusing

17. A. NO CHANGE
    B. said
    C. said, that
    D. said, that,

18. F. NO CHANGE
    G. had went
    H. went
    J. goes

19. A. NO CHANGE
    B. due to the fact that
    C. because
    D. so

20. F. NO CHANGE
    G. on a World Wide Web when he had a set of encyclopedias right there in his office.
    H. when he had a set of encyclopedias right there on a World Wide Web in his office.
    J. when he had a set of encyclopedias on a World Wide Web right there in his office.

21. A. NO CHANGE
    B. To illustrate,
    C. On the one hand,
    D. On the other hand,

22. F. NO CHANGE
    G. the people
    H. it
    J. their talking

23. A. NO CHANGE
    B. convenient, when
    C. convenient. When
    D. convenient; when

24. F. NO CHANGE
    G. For him, Grandpa says that to be able to find anything he wants, is a source of pure joy for him, in merely a few seconds.
    H. Grandpa says a source of pure joy for him is that he is able to find anything he wants, in merely a few seconds.
    J. Grandpa says that being able to find anything he wants in merely a few seconds is a source of pure joy for him.

25. A. NO CHANGE
    B. Additionally, Grandpa
    C. Conversely, Grandpa
    D. Grandpa

26. F. NO CHANGE
    G. pointing
    H. having pointed
    J. Grandpa has pointed

27. A. NO CHANGE
    B. and he probably won't explore the rest of it either.
    C. and so his editor will have to teach him to find things faster.
    D. and his editor knows just that.

28. Upon reviewing Paragraph 4 and realizing that some information has been left out, the writer composes the following sentence:

    He uses the dictionary and thesaurus websites religiously.

    The most logical placement for this sentence would be:

    F. before Sentence 1.
    G. after Sentence 1.
    H. after Sentence 2.
    J. after Sentence 3.

Questions 29 and 30 ask about the essay as a whole.

29. The writer is considering deleting the first sentence of Paragraph 1. If the writer removed this sentence, the essay would primarily lose:

A. information about aspects of technology that his grandfather does not use.
B. humor that sets the mood for the piece.
C. important details about the Internet that his grandfather might enjoy.
D. a justification for his grandfather's reluctance to use the Internet.

30. For the sake of logic and coherence, Paragraph 3 should be placed:

F. where it is now.
G. before Paragraph 1.
H. after Paragraph 1.
J. after Paragraph 4.

Passage III

Chickasaw Wandering

In the twilight of a cool autumn evening, I walked with a gathering of people to the center of a field in Oklahoma. Although I didn't know more of the people who walked with me, a few of them I did know quite well. We were Chickasaw Indians, and some of us had waited for years to make this journey across the Chickasaw territory to the ornately decorated capital of Tishomingo.

For my whole life I had been shown other Chickasaw's pictures—many of them the ancestors of the people, who walked along with me, to the Festival that evening.

My father and grandmother helped preserve tribal history by collecting books and newspaper clippings.

Books about the history and traditions of our tribe were stacked on the bookshelves, and framed portraits of members of our tribe decorated the walls of these rooms. When I was growing up, I would often find my father or grandmother in one of the rooms, my father reading a book and my grandmother listening to ancient tribal music.

That room held everything I knew about being a Chickasaw, and unlike many Chickasaw, my family had moved away from Oklahoma all the way to

Seattle. Once a year, the tribe held a Festival and Annual Meeting that was always well attended.[41] Before they moved to Seattle, my grandmother and father had always attended this event. However, the tribe owned no land in Seattle on which a ceremonial house could be built and Chickasaw ceremonies conducted.[42] Since I had never been to Oklahoma, I had never been to a Chickasaw event or walked in our territory. Still,[43] I had never even known any other Chickasaw children. Finally, my father, grandmother, and I all took a trip to participate in the Festival. As we walked together through the open plain, hundreds of crickets chirping[44] softly from the grass. The insects accompanied our march like the spirits of our ancestors singing to us on our way home.

31. A. NO CHANGE
    B. On
    C. With
    D. From

32. F. NO CHANGE
    G. more of the people whom
    H. most of the people who
    J. most of the people whom

33. The writer wants to balance the statement made in the earlier part of this sentence with a related detail that suggests the unity of the people. Given that all of the following choices are true, which one best accomplishes this goal?

A. NO CHANGE
B. we each had our own reasons for being there.
C. I hoped I would get to know some of them.
D. I felt a kinship with them.

34. F. NO CHANGE
G. were waiting
H. had been in waiting
J. waited

35. A. NO CHANGE
B. pictures in which other Chickasaw were present
C. pictures of other Chickasaw
D. other Chickasaw whose pictures had been taken

36. F. NO CHANGE
G. people who, walked along with me
H. people, who walked along, with me
J. people who walked along with me

37. A. NO CHANGE
    B. Some of those pictures had been reprinted in books my father and grandmother collected.
    C. My grandmother and father proudly displayed these pictures in their homes.
    D. Like other Chickasaw, my father and grandmother had each set aside a room in their own home to the tribe.

38. F. NO CHANGE
    G. my father read a book and my grandmother listened
    H. my father having read a book and my grandmother listening
    J. my father who had read a book and my grandmother who would listen

39. A. NO CHANGE
    B. Her rooms
    C. Those rooms
    D. This room

40. F. NO CHANGE
    G. Chickasaw unlike
    H. Chickasaw, unlike
    J. Chickasaw. Unlike

41. Given that all of the choices are true, which one provides information most relevant to the main focus of this paragraph?

A. NO CHANGE
B. notable for its exquisite dancing.
C. in south central Oklahoma.
D. that lasted several days.

42. F. NO CHANGE
G. Chickasaw ceremonies were conducted there.
H. there were Chickasaw ceremonies conducted there.
J. the conducting of Chickasaw ceremonies.

43. A. NO CHANGE
B. Meanwhile,
C. In fact,
D. On the other hand,

44. F. NO CHANGE
G. crickets, which chirped
H. crickets that chirped
J. crickets chirped

Question 45 asks about the essay as a whole.

45. Suppose the writer's goal had been to write an essay describing the history of the Chickasaw people. Would this essay successfully accomplish this goal?

A. Yes, because it describes events that take place in the past.
B. Yes, because it contains detailed information about the Chickasaw.
C. No, because it focuses on an individual's limited experiences.
D. No, because it is narrated from one person's point of view.

Passage IV

Topping the Washington Monument

During the midday hours of December 6, 1884, engineers and workers braced themselves for the days[46] dangerous mission. [A] Winds that rushed past the workers at speeds of nearly sixty miles per hour threatened[47] to postpone and delay[48] the capstone ceremony marking the placement of the capstone atop the Washington Monument. [49]

Eighty-five years of fundraising and planning had brought about this moment. In 1799, attorney and Congressman[50] John Marshall proposed a monument to honor[51] the young nation's Revolutionary War hero and first

president. Architect Robert Mills, who planned[52] the monument that would memorialize Washington. [B] The monument would be in the form of a 500-foot obelisk made of marble and topped with a 100-pound capstone of aluminum.

In 1861, construction on the monument was halted for because[53] supplies and men were needed to fight the Civil War. [C] Fifteen years passed before work resumed[54] on the monument. The workers had the entire monument's history in their minds during they're attempt to place its[55] capstone. The crowd cheered as, attached to the top of the monument[56], the capstone was hoisted up.

[D] More than eight decades and more than eighty years[57] of planning and building had come to a conclusion, the[58] Washington Monument was finally complete.

46. F. NO CHANGE
    G. days'
    H. day's
    J. days's

47. A. NO CHANGE
    B. had been threatened
    C. will have threatened
    D. threatens

48. F. NO CHANGE
    G. to a later time
    H. by delaying
    J. DELETE the underlined portion

49. The writer is considering deleting the following from the preceding sentence:

    marking the placement of the capstone atop the Washington Monument.

    If the writer were to delete this phrase, the essay would primarily lose:

    A. a minor detail in the essay's opening paragraph.
    B. an explanation of the term *capstone ceremony*.
    C. the writer's opinion about the significance of the capstone ceremony
    D. an indication of the capstone ceremony's significance to the American people.

50. F. NO CHANGE

G. attorney, and Congressman

H. attorney and Congressman,

J. attorney, and Congressman,

Mathematics Test

50 Minutes — 45 Questions

Directions: Choose the correct solution to each question and fill in the corresponding bubble on your answer sheet.

Do not continue to spend time on questions if you get stuck. Solve as many questions as you can before returning to any if time permits.

You may use a calculator on this test for any question you choose. However, some questions may be better solved without a calculator.

Note: Unless otherwise stated, you can assume:

1. Figures are NOT necessarily drawn to scale.
2. Geometric figures are two dimensional.
3. The term *line* indicates a straight line.
4. The term *average* indicates arithmetic mean.

1. If $3x + 7 = 25$, what is the value of x?

A. 4

B. 5

C. 6

D. 7

2. What is 40% of 250?

A. 80

B. 90

C. 100

D. 110

3. Simplify: $5(2x - 3) - 3(x - 4)$

A. $7x - 3$

B. $7x - 27$

C. $13x - 3$

D. $13x - 27$

4. What is the least common multiple of 12 and 18?

A. 24

B. 36

C. 48

D. 72

5. If the average of five numbers is 24, what is their sum?

A. 100

B. 110

C. 120

D. 130

6. Solve for x: $2x^2 - 8x = 0$

A. $x = 0$ only

B. $x = 4$ only

C. $x = 0$ or $x = 4$

D. $x = 0$ or $x = -4$

7. What is |−15| + |−8|?

A. -23

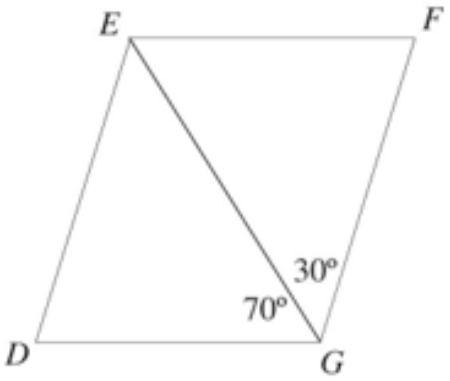
B. -7

C. 7

D. 23

8.

In the parallelogram below, what is the measure of angle EFG?



A. 30°

B. 40°

C. 50°

D. 60°

9. What is 3/4 + 5/6?

A. 8/10

B. 15/24

C. 19/12

D. 8/24

10. A car travels 180 miles in 3 hours. What is its average speed?

A. 50 mph

B. 55 mph

C. 60 mph

D. 65 mph

11. Factor: $x^2 - 9x + 20$

A. $(x - 4)(x - 5)$

B. $(x - 2)(x - 10)$

C. $(x - 1)(x - 20)$

D. $(x - 3)(x - 7)$

12. What is $\sqrt{(169)}$?

A. 11

B. 12

C. 13

D. 14

13. If $f(x) = 3x^2 - 2x + 5$, what is $f(-1)$?

A. 6

B. 8

C. 10

D. 12

14. The slope of the line passing through (2, 5) and (6, 13) is:

A. 1

B. 2

C. 3

D. 4

15. Lena will pick 1 card at random from a pack of 25 baseball cards. Each card features the fielding position for 1 of 25 different baseball players. What is the probability that the card Lena picks will feature an outfielder or a pitcher?

A. 9%

B. 28%

C. 32%

D. 56%

16. In a 45-45-90 triangle, if one leg is 6, what is the hypotenuse?

A. 6

B. $6\sqrt{2}$

C. $6\sqrt{3}$

D. 12

17. Solve: $3x - 4 > 11$

A. $x > 3$

B. $x > 4$

C. $x > 5$

D. $x > 15$

18. The area of a circle with radius 5 is:

A. 10π

B. 15π

C. 20π

D. 25π

19. Express 0.00045 in scientific notation:

A. 4.5×10^{-4}

B. 4.5×10^{-3}

C. 45×10^{-5}

D. 0.45×10^{-3}

20. What is the value of 3^4?

A. 12

B. 64

C. 81

D. 243

21. If $\log_2(x) = 5$, what is x?

A. 10

B. 16

C. 25

D. 32

22. The mayor of Westbrook is deciding how to assign the 6 council members to the row of seats below. From how many different arrangements can she choose?

A. 21

B. 36

C. 64

D. 720

23. A rectangle has length 12 and width 8. What is its perimeter?

A. 20

B. 40

C. 48

D. 96

24. What is the median of {3, 7, 9, 11, 15, 18, 21}?

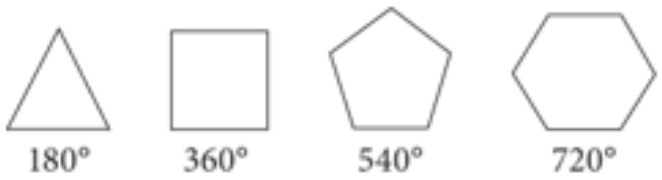
A. 9

B. 11

C. 13

D. 15

25. The following figures show regular polygons and the sum of the degrees of the angles in each polygon. Based on these figures, which equation represents the number of degrees in a regular polygon as a function of the number of sides, n, the polygon has?



A. $f(n) = 60n$

B. $f(n) = 180n$

C. $f(n) = 180(n - 2)$

D. $f(n) = 20n^2$

26. If $i = \sqrt{(-1)}$, what is i^3?

A. i

B. -i

C. 1

D. -1

27. The vertex of $y = (x - 3)^2 + 2$ is:

A. (3, 2)

B. (-3, 2)

C. (3, -2)

D. (-3, -2)

28. Two angles are supplementary. If one is 65°, the other is:

A. 25°

B. 65°

C. 115°

D. 125°

29. What is cos(60°)?

A. 1/2

B. √2/2

C. √3/2

D. 1

30. A bag contains 4 red, 6 blue, and 5 green marbles. What is the probability of drawing a blue marble?

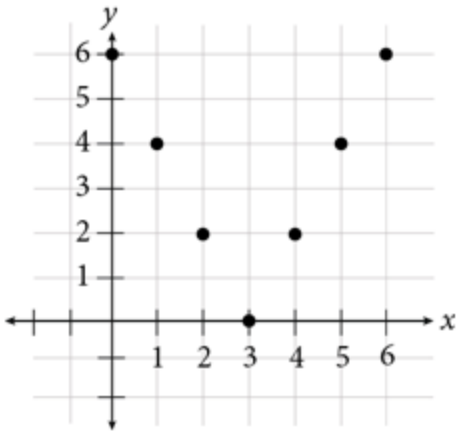
A. 2/5

B. 1/3

C. 6/15

D. 4/15

31. The entire graph of a function, F, is shown in the standard (x,y) coordinate plane below. One of the following sets is the range of the function. Which set is it?



A. {y: y ≥ 0}

B. {y: 0 ≤ y ≤ 6}

C. {x: 0 ≤ x ≤ 6}

D. {0, 2, 4, 6}

32. Simplify: $(2x^3)(3x^5)$

A. $5x^8$

B. $6x^8$

C. $5x^{15}$

D. $6x^{15}$

33. What is the distance between points (-3, 4) and (5, -2)?

A. 8

B. 10

C. 12

D. 14

34. If $2^x = 64$, what is x?

A. 4

B. 5

C. 6

D. 8

35. The volume of a cylinder with radius 3 and height 10 is:

A. 30π

B. 60π

C. 90π

D. 120π

36. Which equation represents a line perpendicular to $y = 2x + 3$?

A. $y = 2x - 5$

B. $y = -2x + 3$

C. $y = -1/2x + 1$

D. $y = 1/2x - 2$

37. In a 30-60-90 triangle, if the shortest side is 4, what is the longest side?

A. 4√2

B. 4√3

C. 8

D. 8√3

38. What is 15% of 80?

A. 10

B. 12

C. 15

D. 18

39. The mean of {5, 8, 10, 12, 15} is:

A. 8

B. 9

C. 10

D. 11

40. If tan θ = 3/4, what is sin θ?

A. 3/5

B. 4/5

C. 3/4

D. 5/4

41. A circle has circumference 10π. What is its radius?

A. 5

B. 10

C. 15

D. 20

42. Solve: |x - 3| = 7

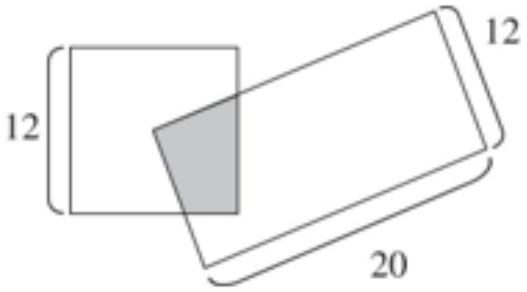
A. x = 10 only

B. x = -4 only

C. x = 10 or x = -4

D. x = 7 or x = -7

43. The figure below shows a square overlapping with a rectangle. One vertex of the rectangle is at the center of the square. What is the area of the shaded region, in square inches?



A. 9

B. 18

C. 36

D. 72

44. If $(x - 2)$ is a factor of $x^2 + kx - 10$, what is k?

A. -3

B. 3

C. -5

D. 5

45. The equation $x^2 - 8x + k = 0$ has exactly one solution for x. What is the value of k?

A. 0

B. 4

C. 8

D. 16

Reading Test

40 Minutes — 36 Questions

Directions: The Reading Test includes multiple passages. Each passage includes multiple questions. A er reading each passage, choose the best answer and fill in the corresponding bubble on your answer sheet. You may review the passages as o en as necessary.

Passage I

Prose Fiction

This passage is adapted from Nathaniel Hawthorne's short story "Rappaccini's Daughter."

Giovanni still found no better occupation than to look down into the garden beneath his window. From its appearance, he judged it one of those botanic gardens that were of earlier date
(5) in Padua than elsewhere in Italy or in the world. Or, not improbably, it might once have been the pleasure-place of an opulent family; for there

was the ruin of a marble fountain in the center, sculptured with rare art, but so woefully shattered that it was impossible to trace the original design from the chaos of remaining fragments. The water, however, continued to gush and sparkle into the sunbeams as cheerfully as ever. A little gurgling sound ascended to the young man's window, and made him feel as if the fountain were an immortal spirit that sung its song unceasingly and without heeding the vicissitudes around it, while one century embodied it in marble and another scattered the perishable embellishments on the soil. All about the pool into which the water subsided grew various plants that seemed to require a plentiful supply of moisture for the nourishment of gigantic leaves, and, in some instances, flowers gorgeously magnificent. There was one shrub in particular, set in a marble vase in the midst of the pool, that bore a profusion of purple blossoms, each of which had the luster and richness of a gem; and the whole together made a show so resplendent that it seemed enough to illuminate the garden, even had there been no sunshine. Every portion of the soil was peopled with plants and herbs, which, if less beautiful, still bore tokens of assiduous care, as if all had their individual virtues, known to the scientific mind that fostered them. Some were placed in urns, rich with old carving, and others in common garden pots; some crept serpent-like along the ground or

climbed on high, using whatever means of ascent was offered them. One plant had wreathed itself round a statue of Vertumnus, which was thus quite veiled and shrouded in a drapery of hanging foliage, so happily arranged that it might have served a sculptor for a study.

While Giovanni stood at the window he heard a rustling behind a screen of leaves, and became aware that a person was at work in the garden. His figure soon emerged into view, and showed itself to be that of no common laborer, but a tall, emaciated, sallow, and sickly-looking man, dressed in a scholar's garb of black. He was beyond the middle term of life, with gray hair, a thin, gray beard, and a face singularly marked with intellect and cultivation, but which could never, even in his more youthful days, have expressed much warmth of heart.

Nothing could exceed the intentness with which this scientific gardener examined every shrub that grew in his path: it seemed as if he were looking into their inmost nature, making observations in regard to their creative essence, and discovering why one leaf grew in this shape and another in that, and why such and such flowers differed among themselves in hue and perfume. Nevertheless, in spite of this deep intelligence on his part, there was no approach to intimacy between himself and these vegetable existences. On the contrary, he avoided their actual touch or

the direct inhaling of their odors with a caution that impressed Giovanni most disagreeably; for the man's demeanor was that of one walking among malignant influences, such as savage beasts, or deadly snakes, or evil spirits, which, should he allow them one moment of license, would wreak upon him some terrible fatality. It was strangely frightful to the young man's imagination to see this air of insecurity in a person cultivating a garden, that most simple and innocent of human toils, and which had been alike the joy and labor of the unfallen parents of the race. Was this garden, then, the Eden of the present world? And this man, with such a perception of harm in what his own hands caused to grow—was he the Adam?

