

# The SAT®

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# Practice

# Test #10

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# Reading Test

## 65 MINUTES, 52 QUESTIONS

Turn to Section 1 of your answer sheet to answer the questions in this section.

### DIRECTIONS

Each passage or pair of passages below is followed by a number of questions. After reading each passage or pair, choose the best answer to each question based on what is stated or implied in the passage or passages and in any accompanying graphics (such as a table or graph).

#### Questions 1-10 are based on the following passage.

This passage is adapted from Mary Helen Stefaniak, *The Cailiffs of Baghdad, Georgia: A Novel*. ©2010 by Mary Helen Stefaniak.

Miss Grace Spivey arrived in Threestep, Georgia, in August 1938. She stepped off the train wearing a pair of thick-soled boots suitable for hiking, a navy blue dress, and a little white tam that rode the waves 5 of her red hair at a gravity-defying angle. August was a hellish month to step off the train in Georgia, although it was nothing, she said, compared to the 119 degrees that greeted her when she arrived one time in Timbuktu, which, she assured us, was a real 10 place in Africa. I believe her remark irritated some of the people gathered to welcome her on the burned grass alongside the tracks. When folks are sweating through their shorts, they don't like to hear that this is *nothing* compared to someplace else. Irritated or 15 not, the majority of those present were inclined to see the arrival of the new schoolteacher in a positive light. Hard times were still upon us in 1938, but, like my momma said, "We weren't no poorer than we'd ever been," and the citizens of Threestep were in the 20 mood for a little excitement.

Miss Spivey looked like just the right person to give it to them. She was, by almost anyone's standards, a woman of the world. She'd gone to boarding schools since she was six years old; she'd 25 studied French in Paris and drama in London; and during what she called a "fruitful intermission" in her formal education, she had traveled extensively in the

Near East and Africa with a friend of her grandmother's, one Janet Miller, who was a medical 30 doctor from Nashville, Tennessee. After her travels with Dr. Miller, Miss Spivey continued her education by attending Barnard College in New York City. She told us all that at school the first day. When my little brother Ralphord asked what did she study at 35 Barnyard College, Miss Spivey explained that Barnard, which she wrote on the blackboard, was the sister school of Columbia University, of which, she expected, we all had heard.

It was there, she told us, in the midst of trying to 40 find her true mission in life, that she wandered one afternoon into a lecture by the famous John Dewey, who was talking about his famous book, *Democracy and Education*. Professor Dewey was in his seventies by then, Miss Spivey said, but he still liked to chat 45 with students after a lecture—especially female students, she added—sometimes over coffee, and see in their eyes the fire his words could kindle. It was after this lecture and subsequent coffee that Miss Spivey had marched to the Teacher's College and 50 signed up, all aflame. Two years later, she told a cheery blue-suited woman from the WPA<sup>1</sup> that she wanted to bring democracy and education to the poorest, darkest, most remote and forgotten corner of America.

55 They sent her to Threestep, Georgia. Miss Spivey paused there for questions, avoiding my brother Ralphord's eye.

What we really wanted to know about—all twenty-six of us across seven grade levels in the one 60 room—was the pearly white button hanging on a

string in front of the blackboard behind the teacher's desk up front. That button on a string was something new. When Mavis Davis (the only bona fide seventh grader, at age thirteen) asked what it was for, Miss Spivey gave the string a tug, and to our astonishment, the whole world—or at least a wrinkled map of it—unfolded before our eyes. Her predecessor, Miss Chandler, had never once made use of that map, which was older than our fathers, and until that moment, not a one of us knew it was there.

Miss Spivey showed us on the map how she and Dr. Janet Miller had sailed across the Atlantic Ocean and past the Rock of Gibraltar into the Mediterranean Sea. Using the end of a ruler, she gently tapped such places as Morocco and Tunis and Algiers to mark their route along the top of Africa. They spent twenty hours on the train to Baghdad, she said, swathed in veils against the sand that crept in every crack and crevice.

“And can you guess what we saw from the train?” Miss Spivey asked. We could not. “Camels!” she said. “We saw a whole caravan of *camels*.” She looked around the room, waiting for us to be amazed and delighted at the thought.

We all hung there for a minute, thinking hard, until Mavis Davis spoke up.

“She means like the three kings rode to Bethlehem,” Mavis said, and she folded her hands smugly on her seventh-grade desk in the back of the room.

Miss Spivey made a mistake right then. Instead of beaming upon Mavis the kind of congratulatory smile that old Miss Chandler would have bestowed on her for having enlightened the rest of us, Miss Spivey simply said, “That’s right.”

<sup>1</sup> The Works Progress Administration (WPA) was a government agency that hired people for public and cultural development projects and services.

1

The narrator of the passage can best be described as

- A) one of Miss Spivey's former students.
- B) Miss Spivey's predecessor.
- C) an anonymous member of the community.
- D) Miss Spivey herself.

2

In the passage, Threestep is mainly presented as a

- A) summer retreat for vacationers.
- B) small rural town.
- C) town that is home to a prominent university.
- D) comfortable suburb.

3

It can reasonably be inferred from the passage that some of the people at the train station regard Miss Spivey's comment about the Georgia heat with

- A) sympathy, because they assume that she is experiencing intense heat for the first time.
- B) disappointment, because they doubt that she will stay in Threestep for very long.
- C) embarrassment, because they imagine that she is superior to them.
- D) resentment, because they feel that she is minimizing their discomfort.