The distrustful gardener, while plucking away the dead leaves or pruning the too luxuriant growth of the shrubs, defended his hands with a pair of thick gloves. Nor were these his only armor. When, in his walk through the garden, he came to the magnificent plant that hung its purple gems beside the marble fountain, he placed a kind of mask over his mouth and nostrils, as if all this beauty did but conceal a deadlier malice; but, finding his task still too dangerous, he drew back, removed the mask, and called loudly, but in the infirm voice of a person affected with inward disease.

1. Of the plants mentioned in the passage, which of the following did Giovanni find to be the most exceptional?

   A. The plant wreathed around the statue
   B. The plant that crept along the ground
   C. The plant with the gigantic leaves
   D. The plant with the purple blossoms

2. In order to ensure that he is safe from the plants, the gardener:

   I. handles them only indirectly.
   II. avoids looking directly at them.
   III. avoids breathing their odors.

   F. I and II only
   G. I and III only
   H. II and III only
   J. I, II, and III

3. Given the descriptions in the passage, the author would agree that compared to Giovanni, the gardener is a:

   A. more religious man.
   B. less cautious man.
   C. more cautious man.
   D. less religious man.

4. Which of the following actions performed by the gardener disturbs Giovanni?

I. Indicating disregard or disapproval of the plants
II. Avoiding directly inhaling the odors of the plants
III. Looking at the inmost nature of the plants

F. I only
G. II only
H. III only
J. I and II only

5. As described in the third paragraph (lines 56–82), the gardener's actions suggest that he is a man who:

A. is very alert.
B. knows all there is to know about plants.
C. loves nature.
D. resembles Adam.

6. The narrator suggests that the plant with "a profusion of purple blossoms" (lines 26–27) could:

F. sprout precious gems.
G. seemingly produce light.
H. overrun the garden.
J. grow very quickly.

7. The narrator takes the point of view of:

   A. a gardener.
   B. Giovanni.
   C. a scientist.
   D. an unknown third party.

8. When Giovanni questions whether the garden is “the Eden of the present world” and whether the gardener is Adam (lines 79–82), he is expressing his belief that the gardener:

   F. goes about his work with great care.
   G. has every reason to be distressed by the plants.
   H. should treat the plants with reverence.
   J. should not appear so afraid of the plants.

9. According to the passage, Giovanni characterizes the area beneath his window as a:

   A. botanic garden.
   B. center for rare art.
   C. place for people with plants.
   D. pleasure-place for the community.

10. In the third paragraph (lines 56–82), the author suggests that the gardener’s relationship with the plants was partly characterized by:

F. the gardener's impatience with the plants.
G. the gardener's interest in understanding the plants.
H. the gardener's desire to harm the plants.
J. the gardener's anger toward the plants.

Passage II

Social Science

This passage is adapted from "Look First to Failure" by Henry Petroski, which appeared in the October 2004 issue of Harvard Business Review. *It discusses a paradox in the field of engineering.*

Engineering is all about improvement, and so it is a science of comparatives. "New, improved" products are ubiquitous, advertised as making teeth whiter, wash fluffier, and meals faster. Larger
(5) engineered systems are also promoted for their comparative edge: the taller building with more affordable office space, the longer bridge with a lighter-weight roadway, the slimmer laptop with greater battery life. If everything is a new, improved
(10) version of older technology, why do so many products fail, proposals languish, and systems crash?

To reengineer anything—be it a straight pin, a procurement system, or a Las Vegas resort—we first must understand failure. Successes give us
(15) confidence that we are doing something right, but they do not necessarily tell us what or why. Failures,

on the other hand, provide incontrovertible proof that we have done something wrong. That is invaluable information.

(20) Reengineering anything is fraught with risk. Take paper clips. Hundreds of styles were introduced in the past century, each claiming to be an improvement over the classic Gem design. Yet none displaced it. The Gem maintains its privileged (25) position because, though far from perfect, it strikes an agreeable balance between form and function. Each challenger may improve on one aspect of the Gem but at the expense of another. Thus, a clip that is easier to attach to a pile of papers is (30) also more likely to fall off. Designers often focus so thoroughly on the advantages that they fail to appreciate (or else ignore) the disadvantages of their new design.

Imagine how much more complex is the (35) challenge of reengineering a jumbo jet. The overall external form is more or less dictated by aerodynamics. That form, in turn, constrains the configuration of the interior space, which must accommodate articulated human passengers as (40) well as boxy luggage and freight. As much as shipping clerks might like fuselages with square corners, they must live with whale bellies. It is no wonder that Boeing invited stakeholders, including willing frequent flyers, to participate in designing (45) its Dreamliner—so the users would buy into the inevitable compromises. The resulting jetliner will

succeed or fail depending on how convincingly those compromises are rationalized.

Logically speaking, basing a reengineering project—whether of a product or a business process—on successful models should give designers an advantage: They can pick and choose the best features of effective existing designs. Unfortunately, what makes things work is often hard to express and harder to extract from the design as a whole. Things work because they work in a particular configuration, at a particular scale, and in a particular culture. Trying to reverse-engineer and cannibalize a successful system sacrifices the synergy of success. Thus John Roebling, master of the suspension bridge form, looked for inspiration not to successful examples of the state of the art but to historical failures. From those he distilled the features and forces that are the enemies of bridges and designed his own to avoid those features and resist those forces. Such failure-based thinking gave us the Brooklyn Bridge, with its signature diagonal cables, which Roebling included to steady the structure in winds he knew from past example could be its undoing.

But when some bridge builders in the 1930s followed effective models, including Roebling's, they ended up with the Tacoma Narrows Bridge, the third-longest suspension bridge in the world and the largest ever to collapse in the wind. In the process of "improving" on Roebling's design, the

very cables that he included to obviate failure were left out in the interests of economy and aesthetics.

When a complex system succeeds, that success masks its proximity to failure. Imagine that the *Titanic* had not struck the iceberg on her maiden voyage. The example of that "unsinkable" ship would have emboldened success-based shipbuilders to model larger and larger ocean liners after her. Eventually the *Titanic* or one of those derivative vessels would probably have encountered an iceberg with obvious consequences. Thus, the failure of the *Titanic* contributed much more to the design of safe ocean liners than would have her success. That is the paradox of engineering—and of reengineering.

11. All of the following are mentioned as constraints on the design of a jumbo jet EXCEPT:

    A. the shape of the human body.
    B. fuel consumption.
    C. aerodynamics.
    D. freight handling.

12. When the author states Boeing wants stakeholders to "buy into" the Dreamliner's inevitable compromises (line 45), he means the company hopes that:

F. passengers will be willing to invest in the company to support Dreamliner development.
G. engineers will be able to satisfy all the needs of passengers, freight handlers, and pilots.
H. users will be willing to pay extra to have their specific needs met.
J. users will understand and accept that the jet will not meet all their needs perfectly.

13. The author believes the sinking of the *Titanic* contributed more to the safety of ocean travel than its success would have because:

A. engineers realized they could not be so careless.
B. later ships carried more lifeboats.
C. shipbuilders were able to learn from mistakes in the *Titanic*'s design before they built more ships with the same weakness.
D. passengers were more likely to take out insurance before a voyage.

14. With which of the following quotes would the author most strongly agree?

F. “Giving up is the only sure way to fail.” (Gena Showalter)
G. “The definition of insanity is doing something over and over again and expecting a different result.” (Albert Einstein)
H. “Mistakes are the portal to discovery.” (James Joyce)
J. “If everyone is moving forward together, then success takes care of itself.” (Henry Ford)

15. According to the passage, which of the following contributed to the failure of the Tacoma Narrows Bridge?

A. The engineers copied the design for the Brooklyn Bridge too closely.
B. The wind at Tacoma Narrows was stronger than in Brooklyn.
C. The engineers ignored the aesthetic aspect of the design.
D. The final design omitted diagonal cables.

16. The author inserts the final paragraph (lines 79–90) in order to:

F. emphasize that the designers of the *Titanic* should have studied earlier ships more thoroughly.
G. make the point that all ocean liners will eventually encounter icebergs and sink.
H. illustrate how the failure of a complex design may contribute more to long-term technical development than its success would have.
J. point out that the designs of ocean liners and bridges both involve significant risks.

17. The main purpose of the Gem paper clip example is to show that:

A. paper clips are indispensable to modern business.
B. attempting to redesign a paper clip is a waste of time.
C. engineers should study the effectiveness of the paper clip before beginning a design project.
D. redesigning a successful product risks damaging its effectiveness.

18. According to the passage, the Gem paper clip continues to be the most popular because:

F. it features an excellent compromise between ease of attachment and security.
G. it was invented long before alternative designs.
H. people are familiar with the name and don't want to risk trying new products.
J. it is unlikely to fall off in use.

19. In the context of this passage, "failure-based thinking" (line 67) refers to:

A. a counterproductive habit engineers adopt that inhibits their creativity.
B. the process of taking inspiration from analyzing the causes of past failures.
C. an example of how cannibalizing a successful system can create synergy.
D. an approach to design that was discredited with the collapse of the Tacoma Narrows Bridge.

20. When the author claims engineering is a "science of comparatives" (line 2), he means that:

F. engineers are always compared to other scientists.
G. engineered products are only better if they are bigger or faster than other products.
H. engineers' designs are generally evaluated based on whether they offer improvements over previous designs of the same product.
J. engineering tools are used to compare the discoveries of scientists.

Passage III

Humanities

The following passages are excerpted from two books that discuss fairy tales. Passage A was written by a specialist in psychology and children's literature

and was published in 1965. Passage B was written by a folklore methodologist and was published in 1986.

Passage A

Most of the stories that our society tells have only enjoyed a comparatively short period of popularity in comparison with the sweep of human history, flaming into popular consciousness in books, television, or film for a period reaching anywhere from a few months to a few centuries. Fads come and go as fickle as the weather, and today's hit may be tomorrow's forgotten relic. But one particular kind of story that our society tells, the fairy tale, has a kind of popularity that is uniquely persistent. Literally since time immemorial, fairy tales have been told and retold, refined and adapted across generations of human history. Folk tales that spoke to people in some deeper way, and thus proved popular, endured and were passed down through the ages. Tales that had only temporal and fleeting appeal are long since lost. Since, as we know, it is a truism that time sifts out the literary wheat and discards the chaff, fairy tales can be said to have undergone the longest process of selection and editing of any stories in human history.

Consider, for example, the story of Snow White. Here is reflected the tale of the eternal struggle for supremacy between the generations. The evil mother queen grows jealous of the competition of

the young Snow White for supremacy in the realm of youth and beauty, so she contrives to do away with her rival. The innocent Snow White survives by a twist of whim and circumstance, and then retreats into the forest—the traditional symbol of the site of psychological change—where she hides among the Seven Dwarves. Small supernatural spirits or homunculi, often depicted in folk tales as tiny elves, spirit men, trolls, or fairies, represent unconscious forces, and thus Snow White must care for and nurture the Seven Dwarves while she undergoes her psychological transformation. The dwarves' mining activities can be said to symbolize this process of mental delving into the depths in hopes of uncovering the precious materials of the developing psyche.

Yet Snow White's road to her new identity is not without incident. The breaching of the secure space by the disguised queen mother and Snow White's giving in to the temptation of the apple—representative of the same youth and beauty that the queen seeks to deprive her of—causes her to fall into the slumberous mock death. Only the prince can deliver Snow White and metaphorically resurrect her with a kiss, itself a motif that suggests her entry into the identity of a mature person ready to leave the dwarves and forest of the unconscious behind and take on adult responsibilities.

The popularity of this tale, and others like it, across time and in widely scattered societies

confirms its power in tapping into unconscious forces and common motifs that all humans share. All humans in all ages experience generational rivalry and the impact that it has on patterns of growth and maturity. The specific symbols used to represent these dynamics are less important than their universality; indeed the very adaptability of the symbolism is what allows tales to remain popular over time. By dramatizing these psychological progressions, the fairy tale helps its audience to process the ill-understood unconscious psychological forces that are a part of human life. Can it be any wonder that such powerful avenues to the cosmic unconscious can be shown to have remained popular across the eons?

Passage B

The contention that folklore represents a cosmic tale that encapsulates cross-cultural human universalities in narrative form is naïve in the extreme. The notion that folk tales somehow embody a symbolically encoded map of human consciousness suffers from a fundamental flaw: It assumes that each tale has a more-or-less consistent form. In fact, the forms of most folk tales that we have today recorded in collections and in the popular media represent nothing more than isolated snapshots of narratives that have countless forms, many of which are so different as to drastically change the interpretations that some critics want to say are

universal.

Consider, for example, the story of Little Red Riding Hood. Some psychological interpretations might conjecture, for example, that this is a tale about obedience and parental authority. Straying from the path in the forest, in this context, might represent rebelling against that authority, and the wolf then symbolizes the dangerous unconscious forces from which parents seek to protect Little Red. The red color of the riding hood might be seen as representing the subdued emotions of anger and hostility. Being consumed by the wolf signifies a period of isolation and transformation. Finally, the rescuing huntsman at the end of the story then symbolizes the return of parental authority to deliver the innocent child from being metaphorically consumed by ill-understood emotional states.

It is an apparently consistent analogy, and one that is difficult to dispute, until one investigates the circumstances of the composition and recording of the version of Little Red Riding Hood that we have today. Earlier editions of the story simply don't have many of the components that critics would like to present as so-called "universal symbols." For example, in the vast majority of the older and simpler versions of this tale, the story ends after the wolf eats the girl. So there can be no theme of parental rescue because, in all but a few of the examples of this tale, there is no rescue and no kind huntsman. In some versions the girl even saves herself,

completely contradicting the assumption that it is a story about rescue. Story elements such as the path, the hunter, and the happy ending, which are seen as essential symbolic components of our interpretation above, were introduced to this ancient tale by the Brothers Grimm in the 19th century. Even the introduction of the "symbolic" red garment dates only from the seventeenth century, when it was put into the story by Charles Perrault.

In fact, every fairy tale known to the study of folklore has so many different versions that there are encyclopedic reference books to catalog the variations and the differences between them. A creature that is an elf in one country and era might be a troll in another. A magic object represented as a hat in one version of a tale might be a cloak in ten other tellings. If folk tales actually represent universal human truths in symbolic form, the symbols in them would have to reflect universal consistency across time. Any attempt to pinpoint a consistent symbolic meaning or underlying scheme in such a field of moving, blending, and ever-changing targets is doomed to fail before it even begins. Instead, we should embrace all such variations on a theme, searching for insights into the cultural conditions that prompt such divergence.

Questions 21–23 ask about Passage A.

21. As it is used in line 4, the word *flaming* most nearly means:

A. on fire.
B. dangerous.
C. important.
D. prominent.

22. The word “avenues” in line 68 conveys the author’s belief that fairy tales offer:

F. boulevards for navigating historic cities.
G. beginnings of life-changing adventures.
H. approaches for understanding common experiences.
J. homecomings for people’s true feelings toward others.

23. In discussing “fairy tales” in lines 7–21, the author of Passage A suggests that:

A. which stories endure and which are forgotten has nothing to do with the characters featured in the story.
B. stories written by a single author and not endlessly retold and edited will not become popular.
C. many folk tales that spoke deeply to their audiences have been lost and forgotten over the ages.
D. folk tales undergo selection and editing, as do other types of literature.

Questions 24–26 ask about Passage B.

24. The final sentence of Passage B provides information about:

F. the author's opinion that only fairy tales written in modern times can be accurately interpreted.
G. folklore methodologists who seek out oral versions of folk tales themselves instead of getting them from books.
H. the earliest recorded versions of folk tales, which are more accurate and authoritative than later versions.
J. the variations among versions of fairy tales, which can tell us something about the cultures in which these versions developed.

25. The author of Passage B specifically disagrees with critics who extract simple symbolic interpretations from fairy tales because of their:

A. disregard for the rigorous principles of modern psychology.
B. willingness to assume that minor details of a specific version of a folk tale are universal.
C. failure to make proper use of reference materials pertaining to folklore methodology.
D. naïve view of the complexity of human nature.

26. The statement that "there can be no theme of parental rescue … huntsman" in Passage B (lines 115–118) suggests that fairy tales:

F. cannot be said to have a single authoritative form.
G. are generally not interested in historical accuracy.
H. should make a greater effort to capture universal human themes.
F. are usually not concerned with themes of rescue.

Questions 27–30 ask about both passages.

27. The authors of both passages state that fairy tales are:

A. intuitively meaningful.
B. critically misunderstood.
C. historically changeable.
D. symbolically rich.

28. Which of the following best describes the primary disagreement that the author of Passage B would most likely raise against the statement in Passage A (lines 32–37) that "Small supernatural spirits . . . transformation"?

F. The specific details in different versions of this folk tale show too much variation to make any consistent interpretations based on this particular version.
G. The popularity of this tale is no indication of its value in expressing a psychological truth.
H. This version of the tale is not necessarily the most accurate, because it is recent and may have deviated too much from the true version over time.
J. Small supernatural spirits could represent many things other than unconscious forces.

29. The author of Passage A would probably respond to the statement in lines 78–84 of Passage B with the argument that:

A. many modern folk tales originated relatively recently and haven't been subjected to centuries of editing.
B. the changes in the symbolism of more-recent revisions of folk tales are less important psychologically than the broad themes.
C. there is no evidence that the symbolism of folk tales is related to psychological forces.
D. Snow White is a poor example to use as evidence because it has changed so much over time.

30. With which of the following statements about fairy tales would the authors of both passages most likely agree?

F. The popularity of fairy tales is due to their deeper meanings.
G. Fairy tales speak to all humans in the language of universal psychological symbols.
H. Fairy tales have resulted from a compositional process very different from that of modern literature written by a single author.
J. The study of folklore is undergoing extensive changes because of new information about different versions of particular tales.

Passage IV

Natural Science

This passage is adapted from an article about particle accelerators. It describes two different devices used to accelerate subatomic particles.

In linear accelerators, particles are accelerated in a straight line, with the target at the end of the line. Low energy accelerators such as cathode ray tubes and X-ray generators use a single pair of
(5) electrodes with a DC voltage of a few thousand volts between them. In an X-ray generator, the target is one of the electrodes.

Higher energy accelerators use a linear array of plates to which an alternating high energy field is
(10) applied. As the particles approach a plate, they are accelerated toward it by an opposite polarity charge applied to the plate. As they pass through a hole in the plate, the polarity is switched so that the plate

now repels the particles, which are now accelerated by it toward the next plate. Normally, a stream bunches particles that are accelerated, so a carefully controlled AC voltage is applied to each plate to repeat this for each bunch continuously.

As the particles approach the speed of light, the switching rate of the electric fields becomes so high as to operate at microwave frequencies, and so microwave cavities are used in higher energy machines instead of simple plates. High energy linear accelerators are often called linacs.

Linear accelerators are very widely used. Every cathode ray tube contains one, and they are also used to provide an initial low-energy kick to particles before they are injected into circular accelerators. They can also produce proton beams, which can produce “proton-heavy” medical or research isotopes, as opposed to the “neutron-heavy” ones made in reactors.

In circular accelerators, the accelerated particles move in a circle until they reach sufficient levels of energy. The particle track is bent into a circle using dipole magnets. The advantage of circular accelerators over linacs is that components can be reused to accelerate the particles further, as the particle passes a given point many times. However, they suffer a disadvantage in that the particles emit synchrotron radiation.

When any charged particle is accelerated, it emits electromagnetic radiation. As a particle

travelling in a circle is always accelerating towards the center of the circle, it continuously radiates. This has to be compensated for by some of the energy used to power the accelerating electric fields, which makes circular accelerators less efficient than linear ones. Some circular accelerators have been deliberately built to generate this radiation (called synchrotron light) as X-rays—for example, the Diamond Light Source being built at the Rutherford Appleton Laboratory in England. High energy X-rays are useful for X-ray spectroscopy of proteins, for example.

Synchrotron radiation is more powerfully emitted by lighter particles, so these accelerators are invariably electron accelerators. Consequently, particle physicists are increasingly using heavier particles, such as protons, in their accelerators to achieve higher levels of energy. The downside is that these particles are composites of quarks and gluons, which makes analyzing the results of their interactions much more complicated.

The earliest circular accelerators were cyclotrons, invented in 1929 by Ernest O. Lawrence. Cyclotrons have a single pair of hollow "D"-shaped plates to accelerate the particles and a single dipole magnet to curve the track of the particles. The particles are injected in the center of the circular machine and spiral outwards toward the circumference.

Cyclotrons reach an energy limit because

of relativistic effects at high energies, whereby particles gain mass rather than speed. As the Special Theory of Relativity means that nothing can travel faster than the speed of light in a vacuum, the particles in an accelerator normally travel very close to the speed of light. In high energy accelerators, there is a diminishing return in speed as the particle approaches the speed of light. The effect of the energy injected using the electric fields is therefore to increase their mass markedly, rather than their speed. Doubling the energy might increase the speed a fraction of a percent closer to that of light, but the main effect is to increase the relativistic mass of the particle.

Cyclotrons no longer accelerate electrons when they have reached an energy for about 10 million electron volts. There are ways of compensating for this to some extent—namely, the synchrocyclotron and the isochronous cyclotron. They are nevertheless useful for lower energy applications.

To push the energies even higher—into billions of electron volts—it is necessary to use a synchrotron. This is an accelerator in which the particles are contained in a doughnut-shaped tube, called a storage ring. The tube has many magnets distributed around it to focus the particles and curve their track around the tube, and microwave cavities similarly distributed to accelerate them. The size of Lawrence's first cyclotron was a mere four inches in diameter. Fermilab now has a ring

with a beam path of four miles.

31. The main idea of the passage is that:

A. linear accelerators are more efficient than circular accelerators.
B. particles in accelerators cannot travel at the speed of light.
C. linear and circular accelerators have important, but different, uses.
D. the cyclotron is a useful type of circular accelerator.

32. The passage states that magnets affect particles by:

F. influencing the direction particles travel.
G. creating curved particles.
H. increasing the acceleration of particles.
J. causing an increase in the particles' energy levels.

33. The passage states that which of the following causes an increase in particle mass in high-energy accelerators?

A. A particle reaching the speed of light
B. Acceleration of a particle in a vacuum
C. Using a mixture of different particles
D. Injecting energy using electric fields

34. As it is used in line 62, the word *quarks* most nearly refers to:

F. objects made up of electrons.
G. objects made up of radiation.
H. components of protons.
J. components of gluons.

35. According to the passage, which of the following CANNOT be a result of using a circular accelerator?

A. Particles that emit electromagnetic radiation
B. Reuse of components to accelerate particles
C. Particles that emit synchrotron radiation
D. An initial low kick of energy in particles

36. With which of the following statements would the author most likely agree?

F. Linear accelerators are of limited use.
G. Using particles such as protons in particle acceleration experiments is not possible, since they are composites of quarks and gluons.
H. Circular accelerators have improved little since Lawrence's first cyclotron.
J. Depending on the desired result, both linear and circular accelerators are valuable tools.

Science Test

40 Minutes — 40 Questions

Directions: The Science Test includes multiple passages. Each passage includes multiple questions. A er reading each passage, choose the best answer and fill in the corresponding bubble on your answer sheet. You may review the passages as o en as necessary.

You may NOT use a calculator on this test.

Passage I

Metabolism is the process by which organisms convert food into energy. Metabolism occurs through a number of *metabolic pathways*, each of which is critical to the organism's survival. Even while at rest, an organism will undergo metabolism, although at a lower rate than while active. When an organism is at rest, the measurement of its ability to metabolize is called the *Basal Metabolic Rate* (BMR). Numerous factors affect an organism's BMR. Researchers decided to conduct a series of studies to investigate some of these factors.

Study 1

The researchers investigated humans and bears (including hibernating bears) at various ages. Their BMRs were evaluated relative to the average peak metabolic rate of each species (the values for both bears not in hibernation and bears in hibernation are compared to the average for bears not in hibernation). The results are shown in Table 1.

Table 1			
Age (years)	BMR (% of average peak)		
	Human	Bear (not in hibernation)	Bear (in hibernation)
1	42	50	30
7	75	80	30
14	85	100	30
21	100	80	30
28	86	40	30
35	72	0	0

Study 2

The average weight of a human male who is 1.8 m tall is approximately 73 kg. The researchers measured the relative BMR of several male individuals, aged 25, who were approximately 1.8 m tall and who had varying weights. The results are shown in Table 2.

Table 2	
Weight (kg)	BMR (% of average peak)

Table 2	
Weight (kg)	BMR (% of average peak)
62	90
63	92
65	93
67	94
69	96
71	98
73	100

Study 3

The researchers investigated the BMR of several 25-year-old males weighing 73 kg at different internal body temperatures. The results are shown in Table 3.

Table 3	
Internal body temperature (°C)	BMR (% of average peak)
35.0	72
35.5	78
36.0	85
36.5	93
37.0	100

Table 3	
Internal body temperature (°C)	BMR (% of average peak)
37.5	108
38.0	115
38.5	122
39.0	129

1. Based on the results of Study 2, if the researchers had collected data for a 68 kg male who was 1.8 m tall, his measured relative BMR would most likely have been:

   A. 91%.
   B. 93%.
   C. 95%.
   D. 97%.

2. A researcher hypothesized that a 25-year-old male who was 1.8 m tall with an above-average weight would have a relative BMR that is greater than 100%. Do the results of Study 2 support this hypothesis?

   F. Yes, because as weight increases, BMR increases.
   G. Yes, because as weight increases, BMR decreases.
   H. No, because as weight increases, BMR increases.
   J. No, because as weight increases, BMR decreases.

3. Which of the following accurately characterizes a difference between Study 1 and Study 2 ?

   A. In Study 1, relative BMR was recorded; in Study 2, absolute BMR was recorded.
   B. In Study 1, absolute BMR was recorded; in Study 2, relative BMR was recorded.
   C. In Study 1, only 1 species was investigated; in Study 2, 2 different species were investigated.
   D. In Study 1, 2 different species were investigated; in Study 2, only 1 species was investigated.

4. Which of the following statements about bears is supported by Study 1 ? As a bear's age increases from 1 to 35 years, the bear's BMR:

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

5. Suppose that a 25-year-old man loses a significant amount of weight in a relatively short period of time. If researchers were to measure his relative BMR before and after his weight loss, they would most likely find that his BMR afterwards:

A. decreased, because lower weights correspond to lower BMRs.
B. decreased, because lower weights correspond to higher BMRs.
C. increased, because lower weights correspond to lower BMRs.
D. increased, because lower weights correspond to higher BMRs.

6. Which of the following hypotheses best explains why a hibernating bear's BMR is lower than a non-hibernating bear's?

F. A bear's energy needs are considerably higher while hibernating.
G. A bear's energy needs are considerably lower while hibernating.
H. A bear has a higher internal body temperature during hibernation.
J. A bear tends to weigh significantly more during hibernation.

7. Based on the passage, which of the following internal body temperatures would most likely lead to weight gain in a human male?

A. 35.0°C
B. 36.5°C
C. 37°C
D. 39.0°C

Passage II

For centuries, physicians attempted to treat patients by transfusion, the transfer of blood from a healthy person to a patient. This was not reliably successful until the discovery of blood groups and blood types in the mid-

20th century. A person is said to have a certain blood type if his or her red blood cells have a particular set of molecules, called antigens, on the cells' surfaces. The primary antigens are A and B; if a person's blood cells have neither A nor B antigens, he or she is designated type "O." Also significant is the Rh antigen, which is inherited separately from the A and B antigens; the presence of the Rh antigen is designated by a "+."

A significant complication that can occur from giving blood to someone of a different type is that the recipient's blood contains antibodies (proteins that react with antigens), which recognize and attack any blood group antigen not normally present in the person's blood. A recipient cannot safely receive blood donated by someone with an incompatible blood type. Table 1 presents a sample of transfusion compatibility for some blood types.

Table 1

Recipient's blood type		Compatible with transfusion from:			
ABO type	Rh type	A–	A+	B–	B+
AB	+	Yes	Yes	Yes	Yes
AB	–	Yes	No	Yes	No
B	+	No	No	Yes	Yes
B	–	No	No	Yes	No

The set of antigens present on an individual's red blood cells is an aspect of his or her phenotype, the physical and biochemical properties of that person. The phenotype is determined by the genotype, which is the set of genes that code for those properties. Humans have two copies, or alleles, of each gene; these alleles may be the same or different. For example, the A, B,

and o alleles are different versions of the gene for ABO type, while the Rh+ and Rh– alleles are different versions of the gene for Rh type. Each parent passes one allele of each gene on to offspring, so a child's genotype consists of two alleles per gene, one from each parent. Table 2 presents the ABO phenotypes that result from each possible genotype.

Table 2

Genotype	Phenotype (ABO type)
AA	A
Ao	A
BB	B
Bo	B
AB	AB
oo	O

8. Based on the passage, an individual with A+ blood could safely receive a transfusion from which of the following blood types?

   F. All blood types
   G. All Rh+ blood types
   H. A+ and A–
   J. A+ and B+

9. A child with a blood group phenotype AB+ could have parents with which of the following phenotypes?

A. O+ and AB+
B. A– and B–
C. A+ and B–
D. A+ and O–

10. Suppose that a patient with blood type B+ is in need of a transfusion, but the blood bank has only A+, A–, B+, and B– available. Based on Table 1, which of those blood types would be suitable for the patient to receive?

F. A+ only
G. A+ and A–
H. B+ only
J. B+ and B–

11. Based on the information provided in the passage, which of the following blood types would be safe for any transfusion recipient to receive, regardless of the recipient's blood type?

A. AB–
B. AB+
C. O–
D. O+

12. Which of the following ABO blood types would NOT be possible for the offspring of a woman with type A blood and a man with type AB

blood?

F. O
G. A
H. B
J. AB

13. A physician orders a blood transfusion for a patient with A+ blood and later discovers that her patient was given O+ blood. Should the physician be confident that this is a safe transfusion?

A. No, because anti-O antibodies in the patient's blood will attack the O antigen in the donor blood, causing an adverse reaction.
B. No, because anti-Rh antibodies in the patient's blood will attack the Rh antigen in the donor blood, causing an adverse reaction.
C. Yes, because the O antigen in the donor blood will not react with the anti-A antibodies in the patient's blood.
D. Yes, because the patient's blood does not contain any antibodies that will attack antigens in the donor blood.

Passage III

Earth's magnetic field has two distinct poles, labeled North and South. Certain materials, such as iron and steel, are sensitive to Earth's magnetic field. The origin and behavior of the magnetic field is modeled by *dynamo theory*, which links the magnetic field with the geological activity of Earth's molten core. Diagram 1 depicts Earth's geological layers from crust to core.

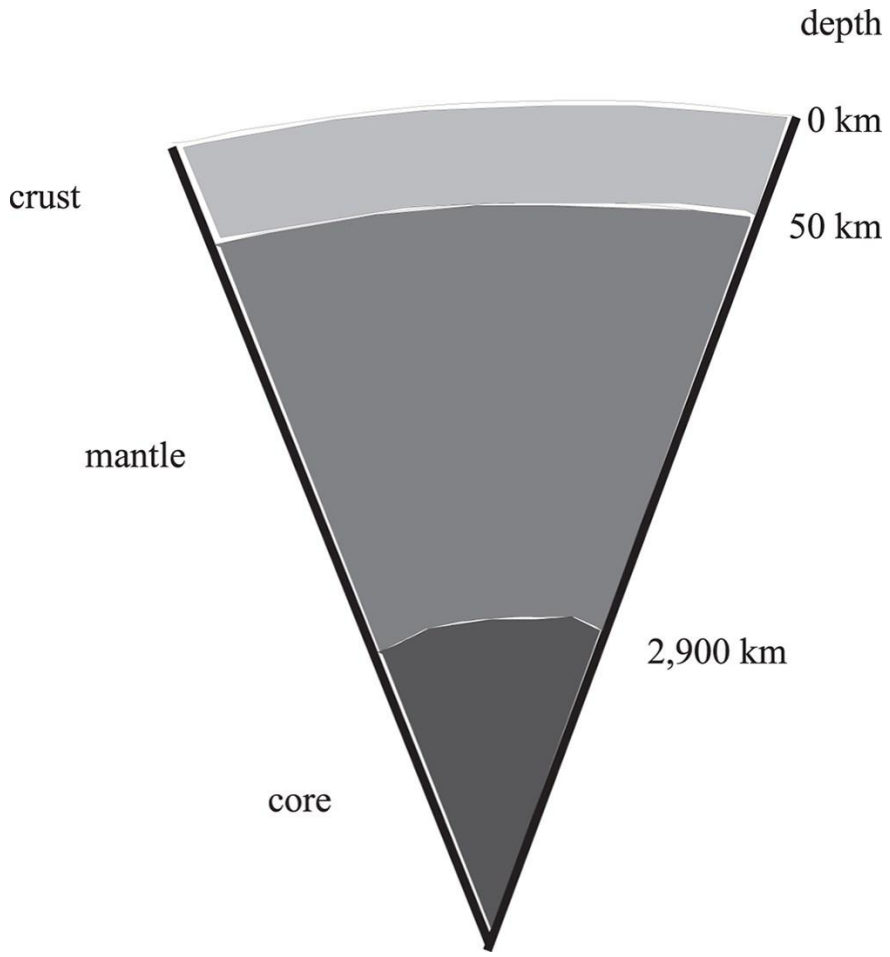


Diagram 1

Note: Diagram is not drawn to scale.

Evidence has been found of complete reversals in the polarity of the magnetic field, called *geomagnetic reversals*. Concentrated deposits of rock with reversed magnetic properties have been found on the ocean floor. The magnetic anomalies observed suggest that Earth undergoes a geomagnetic reversal sporadically over time spans of thousands of years (the last geomagnetic reversal occurred approximately 780,000 years ago). Two scientists discuss the possible causes of geomagnetic reversal.

Scientist 1

Dynamo theory suggests that a constantly moving fluid can help maintain a magnetic field. Earth's core is made of molten nickel and iron. The constant motion of this portion of the core creates eddy currents, which in turn help to create Earth's magnetic field. The motions of the molten core can often be chaotic, and in turn disturb the magnetic field. It is this necessary by-product of the dynamo effect that causes spontaneous geomagnetic reversal.

Scientist 2

Earth's molten core is responsible for the creation, maintenance, and shifts of the magnetic field. The motions of the core, in accordance with dynamo theory, create a magnetic field from eddy currents. The motions of tectonic plates and other seismic events can have a powerful effect on Earth's core. Such events can disrupt the motion of the core to such an extent that the magnetic field effectively turns off. When the regular motions of the core resume, the resulting magnetic field will either remain as it was, or emerge as a reversal of its previous state.

14. Dynamo theory can be applied to other planets that have molten cores and hotter planets are more likely to have molten cores. Based on this information, which of the following planets would the theory most likely NOT apply to?

    F. Neptune
    G. Mars
    H. Venus
    J. Mercury

15. Which of the following pairs of statements best accounts for Earth's geomagnetic reversal according to the viewpoints of the 2 scientists?

	Scientist 1	Scientist 2
A.	Magnetic field resets after seismic disturbance	Natural consequence of the dynamo effect
B.	Seismic disturbance caused by magnetic field	Natural consequence of the dynamo effect
C.	Natural consequence of the dynamo effect	Magnetic field resets after seismic disturbance
D.	Natural consequence of the dynamo effect	Seismic disturbance caused by magnetic field

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

16. Based on Scientist 2's account, seismic activity that affects Earth's molten core must be able to resonate to depths of at least:

F. 50 km.
G. 700 km.
H. 1,500 km.
J. 2,900 km.

17. Which of the following statements is most consistent with the ideas expressed by Scientist 1 ?

    A. The motion of molten nickel and iron creates a magnetic field.
    B. The motion of molten nickel and iron counteracts magnetic fields already in existence.
    C. The melting of nickel and iron creates a magnetic field.
    D. Nickel and iron are found only in Earth's core.

18. Which of the following hypotheses would both scientists agree upon?

    F. The dynamo theory accounts for shifts in Earth's magnetic field.
    G. Eddy currents create seismic disturbances.
    H. Seismic disturbances cause geomagnetic reversal.
    J. The dynamo theory is relevant only every few thousand years.

19. According to the passage, which of the following is a reliable indicator of the polarity of Earth's magnetic field at a particular point in time?

    A. Molten nickel and iron
    B. Deposits of magnetized rock
    C. Seismic activity
    D. Shifts in solar magnetism

20. If it were discovered that the polarity of the Earth's magnetic field can be directly altered only by the activity of the Sun's magnetic field, how would this affect the viewpoints of each scientist?

F. It would strengthen the viewpoint of Scientist 1 only.
G. It would weaken the viewpoint of Scientist 2 only.
H. It would strengthen the viewpoints of both scientists.
J. It would weaken the viewpoints of both scientists.

21. In a computer simulation, the effect of seismic activity on the motion of Earth's molten core was studied. Which of the following findings would be consistent with Scientist 2's viewpoint? The seismic activity would:

A. be caused by the motion of the molten core.
B. cause significant disturbances in the molten core.
C. have no effect on the motion of the molten core.
D. cause eddy currents in the molten core.

Passage IV

Faraday's Law relates changes in magnetic fields to the production of electric voltage. *Magnetic flux* is a measure of the magnetic field in a region of space. It can be thought of as the mathematical product of the magnetic field and an area defined by a loop of wire in that field. The unit of magnetic flux is the weber, abbreviated Wb. Any instance of change in magnetic flux produces a voltage, also known as an *electromotive force* (emf). This relationship is commonly called *electromagnetic induction*.

Students conducted 3 experiments to study electromagnetic induction.

Experiment 1

A magnet was passed at varying speeds through a coiled wire with a diameter of 2 cm, as shown in Diagram 1. The various speeds created corresponding changes to the magnetic flux within the coil. A voltmeter was used to measure the maximum induced emf in units of volts (V). The results are shown in Table 1.

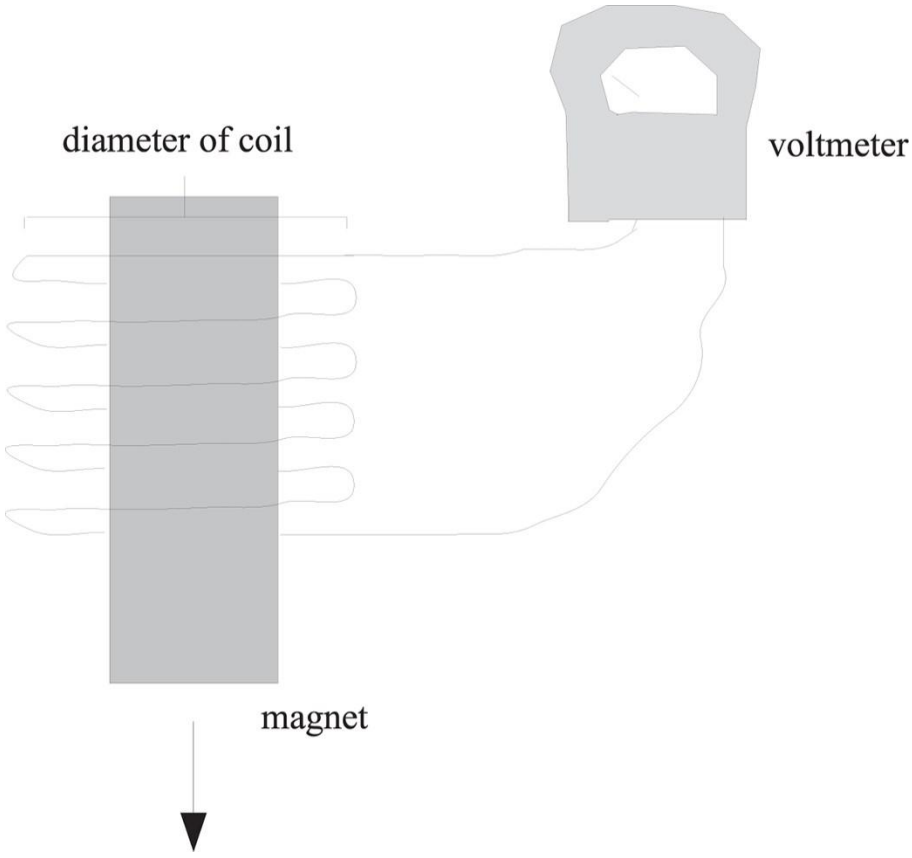


Diagram 1

Table 1		
Trial	Change in magnetic flux (Wb)	Maximum emf (V)

Table 1		
Trial	Change in magnetic flux (Wb)	Maximum emf (V)
1	0.3	0.22
2	0.5	0.41
3	0.7	0.63
4	0.9	0.85

Experiment 2

A coiled wire was rotated at various speeds within a constant magnetic field, creating corresponding changes to the magnetic flux within the coil. Special connectors called “slip rings” allow the coil of wire to rotate without tangling the wires. The slip rings also connect the coil electrically to a voltmeter, which was used to measure the maximum resulting emf. This setup is illustrated in Diagram 2 and the results are recorded in Table 2.

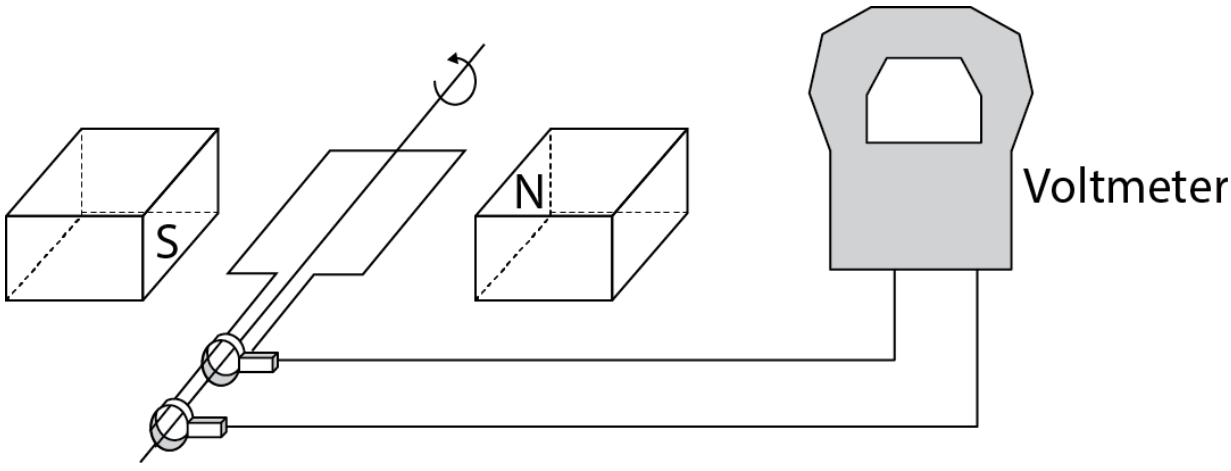


Diagram 2

Table 2		
Trial	Change in magnetic flux (Wb)	Maximum emf (V)
5	0.2	0.2
6	0.4	0.4
7	0.6	0.6

Experiment 3

A coiled wire was mounted on a pole and a metal ring was placed on the pole, as shown in Diagram 3. (Note that the battery powering the current is not depicted.)

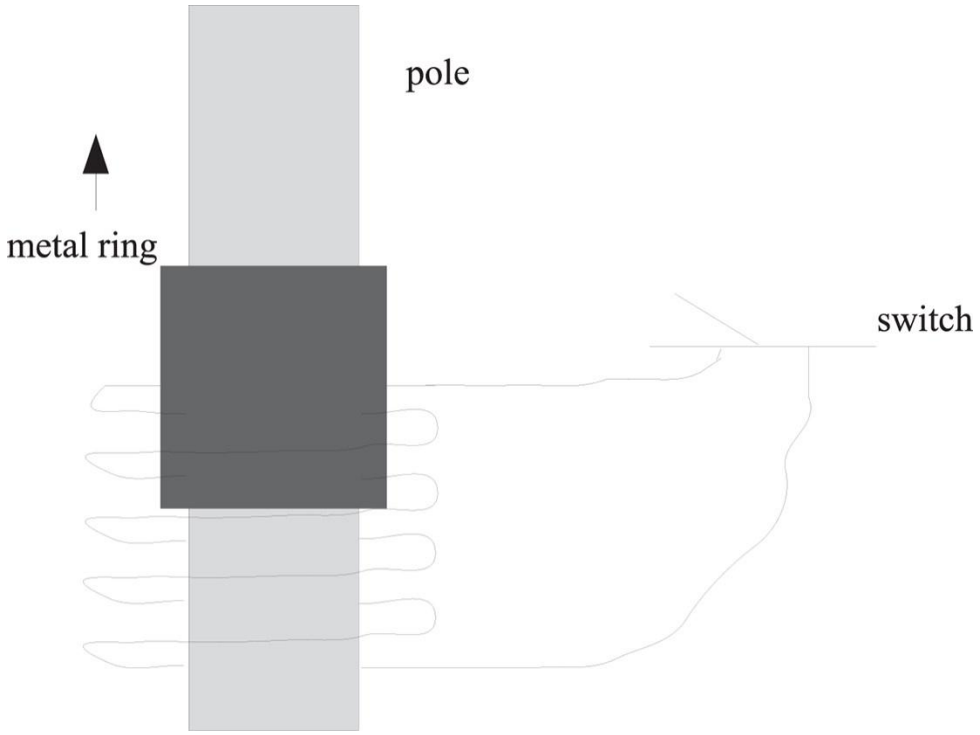


Diagram 3

A current was sent through the wire, producing a magnetic field that caused the metal ring to float up the pole. The students used the same amount of current in each trial and kept the diameter of the coils fixed, but used wires with differing numbers of coils. The height that the metal ring reached on the pole was recorded for each trial. The results are shown in Table 3.

Table 3		
Trial	Number of coils	Height (cm)
8	50	1.1
9	100	1.5
10	150	2.1

22. Based on Table 3, it can be concluded that the magnetic field generated by the wires in Experiment 3:

    F. did not change as the number of coils in the wire increased.
    G. increased as the number of coils in the wire increased.
    H. decreased as the number of coils in the wire increased.
    J. decreased as the amount of current passing through the wire increased.

23. In Experiment 2, if the coil were slowed down to a rotational velocity of 0 m/s, the resulting emf would correspond to the emf recorded in:

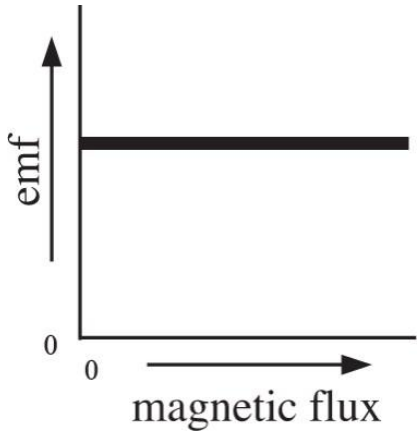
A. Trial 5.
B. Trial 6.
C. Trial 7.
D. none of the trials.

24. Based on Experiment 1, which of the following would provide the highest maximum emf reading?

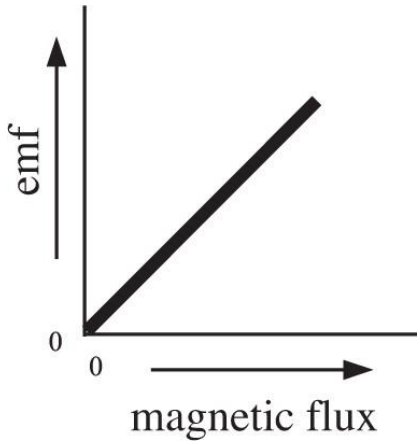
F. Moving the magnet quickly and using a magnet with a strong magnetic field.
G. Moving the magnet quickly and using a magnet with a weak magnetic field.
H. Moving the magnet slowly and using a magnet with a strong magnetic field.
J. Moving the magnet slowly and using a magnet with a weak magnetic field.

25. Based on the results of Experiment 1, the relationship between change in magnetic flux and maximum induced emf is best represented by which of the following graphs?

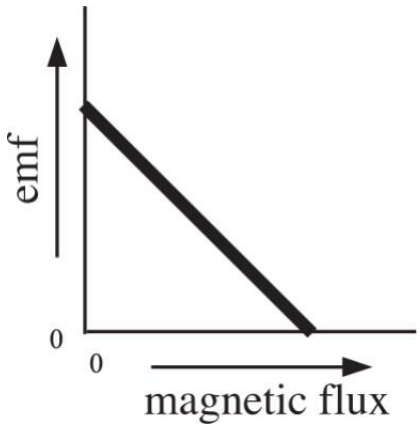
A.


emf
0
0
magnetic flux

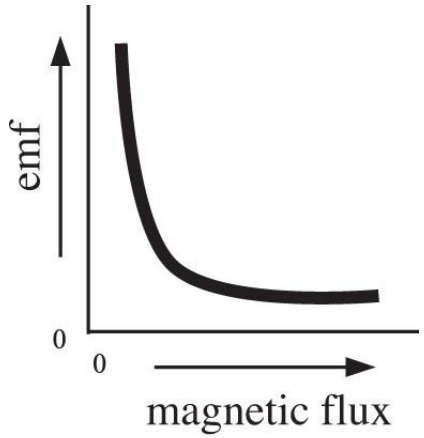
B.


emf
0
0
magnetic flux

C.


emf
0
0
magnetic flux

D.



26. In which of the following trials from Experiment 1 was the magnet moved at the slowest speed?

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

27. If a new trial were conducted that repeated the conditions of Trial 9, except with double the current passing through the wire, which of the following would most likely be the recorded height of the metal ring?

A. 0.7 cm
B. 1.1 cm
C. 1.5 cm
D. 2.9 cm

28. Suppose that the students repeated the conditions of Trials 1–4 of Experiment 1, except that they used a coil with a diameter of 4 cm instead of 2 cm. Based on the passage, how would the results of this new experiment most likely compare to the original results of Experiment 1 ?

F. Maximum emf and change in magnetic flux would both decrease in the new experiment.
G. Maximum emf would decrease but change in magnetic flux would increase in the new experiment.
H. Maximum emf and change in magnetic flux would both increase in the new experiment.
J. Maximum emf would increase but change in magnetic flux would decrease in the new experiment.

Passage V

An acid is defined as any substance that can donate a hydrogen ion in a solution, while a base is defined as any substance that can accept a hydrogen ion. Acids and bases are measured by the pH scale, as indicated in Table 1.

Table 1 shows how pH level corresponds to hydrogen ion concentration in moles per liter, indicated by $[H^+]$.

Table 1	
$[H^+]$ (mol/L)	pH level
1×10^0	0
1×10^{-1}	1

Table 1	
$[H^+]$ (mol/L)	pH level
1×10^{-2}	2
1×10^{-3}	3
1×10^{-4}	4
1×10^{-5}	5
1×10^{-6}	6
1×10^{-7}	7
1×10^{-8}	8
1×10^{-9}	9
1×10^{-10}	10
1×10^{-11}	11
1×10^{-12}	12
1×10^{-13}	13
1×10^{-14}	14

Table 2 shows categorizations of acidic and basic solutions according to pH level. (Note that fractional pHs should be rounded to the nearest whole number before referencing the table.)

Table 2	
Category	pH level
highly acidic	0–3

Table 2	
Category	pH level
slightly acidic	4–6
neutral	7
slightly basic	8–10
highly basic	11–14

Table 3 lists several strong acids and bases. A 1 mol/L solution of a strong acid should have a pH lower than 2, while a 1 mol/L solution of a strong base should have a pH higher than 12.

Table 3	
Strong bases	Strong acids
sodium hydroxide	nitric acid
calcium hydroxide	sulfuric acid
barium hydroxide	hydrobromic acid

Table 4 presents the approximate hydrogen ion concentration in several common substances.

Table 4	
Substance	$[H^+]$ (mol/L)
ammonia	1×10^{-11}

Table 4	
Substance	$[H^+]$ (mol/L)
baking soda	1×10^{-9}
lemon juice	1×10^{-2}
milk	1×10^{-6}
vinegar	1×10^{-3}
water	1×10^{-7}

29. An unknown solution is tested in order to determine if it is an acid or a base. Its hydrogen ion concentration is found to be 1×10^{-11} mol/L. Based on the passage, this solution would be considered:

A. highly acidic.
B. slightly acidic.
C. highly basic.
D. slightly basic.

30. Based on Table 4, which of the following substances has the greatest hydrogen ion concentration?

F. Ammonia
G. Lemon juice
H. Milk
J. Vinegar

31. According to the passage, which of the following substances would be classified as highly acidic?

    A. Milk
    B. Vinegar
    C. Baking soda
    D. Ammonia

32. Based on information in the passage, which of the following is the most accurate statement?

    F. As hydrogen ion concentration increases, a solution becomes more dangerous.
    G. A solution with a pH close to 0 is considered neutral.
    H. The difference in hydrogen ion concentration is greater between highly acidic and highly basic solutions than between slightly acidic and slightly basic solutions.
    J. The difference in hydrogen ion concentration is greater between slightly basic and highly basic solutions than between slightly acidic and highly acidic solutions.

33. Assuming a concentration of 1 mol/L, which of the following substances has the highest pH level?

A. Baking soda
B. Nitric acid
C. Barium hydroxide
D. Vinegar

34. The hydrogen ion concentration, or $[H^+]$, of a solution is inversely proportional to the solution's hydroxide ion concentration, or $[OH^-]$. For example, a solution with a pH of 2 has a pOH of 12, and a solution with a pH of 11 has a pOH of 3. Based on this information, assuming a 1 mol/L solution, which of the following has the highest pOH ?

F. Sulfuric acid
G. Calcium hydroxide
H. Water
J. Ammonia

Passage VI

Carbonated beverages are liquids that have undergone carbonation, a process in which carbon dioxide gas becomes dissolved in them. A group of students proposed a hypothesis that the presence of carbonation in various bottled liquids would affect *balance time* (the time it takes a liquid to reach equilibrium after being initially off-balance). Diagram 1 shows the bottle held by 2 fixed points on a hinged incline. After the hinge is closed and the angle of inclination becomes zero, the liquid in the bottle completes its balance time when it no longer moves within the bottle.

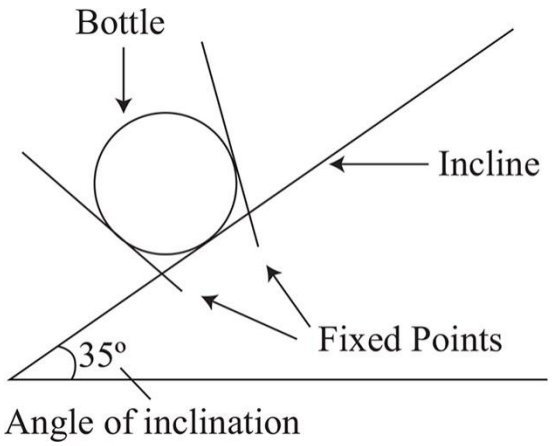


Diagram 1

Each student tested the hypothesis in different trials and recorded average balance times. The initial angle of inclination is 35° for all 3 experiments. Identical 2-L glass bottles were used in all 3 experiments.

Experiment 1

The students added 1 L of clear fruit juice, which is uncarbonated, to an empty bottle. After sealing it, they placed it between the fixed points and closed the hinge. The balance time was then recorded. Next, they added 1 L of the same juice to a second empty bottle, sealed and shook it, and found its balance time. They repeated these 2 procedures with 2 additional liquids: carbonated seltzer that contained a lot of froth, and root beer that was originally carbonated, but was then allowed to become flat (that is, to lose its dissolved carbon dioxide). The results of these trials are shown in Table 1.

Table 1

Trial	Liquid	Balance time (seconds)	
		Without shaking	With shaking
1	Clear Fruit Juice	20.01	19.89

Table 1			
Trial	Liquid	Balance time (seconds)	
		Without shaking	With shaking
2	Carbonated Seltzer	21.35	22.97
3	Root Beer	20.15	22.48

Experiment 2

The students added 1 L of the flat root beer to an empty bottle. After sealing and shaking the bottle, they set it aside for 10 minutes. After the 10 minutes elapsed, they found the bottle's balance time before and immediately after shaking it again (Trial 4). After conducting these measurements, they set the bottle aside for an additional 90 minutes and found the balance time before and immediately after shaking it a third time (Trial 5). The results can be seen in Table 2.

Table 2		
Trial	Balance time (seconds)	
	Before shaking	A er shaking
4	20.83	22.67
5	20.04	22.45

Experiment 3

The students added 1 L of the flat root beer to an empty bottle and 1 L of carbonated seltzer to a second empty bottle. They then sealed both bottles. After shaking both bottles and seeing froth form, the students set them aside for observation. At 10 minutes into the experiment, fewer bubbles were visible in the bottle that contained the root beer. At 90 minutes into the experiment, there were no bubbles remaining in the root beer.

35. Which of the following conclusions is most strongly supported by the results of Experiment 3 ? Ten minutes after being shaken, root beer:

A. had a lower level of carbonation than seltzer.
B. had a higher level of carbonation than seltzer.
C. had a greater quantity of liquid than seltzer.
D. achieved balance time twice as fast as seltzer.

36. When comparing Trials 1 through 5 in Experiments 1 and 2, in which two trials, after shaking, are the balance times the most similar?

F. Trials 1 and 5
G. Trials 1 and 3
H. Trials 2 and 4
J. Trials 3 and 5

37. In Experiment 2, shaking the bottle of root beer resulted in:

A. decreasing the number of bubbles in the beverage.
B. increasing the balance time of the bottle of root beer.
C. decreasing the balance time of the bottle of root beer.
D. increasing the mass of the bottle of root beer.

38. Based on the results of the experiments, is it likely that bubbles were present immediately before the bottle was shaken in Trial 4 ?

F. Based on Experiment 1, it is likely the bubbles were present before shaking.
G. Based on Experiment 1, it is unlikely the bubbles were present before shaking.
H. Based on Experiment 3, it is likely the bubbles were present before shaking.
J. Based on Experiment 3, it is unlikely the bubbles were present before shaking.

39. Suppose a sixth trial existed in which the same bottle of root beer was set aside for an additional 90 minutes after the fifth trial was completed. Based on the results of Experiment 2, what would the balance time most likely be if the students do not shake the bottle?

A. Less than 20.83 seconds
B. Between 20.83 seconds and 22.45 seconds
C. Between 22.45 seconds and 22.67 seconds
D. Greater than 22.67 seconds

40. Based on the results of Trials 3–5 and Experiment 3, if the students had added 1 L of the flat root beer to an empty bottle, then sealed the bottle and shook it, how long would it most likely take for the bubbles to become too few to affect the bottle's balance time?

F. 0 minutes
G. Between 0 minutes and 10 minutes
H. Between 10 minutes and 90 minutes
J. More than 90 minutes

Writing Test

40 Minutes — 1 Question

Directions: The essay is used to evaluate your writing skills. You will have **40 minutes** to review the prompt and plan and write an essay in English. Before you begin, read everything in this test booklet carefully to make sure you understand the task.

Your essay will be judged based on the evidence it provides of your ability to do the following:

- Assert your own perspective on a complex issue and evaluate the relationship between your perspective and at least one other perspective
- Use reasoning and evidence to refine and justify your ideas
- Present your ideas in an organized way
- Convey your ideas effectively using standard written English

Write your essay on the lined essay pages in the answer booklet. All writing on those lined pages will be scored. Use the unlined pages in this test booklet to plan your essay. Your work on these unlined pages will not be scored.

Put your pencil down as soon as time is called.

DO NOT OPEN THIS BOOKLET UNTIL TOLD TO DO SO.

Collegiate Fields of Study

Students pursuing higher education with the intent to commit to a particular field of study often determine that a different concentration is a better fit and subsequently make a change. Many students base their initial field of study on their interests, strengths, and experiences in high school. Some students complete the program they originally selected, but many others find that college unearths new passions and prospects. Additionally, collegiate study often exposes students to job markets that help students evaluate the availability of jobs in their desired field; this is often a driving factor in changing their concentration since students seek financial security upon graduation. Should high schools incorporate career-oriented programs to help students make better decisions regarding their majors? Making better-informed choices before entering college will help students wisely allocate their time and money during their college careers and prevent graduates from entering a career field without background knowledge regarding job availability.

Read and carefully consider these perspectives. Each discusses the importance of providing high school students with the necessary knowledge to choose appropriate fields of study in college.

Perspective One

Perspective Two

Perspective Three

High schools should hold career-oriented seminars at least once a semester during the regular school day to help students make informed decisions when choosing collegiate fields of study. These seminars will help students explore career options, post-graduate position availability, and job	High schools should retain their current primary focus but offer optional after-school career-focused seminars conducted by professionals so students can learn about options before attending college. Students who take advantage of this resource will be able to make better decisions, and these seminars will	High schools should partner with colleges and professionals to embed career-oriented options into current courses. The job market information will be relevant to the class in which it is presented. Although students will only receive career-based information centered on the courses in which they are enrolled, this

requirements. Armed with this knowledge, students can make better-informed choices that will help them to avoid spending unnecessary time and money in both college and job markets.	allow teachers to continue to focus on the core curriculum and assist students academically.	approach guarantees that each student is offered course-specific advice.

Essay Task

Write a clear, well-reasoned essay evaluating multiple perspectives on academic programs that assist students in choosing appropriate fields of study. In your essay, be sure to:

- Assert your own perspective on the issue and evaluate the relationship between your perspective and at least one other perspective
- Use reasoning and evidence to refine and justify your ideas
- Present your ideas in an organized way
- Convey your ideas effectively using standard written English

Your perspective may be fully, somewhat, or not at all in agreement with one or more of the three perspectives in the prompt.

Planning Your Essay

These pages are not scored.

Use the space below to brainstorm and plan your essay. Consider the following as you think about the prompt:

- Strengths and weaknesses of the three perspectives in the prompt
  - What observations do they offer, and what do they overlook?
  - Why are they persuasive or why are they not persuasive?

- Your own background and identity
  - What is your perspective on this issue, and what are its strengths and weaknesses?

- What evidence will you use in your essay?

Answers and Explanations

ENGLISH TEST

1. *American Jazz*

1. **A**
   Difficulty: Low

   Category: Agreement

   Getting to the Answer: The superlative adjective form will use *-est* or *most*—not both. This sentence needs (A), NO CHANGE. *Earliest* is the correct superlative adjective to refer to all *music forms*. Choice B uses *most* with *earliest*, which is grammatically incorrect. Choice C uses *most early*, which is also incorrect; *most* is only used with words that do not have an *-est* superlative form. Choice D uses the right adjective, but creates a subject-verb agreement error; “The earliest . . . forms” does not agree with the singular verb form *was.*

2. **G**
   Difficulty: High

   Category: Agreement

Getting to the Answer: *It's* is a contraction of *it is* or *it has*. If neither of these makes sense when substituted for the contraction, the contraction is incorrect. It doesn't make sense to say "because of it is (or has) having," so we know F is incorrect. Choice (G) substitutes the correct singular possessive adjective, *its*, meaning that the *origins* belong to American jazz. Choice H uses a spelling that is never correct, and J adds an incorrect comma.

3. **A**
   Difficulty: High

   Category: Development

   Getting to the Answer: Just determining whether or not the suggested information is relevant gives you a 50–50 chance of getting the question right. First, determine if the new information is relevant or not. Here, it is, since the paragraph discusses the way that different musical forms came together to form American jazz; eliminate C and D. Choice B is out of scope for the paragraph, which concerns the development, not the popularity, of American jazz. Choice (A) is correct, because a syncopated style helpfully connects the West African folk music with the syncopation of ragtime and blues.

4. **G**
   Difficulty: Medium

   Category: Sentence Structure

Getting to the Answer: The answer choices include difference verb forms. Choose the form that creates a complete sentence. Choices F, H, and J all create fragments. Therefore, (G) is correct.

5. **B**
   Difficulty: Medium

   Category: Sentence Structure

   Getting to the Answer: If a semicolon is used to combine clauses, the clauses must be independent. This sentence incorrectly places a semicolon between an independent and a dependent clause. Choice (B) eliminates the incorrect semicolon. Choice C incorrectly inserts a comma between a preposition and its object. Choice D separates a subject from its verb with a comma, which is also incorrect.

6. **G**
   Difficulty: Medium

   Category: Agreement

   Getting to the Answer: When an underlined selection includes a pronoun, make sure its antecedent is clear and unambiguous. There are several singular nouns in the sentence previous to this one (*style*, *blend*, *America*, *the time*) that could be antecedents for the pronoun *It.* Choice (G) replaces the pronoun with the appropriate noun. Choices H and J do not address the ambiguity issue.

7. **C**
   Difficulty: Medium

   Category: Agreement

   Getting to the Answer: When an English Test question has a stem, read it carefully. This one asks you to determine the unacceptable choice, which means three of the choices will be correct in context. Although “made his living on” is a properly constructed idiom, it is inappropriate in this context, since it refers to the location where the living was made, such as on a boat, rather than the occupation itself. Choice (C) is the correct choice here. Choices A, B, and D are all acceptable in the sentence.

8. **J**
   Difficulty: Medium

   Category: Conciseness

   Getting to the Answer: When DELETE is an option, check to see if the underlined selection is necessary to the meaning of the sentence. *He was* isn’t necessary here; “working as a shoe shiner and a waiter” properly provides a compound object for the preposition, so (J) is correct. Choice G uses incorrect grammatical structure, and H leaves the meaning of the second clause incomplete.

9. **C**
   Difficulty: High

Category: Development

Getting to the Answer: When asked about deleting information, read the sentence without the selection in question. The information that Cab Calloway "spent time at the racetrack" doesn't make sense coming directly a er a sentence that discusses the jobs he held, unless we also know that Calloway worked at the track. Choice (C) is correct; without this explanation, readers might be confused. Choice A is incorrect; the information does relate to the topic at hand. Choice B is also wrong; the information has nothing to do with Calloway's accomplishments or successes. Other information in the sentence tells us how far Cab Calloway came in his life; it's not necessary to keep this clause for the reason that D suggests.

10. **J**
    Difficulty: Medium

    Category: Sentence Structure

    Getting to the Answer: Although DELETE will not always be the correct answer when it's offered, always consider the possibility that the selection is either redundant or used incorrectly. As written, this sentence is a fragment, with no independent clause. Eliminating *where*, as (J) suggests, corrects this error. Choice G is unnecessarily wordy. Choice H does not address the fragment error.

11. **A**
    Difficulty: Medium

Category: Sentence Structure

Getting to the Answer: The ACT tests only a few very specific punctuation rules; make sure your answer choice follows these rules. Choice (A) is correct; no punctuation is needed here. Choice B inserts a colon which, on the ACT, will only be correct when used to introduce a brief explanation, definition, or list. Choice C treats the phrase “in the top jazz circles” as nonessential information set off by commas, but the sentence does not make sense when read without it. Choice D inserts an unneeded comma before a prepositional phrase.

12. **J**
    Difficulty: Medium

    Category: Organization

    Getting to the Answer: Because NO CHANGE is not an answer choice, the sentence must be relevant; you’ll need to determine its most logical placement. *Widely known* is a good context clue. It doesn’t make sense that he was well-known when he was a shoe-shiner and waiter, when he was walking racehorses, and when he first began performing, so you can eliminate F, G, and H. Choice (J) places the sentence logically.

13. **B**
    Difficulty: Medium

    Category: Agreement

Getting to the Answer: The word that follows is a noun, so you need an adjective rather than an adverb. Eliminate A. Choices C and D are awkwardly worded, so (B) is correct.

14. **J**
    Difficulty: Medium

    Category: Development

    Getting to the Answer: In addition to following the rules of grammar, style, and usage, the correct answer choice must also be consistent with the tone of the passage. The phrase “it’ll stick around for a while” is too informal and slangy for the rest of this passage. Choice (J) matches the professional tone of the essay and provides a logical conclusion. Choice G is unnecessarily wordy. Choice H doesn’t provide a logical conclusion to the passage; it concerns jazz’s popularity rather than its endurance.

15. **A**
    Difficulty: Medium

    Category: Development

    Getting to the Answer: Once you determine whether or not the passage satisfies the conditions in the question stem, you can immediately eliminate two of the four choices. First, you’ll need to determine whether or not this essay focuses on “the history and development of American jazz music.” Since it does, you can eliminate

both *no* choices, C and D. Now focus on the reasoning. Choice B misstates the information in the passage, which tells us that jazz developed from folk music, not the other way around. Choice (A) is the correct choice here.

7. *My Grandfather's Internet*

16. **F**

    Difficulty: Medium

    Category: Sentence Structure

    Getting to the Answer: Approximately 25% of ACT English Test questions will require NO CHANGE. This sentence contains no error, so (F) is correct. Choice G creates a run-on sentence. Choice H would be acceptable if the comma were placed a er *world*, but is incorrect punctuated this way. Choice J introduces a verb tense that is inappropriate in context.

17. **B**

    Difficulty: Medium

    Category: Sentence Structure

    Getting to the Answer: When commas are the issue, remember your tested rules. This sentence does not meet any of the tested conditions for proper comma usage; (B) is correct. Choice A separates the verb from its object. Choices C and D do not address the error; *said that*

would be acceptable without the commas but, as written, these choices are incorrect.

18. **H**
    Difficulty: Medium

    Category: Agreement

    Getting to the Answer: When a verb is underlined, check that it is in the correct tense and is properly formed. Choices F and G incorrectly use *went* with *has* and *had*, respectively; the correct past participle for the verb *to go* is *gone*. Choice J uses the present tense, which is incorrect in context. This sentence discusses something that happened in the past, so (H) is correct.

19. **C**
    Difficulty: Low

    Category: Conciseness

    Getting to the Answer: Many ACT Knowledge of Language questions will have four answer choices that are grammatically correct; your goal is to find the best one, which is o en the most concise option. *Because* is all that is needed here; (C) is the best choice. Choices A and B are unnecessarily wordy. Choice D creates an illogical relationship between the clauses; the editor's refusal to read hand-written manuscripts was the cause, not the result, of Grandpa's decision to buy a computer.

20. **G**

    Difficulty: Medium

    Category: Sentence Structure

    Getting to the Answer: When the underlined portion contains modifying phrases, check for proper placement. A modifying phrase should be close to the noun it modifies. The only logical entity that is "on a World Wide Web" is *information*, so that phrase must occur at the beginning of the selection. Choice (G) is correct.

21. **D**

    Difficulty: Medium

    Category: Organization

    Getting to the Answer: Make sure Connections words properly relate the words or clauses they connect. The second sentence here provides a different point than the first; Grandpa is saying that he can talk to interesting people for a long time or he can ignore uninteresting people. Choice (D) uses the appropriate connection. Choices A and B indicate that the second sentence will provide a specific example of the first, but this is not the case. Choice C suggests that the writer will introduce a contrasting perspective a er discussing Grandpa's use of the "close" button, but the writer does not do so.

22. **G**

    Difficulty: Low

Category: Agreement

Getting to the Answer: When the underlined word is a pronoun, make sure its antecedent is clear and that it is in the proper case. Since you wouldn't say *them people*, F is incorrect; *those* would be the proper pronoun here. However, since *those* is not among the answer choices, you'll need to find a logical replacement for the pronoun. Choice (G) correctly indicates who isn't interesting. Choice H incorrectly uses *it* to refer to people. Choice J creates a sentence that is grammatically incorrect.

23. **A**

Difficulty: Medium

Category: Sentence Structure

Getting to the Answer: If you read the sentence and don't find a problem with it, don't be afraid to choose NO CHANGE. It will be the correct choice about 25% of the time. This sentence contains no error; (A) is correct here. Choice B treats the phrase "which is very convenient" as nonessential information, but the sentence does not make sense without it. The second sentence created by C is a fragment. Choice D misuses the semicolon, which is only correct when combining two independent clauses.

24. **J**

Difficulty: High

Category: Sentence Structure

Getting to the Answer: When an entire sentence is underlined, choose the clearest revision. As written, this sentence is wordy and convoluted. While not much briefer, (J) is easier to understand; “in merely a few seconds” is placed directly a er the phrase it modifies, “being able to find anything he wants,” and “for him” follows the phrase it modifies, “a source of pure joy.” Choices F, G, and H are all less concise and more awkward than (J); additionally, G incorrectly places a comma between the sentence’s subject and predicate verb.

25. **D**
Difficulty: Medium

Category: Organization

Getting to the Answer: Make sure transition words are both logical and necessary. This sentence needs nothing to link it to the sentence that precedes it. Choice (D) eliminates the unnecessary word. Choices A and C incorrectly use contrast words to link the two sentences. Choice B uses *additionally*, which means the second sentence is building upon the first sentence. This is not the case either.

26. **F**
Difficulty: Medium

Category: Sentence Structure

Getting to the Answer: Unless context makes it clear that more than one time frame is being referenced, verb tenses should remain consistent. This sentence needs (F), NO CHANGE; the present tense is correct in context. Choices G and H create sentence fragments. Choice J introduces a verb tense that is inappropriate in context.

27. **A**

    Difficulty: Low

    Category: Development

    Getting to the Answer: Don't just read for errors in grammar and usage; read for logic as well. Here, (A) is the only choice that is both consistent with the passage and uses the proper contrast transition *but*. Nothing in the passage indicates that Grandpa won't continue to explore the Internet, as B suggests, or that his editor believes this to be the case, as in D. Choice C doesn't follow logically from the first clause of the sentence.

28. **G**

    Difficulty: Medium

    Category: Organization

    Getting to the Answer: When asked to add information, read the new sentence into the passage at the suggested points to determine its best placement. This sentence adds information about how Grandpa uses the websites he accesses, so placing it before Sentence 1, as F

suggests, is illogical. Choices H and J both place the new information too far from the discussion of Grandpa's use of the Internet. Choice (G) is the most logical place for this new sentence.

29. **D**

Difficulty: Medium

Category: Development

Getting to the Answer: Whenever you are asked to consider deleting something, think about why the author included that information. What purpose does it serve? The first sentence of this passage tells us that Grandpa does not know how to use technology. This explains why Grandpa did not want to use the Internet; (D) is correct. Choice A misstates a detail from the passage; the sentence in question tells us only that Grandpa does not like to use technology, not the specific technologies he avoids. The first sentence is not particularly humorous, which eliminates B. Choice C can be eliminated as well, since no justification for Grandpa's technophobia is provided.

30. **H**

Difficulty: Medium

Category: Organization

Getting to the Answer: When asked about the logical placement for a paragraph, pay attention to any unexplained shi s in the text. If there's a place that needs a transition, that is likely where the paragraph

should go. Because Paragraph 1 ends by saying the Grandpa doesn't see the need for the Internet, and Paragraph 2 describes Grandpa's reaction to the Internet, this is a logical place for a paragraph describing how Grandpa was convinced to try the Internet. Choice (H) is correct.

3. *Chickasaw Wandering*

31. **A**
Difficulty: Low

Category: Agreement

Getting to the Answer: Most idiom questions will hinge on preposition usage. This sentence needs (A), NO CHANGE; "In the twilight" is the appropriate idiom in this context. Choice B is idiomatically incorrect usage. Choices C and D would require more information to be correct; neither "With the twilight" nor "From the twilight" is an acceptable idiom by itself.

32. **H**
Difficulty: High

Category: Agreement

Getting to the Answer: Some constructions might be grammatically correct but inappropriate in context. Although "more of the people who" is a grammatically correct construction, it is used incorrectly

here, so F is incorrect. It was “most of the people” the writer did not know; (H) makes the correction without introducing a new error. Choice G does not address the error; additionally, it uses the objective pronoun form *whom* where *who* is correct. Choice J corrects the incorrect use of *more*, but adds a new error by changing *who* to *whom*.

33. **D**

    Difficulty: Medium

    Category: Development

    Getting to the Answer: Read question stems carefully and use Keywords to determine the correct answer choice. The Keyword in this question stem is *unity*. Choice (D) mentions *kinship*, which suggests a family-like relationship between the writer and the other walkers. Choice A indicates that the writer knew some of the people, but you can know people without feeling unity with them. Choice B’s mention of each walker having his or her own reasons for being there suggests the opposite of unity. Being interested in knowing people, as C suggests, does not convey unity.

34. **F**

    Difficulty: High

    Category: Agreement

    Getting to the Answer: The answer choices are all in the past tense. Determine which fits best with the overall past-tense narration of the

story. The people had been waiting to make their journey, but by the time of the narration they are no longer waiting; they are making the journey. Thus, the answer should express that the people waited prior to the past-tense event of making the journey together. Choices G and J reference an event that was either ongoing in the past or else happened at one time in the past; eliminate them. Choice H is unnecessarily wordy. Only (F) places the waiting prior to the journey, without being too wordy; (F) is therefore correct.

35. **C**

    Difficulty: High

    Category: Sentence Structure

    Getting to the Answer: As written, the sentence does not make clear whether the writer is talking about pictures of other Chickasaw or pictures belonging to other Chickasaw, so A is incorrect. Choice (C) makes this clear. Choice B is unnecessarily wordy. Choice D changes the meaning of the phrase, indicating that it was *Chickasaw*, and not *pictures*, that the writer had been shown.

36. **J**

    Difficulty: Medium

    Category: Sentence Structure

    Getting to the Answer: Only very specific comma uses are tested on the ACT. If commas are used in any other way, they will be incorrect.

The underlined selection does not meet any of the tested requirements for comma usage; (J) is correct. Choice F treats the phrase “who walked along with me” as nonessential information, but the sentence does not make sense without it. Choice G inserts a comma within a phrase modifying “people.” Choice H treats another necessary phrase, “who walked along,” as nonessential.

37. **D**

Difficulty: High

Category: Organization

Getting to the Answer: Each sentence in the passage must lead logically into the next. Look at the sentence preceding the selection and the one that follows. You need to find a choice that transitions from the idea of the pictures the writer had been shown and somewhere that “Books . . . were stacked on the bookshelves.” Choice (D) does this best. Choices A, B, and C all explain where the pictures came from but do not lead logically into the sentence that follows.

38. **F**

Difficulty: High

Category: Sentence Structure

Getting to the Answer: The verbs here must be in the proper format not to create a run-on sentence or change the intended meaning. Choice G creates a run-on, whereas H and J both unnecessarily

reference another time-frame when the father read the book. Choice (F) is correct.

39. **C**
    Difficulty: Low

    Category: Development

    Getting to the Answer: Remember to read for logic as well as grammar and usage. We know there are two rooms: the father's and the grandmother's; (C) correctly conveys this. Choices A and D refer to a single room, but the writer has been talking about two rooms. Choice B seems to indicate that both rooms belong to the writer's grandmother, but this contradicts the passage.

40. **J**
    Difficulty: Medium

    Category: Organization

    Getting to the Answer: Connection words, such as conjunctions, must logically join the ideas they are used to combine. The two clauses here do not relate to one another in a way that makes it logical for them to be joined into a single sentence; one clause concerns the rooms displaying pictures of Chickasaw and the other, the writer's family's move to Seattle, so a change is needed and F is incorrect. Choice (J) correctly makes each clause a separate sentence. Choices G and H create run-on sentences.

41. **C**

Difficulty: High

Category: Development

Getting to the Answer: When NO CHANGE is offered as an option, you'll need to determine the logic and relevance of any potential new material. The information in the underlined sentence, while related to the topic being discussed, does not logically lead from the idea that the writer and his family had moved to Seattle to the reason they were then unable to attend the Annual Meetings. This means you can eliminate A. By pointing out the location of these meetings, (C) connects the two ideas: the meetings were too far away from the family's new home. Choice B is out of scope—dancing at the Festivals is never mentioned in the passage—and still fails to logically connect the ideas. Choice D also fails to provide a logical reason for the writer's family not attending the meetings.

42. **F**

Difficulty: Medium

Category: Conciseness

Getting to the Answer: Be wary of answer choices that are significantly longer than the original selection. Barring errors of grammar or logic, these will be incorrect. There is no need to make this sentence any longer; (F) is correct. Choices G, H, and J are all wordier

than the original and violate the parallel structure required for the compound “built and . . . conducted.”

43. **C**

    Difficulty: Low

    Category: Organization

    Getting to the Answer: Connections words and phrases must logically combine the ideas they connect. This sentence builds on the preceding one by giving more evidence to make the point of the first sentence. Choice (C) correctly reflects this relationship. Choices A and D use inappropriate contrast connections. Choice B indicates two events occurring simultaneously, which is illogical in context.

44. **J**

    Difficulty: Medium

    Category: Sentence Structure

    Getting to the Answer: A sentence can have multiple verbs and still be a fragment. Remember, the *-ing* verb form by itself can never be the predicate (main) verb in a sentence. As written, this sentence is a fragment; neither clause is independent. Choice (J) gives the sentence a correct predicate verb, *chirped*. Choices G and H do not address the error.

45. **C**

Difficulty: High

Category: Development

Getting to the Answer: When asked whether an essay accomplishes a certain purpose, first decide whether or not it accomplishes that purpose and then choose the answer that reflects your reasoning. The question stem asks if this essay fulfills the goal of describing the history of the Chickasaw people. Since the passage focuses primarily on the narrator's own story, you can eliminate the *yes* choices, A and B. Choice D's reasoning is that the essay is narrated from one person's point of view, but history can be narrated in that way. It is not the style of the narration but rather the fact that the essay focuses on the narrator's personal experiences that makes the essay ill-suited for the stated purpose. Choice (C) is correct here.

9. *Topping the Washington Monument*

46. **H**
Difficulty: Medium

Category: Sentence Structure

Getting to the Answer: When apostrophe use is the issue, use context to determine whether a plural or a possessive is required; eliminate answer choices that use the apostrophe in ways that are never correct. As written, this sentence uses the plural *days*, which doesn't make sense in context, so you can eliminate F. Although there are

circumstances in which a noun ending in *s* will be made possessive by adding *'s*, the rules for this usage are quite complicated and are not tested on the ACT; eliminate J. Since the sentence is discussing one specific day (December 6, 1884), the plural possessive in G can also be eliminated. *Day's*, the singular possessive, is what is called for here; (H) is correct.

47. **A**

Difficulty: Low

Category: Agreement

Getting to the Answer: Use context to determine the appropriate tense of underlined verbs. There is no contextual reason to change verb tenses in this sentence; since *rushed* is in the past tense, (A) *threatened* is correct. Choice B changes the meaning of the sentence, making the wind the object of the threat, rather than its cause. Choice C uses a tense that indicates actions that will happen in the future, but these actions have already occurred. Choice D uses the singular verb form *threatens* with the plural noun *winds*.

48. **J**

Difficulty: Low

Category: Conciseness

Getting to the Answer: Whenever DELETE is presented as an option, check the underlined selection for relevance and redundancy. Here,

postpone and *delay* mean essentially the same thing, so eliminate F; (J), DELETE, is the correct choice here. Choice G still contains redundant wording; "to a later time" is included in the meaning of *postpone*. Choice H is also redundant; there is no other way to *postpone* something than *by delaying* it.

49. **B**

    Difficulty: Medium

    Category: Development

    Getting to the Answer: Remember your "purpose of a detail" skills from ACT Reading; that's what question stems like this one are asking for. Here, the phrase marked for deletion is the definition of *capstone ceremony*; (B) correctly explains what the essay would lose if the clause were deleted. Since the term *capstone ceremony* is not something most people are familiar with, this *detail* is not *minor*, as A suggests. Nothing in the phrase reflects the writer's opinion or the ceremony's significance to the American people, which eliminates C and D.

50. **F**

    Difficulty: Medium

    Category: Sentence Structure

    Getting to the Answer: Remember your tested comma rules; if a comma is used in any other way in the underlined selection, it will be

incorrect. A comma is not required, so (F) is correct. Choices G and J insert commas between the two parts of a compound; this is never correct comma usage. Choice H treats “attorney and Congressman” as nonessential information, but leaving it out makes it unclear who John Marshall was.

MATHEMATICS TEST

1. C. Starting with $3x + 7 = 25$, subtract 7 from both sides to get $3x = 18$. Dividing both sides by 3 gives $x = 6$.

2. C. To find 40% of 250, convert the percentage to a decimal (0.40) and multiply: $0.40 \times 250 = 100$.

3. A. Distribute first: $5(2x - 3) = 10x - 15$ and $-3(x - 4) = -3x + 12$. Combining these gives $10x - 15 - 3x + 12 = 7x - 3$.

4. B. List multiples of each number. For 12: 12, 24, 36, 48... For 18: 18, 36, 54... The smallest common multiple is 36.

5. C. If the average of five numbers is 24, use the formula: Average = Sum/Count. Rearranging: Sum = Average × Count = $24 \times 5 = 120$.

6. C. Factor out 2x from the equation: $2x(x - 4) = 0$. For this product to equal zero, either $2x = 0$ (giving $x = 0$) or $x - 4 = 0$ (giving $x = 4$).

7. D. The absolute value of -15 is 15, and the absolute value of -8 is 8. Adding these: $15 + 8 = 23$.

8. C. In a parallelogram, consecutive angles are supplementary (add to 180°). Given angles of 70° and 30°, angle EFG forms a straight line with the 30° angle at G and shares vertex F with the 70° angle. Using properties of parallel lines, angle EFG = 50°.

9. C. Find a common denominator of 12: $3/4 = 9/12$ and $5/6 = 10/12$. Adding: $9/12 + 10/12 = 19/12$.

10. C. Average speed equals total distance divided by total time: 180 miles ÷ 3 hours = 60 mph.

11. A. Find two numbers that multiply to 20 and add to -9. These are -4 and -5, so $x^2 - 9x + 20 = (x - 4)(x - 5)$.

12. C. Since $13 \times 13 = 169$, the square root of 169 is 13.

13. C. Substitute $x = -1$ into $f(x) = 3x^2 - 2x + 5$: $f(-1) = 3(-1)^2 - 2(-1) + 5 = 3(1) + 2 + 5 = 10$.

14. B. Slope formula: $(y_2 - y_1)/(x_2 - x_1) = (13 - 5)/(6 - 2) = 8/4 = 2$.

15. D. From the table, outfielders = 7 and pitchers = 8. Total = 15 out of 25 cards. Probability = 15/25 = 0.56 = 56%.

16. B. In a 45-45-90 triangle, the sides are in ratio $1:1:\sqrt{2}$. If a leg is 6, the hypotenuse = $6\sqrt{2}$.

17. C. Add 4 to both sides: $3x > 15$. Divide by 3: $x > 5$.

18. D. Area of a circle = πr^2. With radius 5: Area = $\pi(5)^2 = 25\pi$.

19. A. Move the decimal point 4 places to the right to get 4.5, so $0.00045 = 4.5 \times 10^{-4}$.

20. C. Calculate $3^4 = 3 \times 3 \times 3 \times 3 = 81$.

21. D. If $\log_2(x) = 5$, then $2^5 = x$. Calculate: $2^5 = 32$.

22. D. Arranging 6 people in 6 seats is a permutation: $6! = 6 \times 5 \times 4 \times 3 \times 2 \times 1 = 720$.

23. B. Perimeter of rectangle = 2(length + width) = 2(12 + 8) = 2(20) = 40.

24. B. With 7 numbers, the median is the 4th value when arranged in order. Counting: 3, 7, 9, [11], 15, 18, 21. The median is 11.

25. C. The sum of angles in a polygon follows the pattern: triangle (3 sides) = 180°, square (4 sides) = 360°, pentagon (5 sides) = 540°. This follows the formula 180(n - 2).

26. B. Calculate $i^3 = i^2 \times i = (-1) \times i = -i$, since $i^2 = -1$ by definition.

27. A. The vertex form $y = (x - h)^2 + k$ has vertex at (h, k). Here h = 3 and k = 2, so vertex is (3, 2).

28. C. Supplementary angles sum to 180°. If one angle is 65°, the other is 180° - 65° = 115°.

29. A. cos(60°) is a standard angle value equal to 1/2.

30. A. Total marbles = 4 + 6 + 5 = 15. Blue marbles = 6. Probability = 6/15 = 2/5.

31. B. Looking at the graph, the y-values of all plotted points range from a minimum of 0 to a maximum of 6, giving range $\{y: 0 \leq y \leq 6\}$.

32. B. When multiplying terms with the same base, add exponents: $(2x^3)(3x^5) = 2 \times 3 \times x^{3+5} = 6x^8$.

33. B. Distance formula: $d = \sqrt{[(x_2-x_1)^2 + (y_2-y_1)^2]} = \sqrt{[(5-(-3))^2 + (-2-4)^2]} = \sqrt{[64 + 36]} = \sqrt{100} = 10$.

34. C. Since $2^6 = 64$, the value of x is 6.

35. C. Volume of cylinder = $\pi r^2 h = \pi(3^2)(10) = \pi(9)(10) = 90\pi$.

36. C. Perpendicular lines have negative reciprocal slopes. The slope of $y = 2x + 3$ is 2, so a perpendicular line has slope -1/2.

37. C. In a 30-60-90 triangle, sides are in ratio $1:\sqrt{3}:2$. If shortest side = 4, then longest side = $4 \times 2 = 8$.

38. B. Calculate 15% of 80: $0.15 \times 80 = 12$.

39. C. Mean = $(5 + 8 + 10 + 12 + 15)/5 = 50/5 = 10$.

40. A. If $\tan \theta = 3/4$, construct a right triangle with opposite = 3, adjacent = 4. By Pythagorean theorem, hypotenuse = 5. Therefore $\sin \theta$ = opposite/hypotenuse = 3/5.

41. A. Circumference = $2\pi r = 10\pi$. Dividing both sides by 2π gives $r = 5$.

42. C. The absolute value equation $|x - 3| = 7$ means $x - 3 = 7$ or $x - 3 = -7$. Solving: $x = 10$ or $x = -4$.

43. D. The square has area $12^2 = 144$. The rectangle at the center covers half the square's area in the overlap. Shaded area = 144/2 = 72.

44. B. If $(x - 2)$ is a factor, then $x = 2$ is a root. Substituting into $x^2 + kx - 10 = 0$: $4 + 2k - 10 = 0$, so $2k = 6$, and $k = 3$.

45. D. For a quadratic equation to have exactly one solution, the discriminant must equal zero. For $x^2 - 8x + k = 0$, discriminant = $b^2 - 4ac = 64 - 4k = 0$. Solving: $k = 16$.

READING TEST

Passage I

1. Suggested Passage Map notes:

   ¶1: Giovanni (G) admires garden below

   ¶2: G sees old, sickly gardener

   ¶3: gardener avoids touching plants

   ¶4: gardener wears mask to shield himself

1. **D**
   Difficulty: Medium

   Category: Detail

   Getting to the Answer: Good notes will help lead you quickly to the section of the passage you need to research. In lines 25–30, Giovanni notices “one shrub in particular” that seems to “illuminate the garden.” The plant he is speaking about is the one with “a profusion of purple blossoms.” In the next sentence, he considers other plants that are *less beautiful* than the one with purple blossoms. This should lead

you to (D). Choice A is a misused detail; the plant that is wreathed around the statue (lines 39–43) is shown in a positive light, but these lines do not indicate that Giovanni finds the plant to be exceptional. Choice B is a misused detail; in lines 37–39, there is information about plants that "crept serpent-like along the ground," yet no specific plant on the ground is mentioned, nor are any viewed as being special. Choice C is a misused detail; in line 23, "gigantic leaves" are mentioned, but not a specific plant's leaves.

2. **G**
   Difficulty: Medium

   Category: Detail

   Getting to the Answer: If you are able to determine that a certain numbered statement is correct (or incorrect), you can include (or eliminate) all answer choices that include that statement. Normally, you would start with the statement that appears most frequently, but all statements here appear an equal number of times. Your notes should indicate that the narrator discusses the gardener's interaction with the plants principally in paragraphs 3 and 4. Skim those paragraphs for the information in the three statements. In lines 67–68, you see that the gardener avoids the "actual touch or the direct inhaling of [the plants'] odors." Paragraph 4 offers alternate confirmation of these two statements. Based on this, you know that Statements I and III are valid; eliminate all choices that don't include both of them (F and H). A quick skim of the paragraphs offers no

support for Statement II; eliminate J. Choice (G) is correct; the passage supports both statements.

3. **C**
   Difficulty: Medium

   Category: Inference

   Getting to the Answer: Consider what the author writes about the gardener. In lines 85–86, he states that the gardener wears gloves to protect himself. He also wears other "armor," the mask that he puts over his mouth and nostrils, in lines 89–90. In lines 67–74, Giovanni is disturbed by the fact that the gardener takes so much caution with the plants, indicating that Giovanni himself would not take these types of precautions. A good prediction is that the gardener is a cautious man. Choice (C) matches this. Choices A and D are distortions; Giovanni alludes to Adam and the Garden of Eden, but this does not indicate that the gardener is more or less religious. Choice B is opposite; the narrator depicts the gardener as being very cautious, behavior that disturbs Giovanni.

4. **J**
   Difficulty: Medium

   Category: Detail

   Getting to the Answer: In Roman numeral questions, start with the statements that appears most frequently. Statements I and II appear

more frequently than the third one does, so start there. In line 69, the gardener "impressed Giovanni most disagreeably" by avoiding the inhalation of the plants' odors; Statement II is valid then. Eliminate F and H. (Note that this means you don't have to investigate Statement III.) In the following lines, Giovanni becomes upset that "the man's demeanor was that of one walking among malignant influences," which supports Statement I. Choice (J) is the correct choice.

5. **A**

   Difficulty: Medium

   Category: Inference

   Getting to the Answer: Some questions will ask you to read between the lines. Although this can sometimes be difficult, remember that the answer will always be supported by information in the passage. The gardener, in lines 67–68, avoids directly touching the plants or "inhaling . . . their odors." Yet he is also described as a *scientific gardener*, who seems to be *looking into* the nature of the plants. You can infer that he is observant and seems to understand the essence of the plants. Predict that he is "focused" or "attentive." Choice (A) matches this prediction. Choice B is extreme; lines 56–63 indicate that the gardener knows a lot about plants. The narrator suggests, however, that he discovers this information as he works, not that he already knows all there is to know about plants. Choice C is opposite; the fact that he refuses to touch or smell the plants goes against the idea that he loves nature. Choice D is a misused detail; Giovanni

mentions Adam in lines 80–82, but there is no indication that the gardener actually resembles him.

6. **G**
   Difficulty: Medium

   Category: Inference

   Getting to the Answer: Don't "over-infer." The correct choice will be closely related to something stated in the passage. In lines 30–31, the plant is described as seemingly able to "illuminate the garden, even had there been no sunshine." From this, you can infer that the plant seemed capable of producing light, which matches (G). Choice F is a distortion; in lines 27–28 the narrator states that each blossom "had the luster and richness of a gem." To say that the plant could sprout gems stretches the metaphor too far. Choice H is a distortion; the narrator suggests that the plant could shed light on the garden, not overrun it like a weed. Choice J is out of scope; nowhere in the passage is there any indication that the plant grows very quickly.

7. **D**
   Difficulty: Low

   Category: Inference

   Getting to the Answer: Take the time to predict an answer before looking at the answer choices; this will help you avoid being tempted by incorrect answer choices. The passage is not told directly from

Giovanni's point of view; the reader understands what Giovanni is thinking, yet this information comes from an unidentified narrator. Look for this among the choices; (D) matches. Choice A is a misused detail; the narrator refers to the gardener in the third person. Choice B is a misused detail; the narrator refers to Giovanni in the third person. Choice C is a misused detail; the gardener is described as being scientific, yet that does not indicate that the narrator is a scientist.

8. **J**

   Difficulty: Medium

   Category: Function

   Getting to the Answer: Read the referenced lines carefully to determine the author's intent. These statements are made a er the narrator describes Giovanni as being disturbed by the insecurities the gardener shows while cultivating the garden. The narrator mentions Eden to show how far the gardener's behavior is from the "joy and labor" of Adam in the ideal garden—he should display more positive feelings for the plants he tends. Choice (J) matches this prediction. Choice F is a misused detail; Giovanni seems to recognize this in the gardener earlier in the paragraph, but this has no relation to the references to Adam and Eden. Choice G is opposite; Giovanni finds the gardener's behavior inexplicable. Choice H is a distortion; while these are Biblical references, Giovanni never implies that the gardener should show the plants respect, religious or otherwise.

9. **A**

Difficulty: Low

Category: Detail

Getting to the Answer: When you don't receive line references, good notes will help you know where to research. Your notes should indicate that every paragraph but the first focuses on Giovanni's observation of the gardener, so look to the first paragraph. Choice (A) is correct; in lines 3–4, Giovanni refers to the garden as "one of those botanic gardens," different from most in the world. Choice B is a distortion; rare art is mentioned in line 9, but this refers specifically to the marble fountain, not to the garden as a whole. Choice C is a distortion; this answer is a misreading of lines 31–32, where the narrator states that "the soil was peopled with plants and herbs." He is not referring to actual people, but the plants that populate the garden. Choice D is a distortion; in lines 6–7, the narrator states that the garden "might once have been the pleasure-place of an opulent family." He never states that it was such a locale for "the community."

10. **G**

Difficulty: High

Category: Inference

Getting to the Answer: When given line references in the question stem, go back to those lines in the text and, if necessary, read the sentences before and a er those lines. The paragraph begins by describing the gardener as examining the plants intently and "looking

into [the plants'] inmost nature," "discovering why one leaf grew in this shape and another in that" (lines 61–62). He seems interested in understanding what the plants are made up of. The remainder of the paragraph discusses his apparent fear of the plants. Look for one of these ideas in the correct choice. Choice (G) matches the first part of the paragraph. Choice F is opposite; the paragraph indicates that he is quite patient, intently seeking to understand the plants' inmost qualities. Choice H is a distortion; the gardener seems to fear the plants may harm him, but he does not seem to want to harm the plants. Choice J is out of scope; there is no indication that the gardener is angry with the plants.

Passage II

2. Suggested Passage Map notes:

    ¶1: eng. focuses on improvement

    ¶2: re-eng. starts w/ understanding failure

    ¶3: ex. of failed re-eng.: paperclip

    ¶4: ex. of eng. compromises: jumbo jet

    ¶5: ex. of re-eng. based on failure: Roebling bridge

    ¶6: re-eng. of Roebling created failure (TNB)

¶7: failures contribute more than successes (Titanic)

11. **B**

    Difficulty: Low

    Category: Detail

    Getting to the Answer: You are looking for three things that ARE mentioned and one that IS NOT. Don't get the two confused. First check your notes to see that the author mentions jumbo jet design in paragraph 4. Research the passage and cross off each choice that is referenced in the paragraph. Choice (B) is not referenced in this paragraph. Choice A is opposite; the author mentions this in line 39. Choice C is opposite; the author mentions this in line 37. Choice D is opposite; the author mentions this in line 40.

12. **J**

    Difficulty: Medium

    Category: Inference

    Getting to the Answer: The test makers frequently give you uncommon usages of common words. You need to read carefully to understand the intended meaning of the phrase. The Boeing example starts by pointing out that the plane's design will be limited in ways that will make it impossible to satisfy everyone. You can assume that the company wants to come close enough to satisfying all the plane's users that those users will be happy with the final design. Choice (J)

matches the thrust of the text. Choice F is out of scope; the author doesn't discuss such investments. Choice G is extreme; the passage tells you that there will be compromises. Choice H is out of scope; the cost to users is not mentioned.

13. **C**
    Difficulty: Medium

    Category: Detail

    Getting to the Answer: You need to find the details used as evidence for this belief. Therefore, your answer will come straight from the passage. Your passage notes should send you to the last paragraph. The author asks you to "imagine" that the *Titanic* hadn't sunk on her first trip. In the author's opinion, there would have been many ships designed even larger than the *Titanic*, eventually resulting in a catastrophic sinking. Look for an answer choice that reflects this idea. Choice (C) is correct. Choice A is out of scope; there is no evidence that ship designers were careless before the *Titanic* sank. Choice B is out of scope; the number of lifeboats is not mentioned. Choice D is out of scope; the passage never discusses insurance.

14. **H**
    Difficulty: Medium

    Category: Inference

Getting to the Answer: Your map should tell you that the entire passage is focused on learning from mistakes. As the author writes, "Failures . . . provide incontrovertible proof that we have done something wrong. That is invaluable information" (lines 16–19). To support this, he gives examples of re-engineering the paper clip and jet plane, and the tragedy of the *Titanic*, which, he writes, "contributed much more to the design of safe ocean liners than would have her success" (lines 88–89). Thus, the author would agree with James Joyce, (H), emphasizing the importance of mistakes in discovering ways to succeed. It cannot be assumed that he would agree with F, since giving up is not discussed in the passage. Similarly, repeating the same approach and expecting success, G, is irrelevant, and Ford's quote, J, is also out of scope; the author does not equate teamwork with success.

15. **D**

Difficulty: Medium

Category: Detail

Getting to the Answer: Use your notes to find the correct paragraph and predict the answer before looking at the choices; you will reach your answer more quickly and be less likely to fall into traps set by the test maker. Based on your notes, you should go directly to paragraph 6. It tells you that the engineers for the Tacoma Narrows Bridge tried to improve on Roebling's design for the Brooklyn Bridge and le out "the very cables that he included to obviate failure." The prior paragraph identifies those cables. Choice (D) is correct. Choice A is opposite;

deviations from the design of the Brooklyn Bridge were the cause of the failure of the Tacoma Narrows Bridge. Choice B is out of scope; the author doesn't discuss any difference in the wind strength between the two bridges. Choice C is opposite; the engineers' concern for "economy and aesthetics" were what caused them to leave out the critical cables.

16. **H**

    Difficulty: High

    Category: Function

    Getting to the Answer: Use your notes to help you understand the writer's purpose in selecting this specific example. Because this is the final paragraph, it is likely that its meaning will be closely related to the overall purpose of the passage. Lines 80–84 state that the *Titanic*'s failure contributed more to ocean liner safety than its success would have. Note that the correct choice may not be stated so specifically; (H) is correct. Choice F is a distortion; the author's point is about design in general, not just the *Titanic*. Choice G is a distortion; the article is not about the fate of ocean liners. Choice J is out of scope; this is true, but it's not the function of the paragraph.

17. **D**

    Difficulty: Medium

    Category: Function

Getting to the Answer: Focus on how an example fits into the overall point the author is making. Use your notes to locate the paper clip example—paragraph 3. The author points out that challengers to the Gem may be able to improve on one aspect of its design but not another. This reiterates the topic sentence, "Reengineering anything is fraught with risk." The example is probably meant to emphasize this point. Choice (D) is correct. Choice A is out of scope; the paragraph is not about the importance of paper clips. Choice B is extreme; the example points out the risks of reengineering in general. Choice C is a distortion; the author does not recommend that all engineers should study the paper clip's specific design.

18. **F**

Difficulty: Low

Category: Detail

Getting to the Answer: Use your notes to research paragraph 3. To avoid traps, predict your answer before reading the choices. The paragraph tells you that the Gem clip is easy to use and doesn't fall off. Challengers have improved on one aspect of the Gem clip but have sacrificed the other. Choice (F) addresses the compromise predicted. Choice G is out of scope; function, not timing, determines success. Choice H is out of scope; brand awareness and familiarity are not mentioned. Choice J is a distortion; this mentions only one of the benefits the author lists rather than the Gem's successful balance of features.

19. **B**

    Difficulty: Medium

    Category: Detail

    Getting to the Answer: When dealing with unfamiliar or passage-specific terms, read around the reference carefully. “Failure-based thinking” in this reference is related to Roebling’s successful design of the Brooklyn Bridge. A careful reading shows you that Roebling was able to succeed because he understood where others had failed. You need to look for a positive use of “failure” in your answer choice. Choice (B) matches this prediction. Choice A is out of scope; the author doesn’t discuss such a habit. Choice C is a distortion; this choice can be tempting because it uses several key words from the paragraph, but the passage says cannibalizing can sacrifice synergy, not create it. Choice D is opposite; the Tacoma Bridge collapse supports the author’s theory because the designers of that bridge failed to use “failure-based thinking.”

20. **H**

    Difficulty: Medium

    Category: Inference

    Getting to the Answer: To answer this question, you need to understand the author’s use of the term in context. First, read the entire sentence and, if necessary, the sentences before and a er. *So* in the middle of the sentence tells you that the first and second halves of

the sentence are closely linked. From this, you conclude that *comparatives* relates to improvements. You need to look for an answer choice that tells you that engineering is measured by its ability to make improvements. Choice (H) is correct. Choice F is out of scope; the comparison is between products, not individuals. Choice G is a distortion; “bigger” and “faster” are only two possible measures of improvement. Choice J is out of scope; the author doesn’t deal with such comparisons.

Passage III

3. Suggested Passage Map notes:

   Passage A

   ¶1: fairy tales ( ) passed down for centuries

   ¶2: ex. Snow White includes symbolism

   ¶3: Snow White’s new identity = mature adult

   ¶4: popular b/c shared human experiences

   Passage B

   ¶1: fairy tales ( ) do NOT represent shared human experiences

   ¶2: ex. LRRH seems to be about obedience, parental auth.

¶3: older versions of LRRH didn't include obedience, parental auth.

¶4: all have variations, symbols not universal

21. **D**

    Difficulty: Medium

    Category: Vocab-in-Context

    Getting to the Answer: The word in question appears in the context of the author comparing stories of short-lived interest to those of fairy tales, which have been told "since time immemorial" (line 11). Of the short-lived stories, some come "flaming into popular consciousness . . . for a period reaching anywhere from a few months to a few centuries." For that period of time, they become prominent and grab the listener's interest. Match this with (D). All other answers have the wrong definition in the context of the passage. Though C is tempting, there is no indication that these stories are important; just that they are of relatively fleeting interest. Completely unimportant stories, such as Facebook anecdotes, can be interesting but not particularly important.

22. **H**

    Difficulty: Low

    Category: Inference

Getting to the Answer: Read the sentence referenced in the question stem to make a prediction. The passage states that these avenues are used to get at "the cosmic unconscious," so predict that the author believes fairy tales are one method to help people process common human experiences. Choice (H) matches this prediction. Choice F reflects the standard meaning of the word avenues, which doesn't fit here. Choices G and J don't make sense in context.

23. **D**

Difficulty: Medium

Category: Inference

Getting to the Answer: Correct answers to Inference questions will only be a step removed from what is stated in the passage. The lines indicated in the passage, along with those preceding them, discuss how popular fairy tales survive, while unpopular ones die out ("time . . . discards the chaff"). Look for an answer close to that. Choice (D) matches the passage's emphasis on *editing* and *appeal*. A Choice A is out of scope; characters are not discussed at this point. Choice B is a distortion; a story written by one author could enjoy popularity, at least temporarily. Choice C is opposite; such tales would have *endured*.

24. **J**

Difficulty: Medium

Category: Detail

Getting to the Answer: Don't range too far from the text given and the ideas in that text when drawing your conclusion. The final sentence of Passage B states that we should acknowledge the many variations among versions of fairy tales and search "for insights into the cultural conditions that prompt such divergence." In other words, we should reflect on what these variations tell us about the specific cultures in which they appear. This matches (J) nicely. Choice F is a distortion; the author of Passage B indicates that there is no "accurate" interpretation of fairy tales, regardless of when they were written. Choice G is out of scope; the passage doesn't explore the difference between written and "oral versions" of the stories. Choice H is a distortion; the author of Passage B does not suggest that any version of a tale is more valid or authoritative than any other.

25. **B**

Difficulty: Medium

Category: Detail

Getting to the Answer: Remember not to confuse something said by one author with something said by the other author. You know that the author of Passage B disagrees with the kinds of symbolic interpretations made in Passage A, and this question asks specifically why. Predict something about the way that such interpretations fail to take multiple versions of tales into account. Choice (B) matches this prediction. Choice A is opposite; if anything, Author B thinks that Author A pays too much attention to "psychology." Choice C is out of scope; the problem that Author B sees goes beyond simple failure to

use reference materials. Choice D is a misused detail; Author B criticizes not the "naïve view of . . . human nature," but rather the naïve view of folklore methodology.

26. **F**

    Difficulty: High

    Category: Inference

    Getting to the Answer: Beware of answer choices that pull from details in the passage but have nothing to do with the inference at hand. The indicated section of the passage makes the argument that an interpretation based on details about the huntsman can't be valid when most versions of the folk tale don't have a huntsman in them. Predict something along the lines of fairy tales having too many variations to interpret. Choice (F) is the best match for this prediction. Choice H is a distortion; this original idea comes from Passage A. Choice G is out of scope; the passage doesn't raise the question of historical accuracy. Choice J is a distortion; the author is not arguing about how o en certain themes appear in fairy tales, but rather against the universality of themes at all.

27. **C**

    Difficulty: Medium

    Category: Detail

Getting to the Answer: Some questions don't lend themselves easily to prediction; work your way through the answer choices if you need to. This question calls for a detail that the passages have in common, but it doesn't give you any real hints as to where to look. Eliminate wrong answers, paying special attention to those that come from one passage only. Choice (C) is the correct choice. Both authors admit that fairy tales have changed over time. Author A uses the idea of fairy tales changing to introduce the idea of their lasting significance in the first paragraph, and Author B uses the fact that they change as the basis of the argument against universal interpretation. Choice A is a distortion; only Passage A states this. Choice B is a distortion; this idea appears only in Passage B. Choice D is a distortion; this appears only in Passage A. The author of Passage B would not agree that symbolic interpretation of folk tales is valid.

28. **F**

Difficulty: Medium

Category: Inference

Getting to the Answer: Return to the main point made by Author B. The correct answer should be consistent with this overall idea. The main argument made by Author B is that it isn't possible to interpret the symbolism of specific tales as reflecting general psychological truth, so eliminate any answer choice that contradicts that idea. Only (F) captures the central argument of Author B against this type of interpretation. Choice G is out of scope; Author B does not address the "popularity" of such tales. Choice H is a distortion; Author B does not

believe that there is such a thing as a definitive version of a tale. Choice J is a distortion; this choice doesn't reflect the overall opinion of Author B that interpretations can't be made at all.

29. **B**

    Difficulty: High

    Category: Inference

    Getting to the Answer: In questions asking what one author might say to the other, be careful not to confuse the respective viewpoints of the authors. Author A mentions that these motifs are common to all humans in "widely-scattered" (line 55) societies across time, so Author A would probably argue that the specifics of a given version are less important than these universal psychological trends. This prediction matches (B). Choice A is out of scope; Author A makes no mention of recent versions of folk tales or advances in methodology. Choice C is opposite; Author A believes in the relevance of "psychological forces." Choice D is opposite; Author A chooses Snow White as the principal example of his argument.

30. **H**

    Difficulty: Low

    Category: Inference

    Getting to the Answer: For broadly stated questions, work through the choices, eliminating clearly incorrect answers, and then return to

the passages to support your choice. Because a prediction for this question might be difficult, check and eliminate answer choices that don't match both passages. Because both authors would concur that folk tales are developed and passed down through generations in their introductory paragraphs (certainly a unique "compositional process"), they would agree with (H). Choice F is a distortion; only Author A emphasizes this. Choice G is a distortion; the contention that folk tales have "universal" truth comes from Passage A only. Choice J is out of scope; neither passage says anything about "new information about… particular tales."

Passage IV

4. Suggested Passage Map notes:

    ¶1: Low energy linear acc. use 1 pair of electrodes

    ¶2: High energy linear acc. use multiple plates

    ¶3: Microwave cavities used in high energy machines (linacs)

    ¶4: Linear acc. widely used

    ¶5: Circular acc. can accelerate particles further but emit radiation

    ¶6: Circular acc. less efficient than linear acc.

    ¶7: Physicists use heavier particles to ↑ energy

¶8: 1st circular acc. were cyclotrons (1929, Lawrence)

¶9: Cyclotrons reach an energy limit

¶10: Cyclotrons used for lower energy app.

¶11: Synchrotrons used for high energy app.

31. **C**
    Difficulty: Low

    Category: Global

    Getting to the Answer: Be sure to predict an answer before looking at the answer choices; predicting will help you avoid trap answers. Throughout this passage, the author discusses how linear and circular accelerators work and how they differ in their uses. Choice (C) matches this prediction well. Choice A is a misused detail; although this does appear, it is not the main idea of the entire passage. Choice B is a misused detail; this appears in the passage, but it is not the main idea. Choice D is a misused detail; based on the passage, cyclotrons do seem to be a useful type of circular accelerator, but as this answer does not mention linear accelerators, it cannot be the main idea of the entire passage.

32. **F**
    Difficulty: Medium

Category: Detail

Getting to the Answer: Think of Detail questions as matching questions. The answer choice will always match a detail stated directly in the passage. In lines 98–100, the author writes, “The tube has many magnets distributed around it to focus the particles and curve their track around the tube.” The author similarly describes the function of magnets in lines 35–36. The magnets, by focusing the particles and their curve, influence the direction in which the particles travel; use this as your prediction. Choice (F) matches this prediction well. Choice G is a distortion; this misconstrues the statement that the magnets curve the particles’ track “around the tube” (line 100). The particles’ track is curving, not the particles themselves. Choice H is a distortion; the microwave cavities accelerate the particles (lines 100–101), not the magnets. Choice J is out of scope; there is no indication that the magnets impact the energy levels of the particles.

33. **D**

Difficulty: Medium

Category: Detail

Getting to the Answer: On Detail questions, avoid incorrect choices that contain details from the passage not relevant to the question being asked. According to lines 81–83, “The effect of the energy injected using the electric fields is therefore to increase their mass.” Choice (D) is correct. Choice A is a distortion; the passage states that particles do not reach the speed of light. Choice B is a distortion;

accelerating particles does not always result in increasing their mass. Choice C is out of scope; there is no indication in the passage that using a mixture of different particles will cause particle mass to increase.

34. **H**

    Difficulty: Medium

    Category: Vocab-in-Context

    Getting to the Answer: Read the entire sentence that contains the vocabulary word to decipher its meaning; then look at the choices. In lines 58–61, the author states that heavier particles, such as protons, are being used in accelerators. In the following sentence, you see that "these particles are composites of quarks and gluons." It follows that quarks help make up protons. Choice (H) matches this prediction. Choice F is a misused detail; electron accelerators are mentioned in lines 56–58, but there is no indication that electrons are what make up a quark. Choice G is out of scope; there is no indication that a quark is made up of radiation. Choice J is a distortion; gluons and quarks seem to be roughly equivalent. Neither is a component of the other.

35. **D**

    Difficulty: Medium

    Category: Detail

Getting to the Answer: Some questions will ask you what CANNOT be possible. Make sure you take the time to read the question carefully, so that you don't select what is possible. In lines 27–29, the passage states that linear accelerators "are also used to provide an initial low-energy kick to particles before they are injected into circular accelerators." These lines show that linear accelerators provide this kick, not the circular accelerator, as (D) suggests. Choice A is opposite; in lines 42–43, the author states that "When any charged particle is accelerated, it emits electromagnetic radiation," which means that the circular accelerator can cause this. Choice B is opposite; in lines 37–38, the author states that the parts of circular accelerators "can be reused to accelerate the particles further." Choice C is opposite; in lines 39–41, the author states that circular accelerators suffer a disadvantage in that the particles emit synchrotron radiation.

36. **J**

Difficulty: Medium

Category: Inference

Getting to the Answer: It can be assumed that an author will agree with anything in the passage and anything that is in line with what the passage. The author describes both linear and circular accelerators, stating that linear accelerators are in wide use, and they can produce "'proton-heavy' medical or research isotopes" (line 30–31). Though the author doesn't explain how research isotopes are used, it can be assumed that they have some benefits. Circular accelerators "are useful for X-ray spectroscopy of proteins" (line 54-55), so they also

have benefits. Since they are both useful, the correct answer is (J). Choice F is opposite, as is G, since the author states in lines 58–61 that physicists are using protons in accelerators. Choice H is a distortion; the passage mentions other types of circular accelerators developed since Lawrence's first cyclotron, such as the synchrotron.

SCIENCE TEST

Passage I

1. **C**

   Difficulty: Low

   Category: Data—Inference & Calculation

   Getting to the Answer: According to Table 2, which presents the results of Study 2, a 67 kg male of the specified height has a relative BMR of 94% of average peak, while a 69 kg male has a relative BMR of 96%. It is reasonable to conclude that a 68 kg male would have a relative BMR that falls between those values, which makes (C) the correct answer.

2. **F**

   Difficulty: Medium

   Category: Thinking Like a Scientist—Evaluating Hypotheses

   Getting to the Answer: Table 2 shows that as body weight increases, so does the relative BMR. Extrapolating from this trend, a male who weighed more than 73 kg would have a BMR higher than 100% of the average peak. The researcher's hypothesis is supported by the results of Study 2, so (F) is correct.

3. **D**

   Difficulty: Low

   Category: Experiments—Design & Methodology

   Getting to the Answer: According to the descriptions of the studies in the passage, Study 1 investigated both humans and bears (including bears in hibernation), while Study 2 investigated only human subjects. Choice (D) is thus correct. Choices A and B are incorrect because

relative BMR was recorded in both studies. Choice C is incorrect because it reverses the number of species investigated by each study.

4. **H**
   Difficulty: Low

   Category: Data—Detail & Interpretation

   Getting to the Answer: According to Table 1, the BMR of a bear rises as the bear begins to age but drops a er the age of 14. Choice (H) reflects this trend in its entirety.

5. **A**
   Difficulty: Medium

   Category: Data—Inference & Calculation

   Getting to the Answer: The question stem describes an individual who loses weight, so turn to the results of Study 2, which investigated the effect of weight on BMR. According to Table 2, individuals who weigh less have lower relative BMRs. Consequently, an individual who lost weight could be expected to see a decrease in BMR. Choice (A) is thus correct.

6. **G**
   Difficulty: Medium

   Category: Thinking Like a Scientist—Evaluating Hypotheses

Getting to the Answer: According to the introduction to the passage, metabolism is how organisms convert food into energy, and BMR is simply the rate at which metabolism occurs while an organism is at rest. During hibernation, a bear is essentially in a kind of prolonged sleep, allowing it to survive through winter months when food may be scarce. It stands to reason, then, that a bear has a lower BMR because it has less need for energy while hibernating. Choice (G) is thus correct. Choice F is incorrect because it suggests the opposite—but a higher need for energy would actually correspond to a higher BMR. Choice H is incorrect because the results of Study 3 showed that higher internal body temperatures were correlated with higher BMRs. Choice J is incorrect because the results of Study 2 showed that heavier weights were associated with higher BMRs.

7. **A**

   Difficulty: Medium

   Category: Data—Inference & Calculation

   Getting to the Answer: The effect of internal temperature on relative BMR was investigated in Study 3, so look to Table 3 for guidance on this question. According to the table, BMR increases as body temperature increases. Thus, the lowest temperature will result in the lowest BMR, while the highest temperature will result in the highest BMR. In order to gain weight, an organism would need to convert less of the food it consumes into energy, which means it would need to have a lower BMR. Consequently, you're looking for the choice with the lowest temperature, so (A) is correct. All of the other choices are

associated with higher relative BMRs, which would be less likely to result in weight gain.

Passage II

8. **H**
   Difficulty: Medium

   Category: Data—Inference & Calculation

   Getting to the Answer: A+ is not one of the recipients listed in Table 1, but its transfusion compatibility can be inferred from the pattern established in the table or from the description in the second paragraph, which states that a recipient's antibodies "recognize and attack any blood group antigen not normally present in the person's blood." An A+ individual's blood cells contain the A and Rh antigens, but not the B antigen. Thus, an A+ individual can safely receive blood of any non-B type. Choices F, G, and J can be eliminated, because they each include at least one blood type containing the B antigen. Choice (H) is correct because it is the only option that exclusively contains blood types without the B antigen.

9. **C**
   Difficulty: High

   Category: Data—Inference & Calculation

Getting to the Answer: According to the passage, children receive one allele for ABO type and one allele for Rh type from each parent. In order to have AB blood, a child will need to have one parent passing on the A allele and the other parent passing on the B allele, which means that A and D can be eliminated. To have Rh+ blood, the child will need to have at least one parent who has the Rh antigen, so B can also be eliminated. Choice (C) is correct because the child could receive the A allele and the Rh+ allele from the first parent and the B allele from the second parent.

10. **J**

    Difficulty: Low

    Category: Data—Detail & Interpretation

    Getting to the Answer: Based on Table 1, a recipient with B+ blood can safely receive transfusions from both B+ and B– blood. Choice (J) is thus correct.

11. **C**

    Difficulty: High

    Category: Data—Inference & Calculation

    Getting to the Answer: According to the second paragraph of the passage, a blood transfusion recipient's antibodies will "recognize and attack any blood group antigen not normally present in the person's blood." Thus, in order for a blood type to be safe for any transfusion

recipient, it should completely lack the blood group antigens discussed in the passage. The first paragraph of the passage notes that type O blood cells lack both the A and B antigens and implies that a "–" indicates the lack of the Rh antigen. Thus, type O– blood will completely be lacking in antigens, making it safe for any transfusion recipient. Choice (C) is correct.

12. **F**

    Difficulty: Medium

    Category: Thinking Like a Scientist—Applying Core Knowledge

    Getting to the Answer: Based on Table 2, a man with type AB blood would have to have a genotype of AB, while a woman with type A blood could have a genotype of AA or Ao. In order to produce a child with type O blood, both parents would have to be able to pass on an o allele to their offspring, but the father can only pass on an A or a B. Thus, type O blood is not possible for this couple's offspring, making (F) correct. Choice G is incorrect because type A blood would be the result if the father passed on an A allele (the child's genotype would then be AA or Ao). Choice H is incorrect because type B blood would be the result if the father passed on a B allele and the mother passed on an o allele. Choice J is incorrect because type AB blood would be the result if the father passed on a B allele and the mother passed on an A allele.

13. **D**

    Difficulty: Medium

Category: Data—Inference & Calculation

Getting to the Answer: The second paragraph indicates that a transfusion is unsafe when the recipient's antibodies "recognize and attack any blood group antigen not normally present in the person's blood." O+ blood cells include only the Rh antigen because, as noted in the first paragraph, type O simply refers to the absence of A and B antigens. Because the patient has A+ blood, which includes an Rh antigen, he has no anti-Rh antibodies, so it will be safe for him to receive O+ blood. Choice (D) is thus correct. Choices A and B are incorrect because they suggest that the transfusion is unsafe, while C is incorrect because there is no such thing as an O antigen and because A+ blood would not contain anti-A antibodies.

Passage III

14. **F**

Difficulty: Low

Category: Thinking Like a Scientist—Evaluating Hypotheses

Getting to the Answer: According to the question stem, hotter planets are more likely to have molten cores, meaning that dynamo theory can be applied to them. Because planets are generally hotter the closer they are to the Sun, the planet that is farthest from the Sun would be the least likely to have a molten core. Neptune is much farther from the Sun than Mercury, Venus, and Mars, so (F) is correct.

15. **C**

    Difficulty: Medium

    Category: Experiments—Synthesizing Data

    Getting to the Answer: According to the passage, Scientist 1 believes that geomagnetic reversal is a natural consequence of dynamo theory, whereas Scientist 2 believes it to be caused by seismic events. Choice (C) accurately summarizes the views of both scientists.

16. **J**

    Difficulty: Medium

    Category: Data—Detail & Interpretation

    Getting to the Answer: Scientist 2 suggests that seismic activity can affect the molten core of the Earth. Diagram 1 shows that the core is found at a depth of 2,900 km. Choice (J) is thus correct.

17. **A**

    Difficulty: Medium

    Category: Thinking Like a Scientist—Evaluating Hypotheses

    Getting to the Answer: Scientist 1 states that the constant motion of molten nickel and iron in the core "creates eddy currents, which in turn help to create Earth's magnetic field." Choice (A) is thus correct.

18. **F**

Difficulty: Medium

Category: Thinking Like a Scientist—Evaluating Hypotheses

Getting to the Answer: Scientist 1 believes that the dynamo theory, which contends that the Earth's magnetic field is the result of motion in the liquid core, fully accounts for geomagnetic reversal. Scientist 2, while attributing geomagnetic reversal to the effects of seismic activity, does not dispute the dynamo theory itself. Choice (F) is thus correct. Choice G is incorrect because neither scientist attributes seismic disturbances to eddy currents. Choice H is incorrect because only Scientist 2 believes it. Choice J is incorrect because both scientists agree that dynamo theory generally explains the existence of the Earth's magnetic field, not just during times of geomagnetic reversal.

19. **B**

Difficulty: Medium

Category: Thinking Like a Scientist—Evaluating Hypotheses

Getting to the Answer: The introductory text states that scientists found evidence of geomagnetic reversal in magnetized rock deposits on the ocean floor. Thus, the best evidence of the polarity of the magnetic field at a particular point in time can be found in these deposits, (B).

20. **J**

Difficulty: Medium

Category: Thinking Like a Scientist—Evaluating Hypotheses

Getting to the Answer: Both scientists argue that geomagnetic reversal is a result of activity within the Earth's molten core. Scientist 1 thinks that these reversals spontaneously arise from the motions of molten nickel and iron, while Scientist 2 believes that seismic disturbances disrupt these motions, sometimes resulting in a geomagnetic reversal. Neither scientist suggests that geomagnetic reversals can be caused by an external source like the Sun's magnetic field, so the information in the question stem would weaken both scientists' accounts. Choice (J) is thus correct.

21. **B**

Difficulty: Medium

Category: Thinking Like a Scientist—Evaluating Hypotheses

Getting to the Answer: Scientist 2 believes that seismic activity "can disrupt the motion of the core to such an extent that the magnetic field effectively turns off." These disruptions will sometimes result in geomagnetic reversals. Because Scientist 2 contends that seismic activity can significantly disturb the motions of the core, (B) is correct. Choice A is incorrect because it reverses the direction of causality suggested by Scientist 2; seismic activity affects the core, but not vice-versa. Choice C is incorrect because it directly contradicts Scientist 2's account. Choice D is incorrect because Scientist 2 suggests that eddy

currents spontaneously arise from the core's motion, but never suggests that these currents are caused by seismic activity.

Passage IV

22. **G**

    Difficulty: Medium

    Category: Data—Inference & Calculation

    Getting to the Answer: The description of Experiment 3 states that the current generates a magnetic field, which causes the ring to move up the pole. According to Table 3, as the number of coils in the wire increased, so did the height reached by the metal ring. It follows, then, that a greater number of coils produces a stronger magnetic field, capable of moving the ring up a greater distance. The relationship between magnetic field and number of coils is direct, so (G) is correct. Choices F and H are incorrect because they do not accurately describe the relationship between number of coils and magnetic field. Choice J is incorrect because the amount of current passing through the wire was held constant.

23. **D**

    Difficulty: Medium

    Category: Data—Inference & Calculation

Getting to the Answer: In Experiment 2, the rotation of the wire caused a change in magnetic flux, which produced a voltage. If the wire is not rotating, there will be no change in magnetic flux and no voltage produced. Therefore, none of the existing data points account for this case. Choice (D) is thus correct.

24. **F**

Difficulty: High

Category: Experiments—Design & Methodology

Getting to the Answer: The introduction to the passage states that magnetic flux depends on the strength of the magnetic field, while the description of Experiment 1 suggests that the speed of the magnet corresponds to changes in magnetic flux. Moreover, Table 1 shows that higher magnetic flux changes correlate with higher emf readings. Thus, in order to produce the highest emf, you need to create the largest change in magnetic flux, which requires moving the magnet more quickly and having a magnet with a stronger magnetic field. Choice (F) is correct.

25. **B**

Difficulty: Medium

Category: Experiments—Synthesizing Data

Getting to the Answer: According to Table 1, which provides the results of Experiment 1, maximum induced emf increases as the

change in magnetic flux increases. Thus, you are looking for a graph with a positive slope. The only choice that satisfies this requirement is (B).

26. **F**

    Difficulty: Low

    Category: Data—Inference & Calculation

    Getting to the Answer: According to the description of Experiment 1, the magnet's "various speeds created corresponding changes to the magnetic flux within the coil." In other words, the greater the speed, the greater the change in magnetic flux. To find the trial with the lowest speed, then, you merely need to identify which of the trials had the lowest change in magnetic flux. Trial 1 was lower than any of the other trials in Experiment 1, so (F) is correct.

27. **D**

    Difficulty: Medium

    Category: Data—Inference & Calculation

    Getting to the Answer: The description of Experiment 3 states that the current sent through the wire produced "a magnetic field that caused the metal ring to float up the pole." From this, it is reasonable to conclude that a larger current would produce a larger magnetic field, which would cause the ring to move farther up the pole. In Trial 9, the ring reached a height of 1.5 cm, so in this new trial the height

should be even greater. The only value above 1.5 cm is found in (D), making it the correct answer.

28. **H**

    Difficulty: Medium

    Category: Data—Inference & Calculation

    Getting to the Answer: According to the introduction of the passage, magnetic flux is "the mathematical product of the magnetic field and an area defined by a loop of wire in that field." Consequently, a larger area (created by a loop with a larger diameter) would create a larger magnetic flux, which means that the changes in magnetic flux caused by passing a magnet through the coil would be greater in the new experiment. Choices F and J can be eliminated because they suggest that the change in magnetic flux would decrease. Because there is a direct relationship between change in magnetic flux and maximum induced emf, as indicated by the results in Table 1, the value for emf could also be expected to increase in the new experiment, which eliminates G. Choice (H) is thus correct.

Passage V

29. **C**

    Difficulty: Low

    Category: Experiments—Synthesizing Data

Getting to the Answer: Table 1 shows the link between pH and hydrogen ion concentration. According to Table 1, a concentration of 1 x 10^{-11} mol/L corresponds to a pH of 11. According to Table 2, a solution with a pH of 11 is categorized as highly basic. Choice (C) is thus correct.

30. **G**
Difficulty: Medium

Category: Thinking Like a Scientist—Applying Core Knowledge

Getting to the Answer: Read the question carefully to make sure you understand what is being asked. The hydrogen ion concentrations in Table 4 are given in terms of 10 to a negative power, where $1 \times 10^{-2} = 0.01$, $1 \times 10^{-3} = 0.001$, and so on. From this, it can be seen that the smaller the number in the exponent (the closer the exponent is to 0), the larger the concentration. With an exponent of –2, which is closer to 0 than any of the others provided in the table, lemon juice has the greatest concentration of hydrogen ions. Choice (G) is thus correct.

31. **B**
Difficulty: Medium

Category: Experiments—Synthesizing Data

Getting to the Answer: To answer this question, you must synthesize the information from multiple tables. Table 2 provides the pH level of highly acidic solutions, Table 1 shows how pH level corresponds to

hydrogen ion concentration, and Table 4 lists the hydrogen ion concentrations for the substances in the answer choices. From Tables 1 and 2, you can deduce that a highly acidic solution has a hydrogen ion concentration of 1×10^{-3} mol/L or higher. In Table 4, only vinegar falls within this range. Thus, (B) is correct.

32. **H**

Difficulty: Medium

Category: Data—Inference & Calculation

Getting to the Answer: According to Table 2, highly acidic solutions have a pH between 0 and 3, slightly acidic solutions have a pH between 4 and 6, slightly basic solutions have a pH between 8 and 10, and highly basic solutions have a pH between 11 and 14. Because each 1-point increase in pH corresponds to a 10-fold increase in hydrogen ion concentration (as is clear from Table 1), the difference in [H+] is much greater between highly acidic and highly basic solutions than it is between slightly acidic and slightly basic solutions. Choice (H) is thus correct. Choice F is incorrect because the passage does never discusses what makes a solution "dangerous." Choice G is incorrect because a solution with a pH close to 0 is highly acidic, not neutral. Choice J is incorrect because the difference between highly and slightly acidic solutions is the same as the difference between highly and slightly basic solutions, according to Table 2.

Passage VI

33. **C**

Difficulty: Medium

Category: Experiments—Synthesizing Data

Getting to the Answer: The passage explains that 1 mol/L solutions of strong acids have pH values less than 2, while 1 mol/L solutions of strong bases have pH values greater than 12. According to Table 3, barium hydroxide is a strong base, so it must have a pH of greater than 12, which is higher than the pH of any of the other solutions given. Choice (C) is thus correct. Choice A is incorrect because baking soda has a pH of 9, as indicated by cross-referencing Table 4 with Table 1. Choices B and D are incorrect because nitric acid and vinegar are both acids with pH values below 7.

34. **F**

Difficulty: Medium

Category: Data—Inference & Calculation

Getting to the Answer: The question stem explains that pH and pOH are inversely proportional: as pH goes down, pOH goes up. Therefore, the solution with the lowest pH will have the highest pOH. Sulfuric acid (listed in Table 3) is the only strong acid listed among the answer choices, so it will have the lowest pH (below 2 at a concentration of 1 mol/L). Choice (F) is thus correct.

35. **A**

Difficulty: Low

Category: Data—Inference & Calculation

Getting to the Answer: Experiment 3 does not include a table of results, but does describe the relevant results in the text: “At 10 minutes into the experiment, fewer bubbles were visible in the bottle that contained the root beer.” This suggests that, ten minutes a er being shaken, the root beer had fewer bubbles and thus a lower level of carbonation than the seltzer. Choice (A) is correct. Choice B is incorrect because it states the opposite. Choice C is incorrect because there was 1 L of liquid in each bottle. Choice D is incorrect because balance time wasn’t measured in Experiment 3.

36. **J**

Difficulty: Low

Category: Data—Detail & Interpretation

Getting to the Answer: This question can be answered simply by comparing data in Tables 1 and 2. The question is asking for the most similar balance times a er the liquids have been shaken, which is reported in the right-most column of each table. According to the tables, the balance time a er shaking for Trial 3 was 22.48 seconds and for Trial 5 was 22.45 seconds. These are by far the closest in value, so (J) is correct.

37. **B**

Difficulty: Medium

Category: Data—Detail & Interpretation

Getting to the Answer: The results for Experiment 2 are found in Table 2. For both of the trials, the balance time a er shaking was longer than the balance time before shaking. Thus, it can be concluded that shaking the bottle of root beer increased its balance time, (B). Choice A is incorrect because the number of bubbles weren't measured in Experiment 2, though it is more likely that they would have increased, not decreased. Choice C is incorrect because it states the opposite of what the results show. Choice D is incorrect because the bottle was sealed, so its mass should have remained constant.

38. **H**

Difficulty: Medium

Category: Data—Inference & Calculation

Getting to the Answer: According to the description of Experiment 2, the first measurement of balance time in Trial 4 occurred a er setting aside the bottle for 10 minutes, so this question is really asking if bubbles would still be present 10 minutes a er the root beer was shaken. This is directly investigated in Experiment 3, when bubbles in the root beer were compared to bubbles in the seltzer: "At 10 minutes into the experiment, fewer bubbles were visible in the bottle that contained the root beer." This suggests that there were still bubbles present before the bottle was shaken in Trial 4, so (H) is correct. Choice

F is incorrect because it cites the wrong experiment, while G and J are incorrect because they reach the opposite conclusion.

39. **A**

Difficulty: Medium

Category: Data—Inference & Calculation

Getting to the Answer: According to the description of Trial 5 in Experiment 2, the bottle of root beer was set aside for 90 minutes a er being shaken before having its balance time recorded. The scenario in the question stem merely involves a repetition of the conditions in Trial 5, so similar results should be expected. The original balance time before shaking for Trial 5 was 20.04 seconds, so the balance time in this new trial would likely be slightly above 20 seconds as well. Choice (A) is thus correct.

40. **H**

Difficulty: Medium

Category: Data—Inference & Calculation

Getting to the Answer: According to the description of Experiment 3, there were no bubbles remaining in the bottle a er setting it aside for 90 minutes, although there were bubbles present a er setting it aside for only 10 minutes. Moreover, balance time in Trial 4 (a er a 10-minute wait) was longer than the original balance time without shaking in Trial 3, while balance time in Trial 5 (a er a 90-minute wait)

was back to around 20 seconds. It can therefore be inferred that it takes somewhere between 10 and 90 minutes for the bubbles to become too few to affect the balance time. Choice (H) is thus correct.

WRITING TEST

Model Essay

Below is an example of what a high-scoring essay might look like. Notice the author states her position clearly in the introductory paragraph and supports that position with evidence in the following paragraphs. This essay also uses transitions, some advanced vocabulary, and an effective "hook" to draw in the reader.

High school is a time to master a solid educational base and explore future opportunities, therefore high schools need to expose students to career opportunities. The best way to accomplish this goal is to require students to attend in-school seminars that are held on a regular basis. Having information about a variety of careers provides an excellent basis to keep exploring, and that basis should be introduced in high school to give students a jump start on their thinking about careers.

Because exploring options is so important to deciding on a career, students should be required to attend career seminars in assemblies held during the regular school day. While attending such events once a semester is a good start, it would make sense for the number of seminars to increase as graduation approaches. Freshmen should be expected to

attend just two seminars a year, as they are likely least sure of their future careers, while juniors and seniors should attend a few each semester. The seminars for freshmen and sophomores should focus on the myriad of options available to entice students to study hard and earn the graders required to be admitted to competitive college programs. For juniors and seniors, the information should be more focused and provide real-life examples of what someone can actually do with a Gen Ed degree versus a bachelors in STEM. Students need to learn whether it's worth it to spend tens of thousands of dollars on a degree that will require additional training after graduation, such as a Bachelor of Philosophy. If students know that the job market is looking for people with Bachelors degrees in the sciences, technology, engineering, and math fields, hopefully they'll pursue degrees that will provide options for paying back mountains of student debt.

At my high school in Miami, only about half of the graduating class each year goes directly on to college, leaving hundreds of students who are entering into the job market without much guidance. The students who need these seminars the most are the least likely to spend their free time after school attending a lecture about jobs, so it is imperative that schools make students attend job information sessions during the day. Many of those students do not have a family background that encourages college or professional careers, and those students would likely not attend seminars that they feel is of no interest to them. By bringing professions right into the school day , students will learn their options after graduation. Someone who is considering continuing to work part-time at a restaurant could learn from a career lecture how much career advancement is possible in companies many students don't think of often,

such as rental car companies like Hertz and retail clothing stores like Banana Republic.

The idea to embed career-oriented options into current courses misses the fact that not all students take the same courses, so those who do not take courses with career-options embedded in them will not be exposed to these opportunities. Also, if the options are taught in a class relevant to it, who would choose which classes and options to incorporate? Furthermore, this option would take up class time and teachers may not be able to teach everything they need to. The argument states that all students would be given course-specific advice, but to guarantee that every student gets that advice means that there will have to be a lot of options offered in every class, from art to history, and a lot of classes interrupted. This approach takes up school time. The same professionals and college representatives can give seminars and not have to develop whole programs that would go into high school classes. This may be overkill. We don't need to have entire embedded programs to be exposed to career possibilities.

When all students have the opportunity to learn about careers and future financial security, they can make better decisions about what to study in college, and presumably graduate into a society which values and recompenses their expertise.

You can evaluate your essay and the model essay based on the following criteria:

- Is the author's own perspective clearly stated?

- Does the body of the essay assess and analyze each perspective?
- Is the relevance of each paragraph clear?
- Does the author start a new paragraph for each new idea?
- Is each sentence in a paragraph relevant to the point made in that paragraph?
- Are transitions clear?
- Is the essay easy to read? Is it engaging?
- Are sentences varied?
- Is vocabulary used effectively?
- Is college-level vocabulary used