4

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 2-5 (“She stepped . . . angle”)
- B) Lines 10-14 (“I believe . . . else”)
- C) Lines 14-20 (“Irritated . . . excitement”)
- D) Lines 23-25 (“She'd gone . . . London”)

5

Miss Spivey most likely uses the phrase “fruitful intermission” (line 26) to indicate that

- A) she benefited from taking time off from her studies in order to travel.
- B) her travels with Janet Miller encouraged her to start medical school.
- C) her early years at boarding school resulted in unanticipated rewards.
- D) what she thought would be a short break from school lasted several years.

6

The interaction between Miss Spivey and Ralphord serves mainly to

- A) suggest that Miss Spivey has an exaggerated view of what information should be considered common knowledge.
- B) establish a friendly dynamic between the charming schoolchildren and their indulgent and doting new instructor.
- C) introduce Ralphord as a precocious young student and Miss Spivey as a dismissive and disinterested teacher.
- D) demonstrate that the children want to amuse Miss Spivey with their questions.

7

In the third paragraph, what is the narrator most likely suggesting by describing Miss Spivey as having “wandered” (line 40) in one situation and “marched” (line 49) in another situation?

- A) Dewey, knowing Miss Spivey wasn’t very confident in her ability to teach, instilled in her a sense of determination.
- B) Talking with Dewey over coffee made Miss Spivey realize how excited she was to teach in the poorest, most remote corner of America.
- C) After two years spent studying, Miss Spivey was anxious to start teaching and be in charge of her own classroom.
- D) Miss Spivey’s initial encounter with Dewey’s ideas was somewhat accidental but ultimately motivated her to decisive action.

8

According to the passage, Miss Spivey ended up in Threestep as a direct result of

- A) her friendship with Janet Miller.
- B) attending college in New York City.
- C) talking with a woman at the WPA.
- D) Miss Chandler’s retirement from teaching.

9

In the passage, when Miss Spivey announces that she had seen camels, the students’ reaction suggests that they are

- A) delighted.
- B) fascinated.
- C) baffled.
- D) worried.

10

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 82-84 (“She looked . . . thought”)
- B) Lines 85-86 (“We all . . . up”)
- C) Lines 87-90 (“She means . . . room”)
- D) Lines 91-95 (“Instead . . . right”)

**Questions 11–21 are based on the following passage and supplementary material.**

This passage is adapted from David Owen, *The Conundrum: How Scientific Innovation, Increased Efficiency, and Good Intentions Can Make Our Energy and Climate Problems Worse*. ©2011 by David Owen.

Building good transit isn't a bad idea, but it can actually backfire if the new trains and buses merely clear space on highway lanes for those who would prefer to drive—a group that, historically, has included almost everyone with access to a car. To have environmental value, new transit has to replace and eliminate driving on a scale sufficient to cut energy consumption overall. That means that a new transit system has to be backed up by something that impels complementary reductions in car use—say, the physical elimination of traffic lanes or the conversion of existing roadways into bike or bus lanes, ideally in combination with higher fuel taxes, parking fees, and tolls. Needless to say, those ideas are not popular. But they're necessary, because you can't make people drive less, in the long run, by taking steps that make driving more pleasant, economical, and productive.

One of the few forces with a proven ability to slow the growth of suburban sprawl has been the ultimately finite tolerance of commuters for long, annoying commutes. That tolerance has grown in recent decades, and not just in the United States, but it isn't unlimited, and even people who don't seem to mind spending half their day in a car eventually reach a point where, finally, enough is enough. That means that traffic congestion can have environmental value, since it lengthens commuting times and, by doing so, discourages the proliferation of still more energy-hungry subdivisions—unless we made the congestion go away. If, in a misguided effort to do something of environmental value, municipalities take steps that make long-distance car commuting faster or more convenient—by adding lanes, building bypasses, employing traffic-control

measures that make it possible for existing roads to accommodate more cars with fewer delays, replacing tollbooths with radio-based systems that don't require drivers even to slow down—we actually make the sprawl problem worse, by indirectly encouraging people to live still farther from their jobs, stores, schools, and doctors' offices, and by forcing municipalities to further extend road networks, power grids, water lines, and other civic infrastructure. If you cut commuting time by 10 percent, people who now drive fifty miles each way to work can justify moving five miles farther out, because their travel time won't change. This is how metropolitan areas metastasize. It's the history of suburban expansion.

Traffic congestion isn't an environmental problem; traffic is. Relieving congestion without doing anything to reduce the total volume of cars can only make the real problem worse. Highway engineers have known for a long time that building new car lanes reduces congestion only temporarily, because the new lanes foster additional driving—a phenomenon called induced traffic. Widening roads makes traffic move faster in the short term, but the improved conditions eventually attract additional drivers and entice current drivers to drive more, and congestion reappears, but with more cars—and that gets people thinking about widening roads again. Moving drivers out of cars and into other forms of transportation can have the same effect, if existing traffic lanes are kept in service: road space begets road use.

One of the arguments that cities inevitably make in promoting transit plans is that the new system, by relieving automobile congestion, will improve the lives of those who continue to drive. No one ever promotes a transit scheme by arguing that it would make traveling less convenient—even though, from an environmental perspective, inconvenient travel is a worthy goal.

**Figure 1**

## Effect of Route Capacity Reduction in Selected Regions

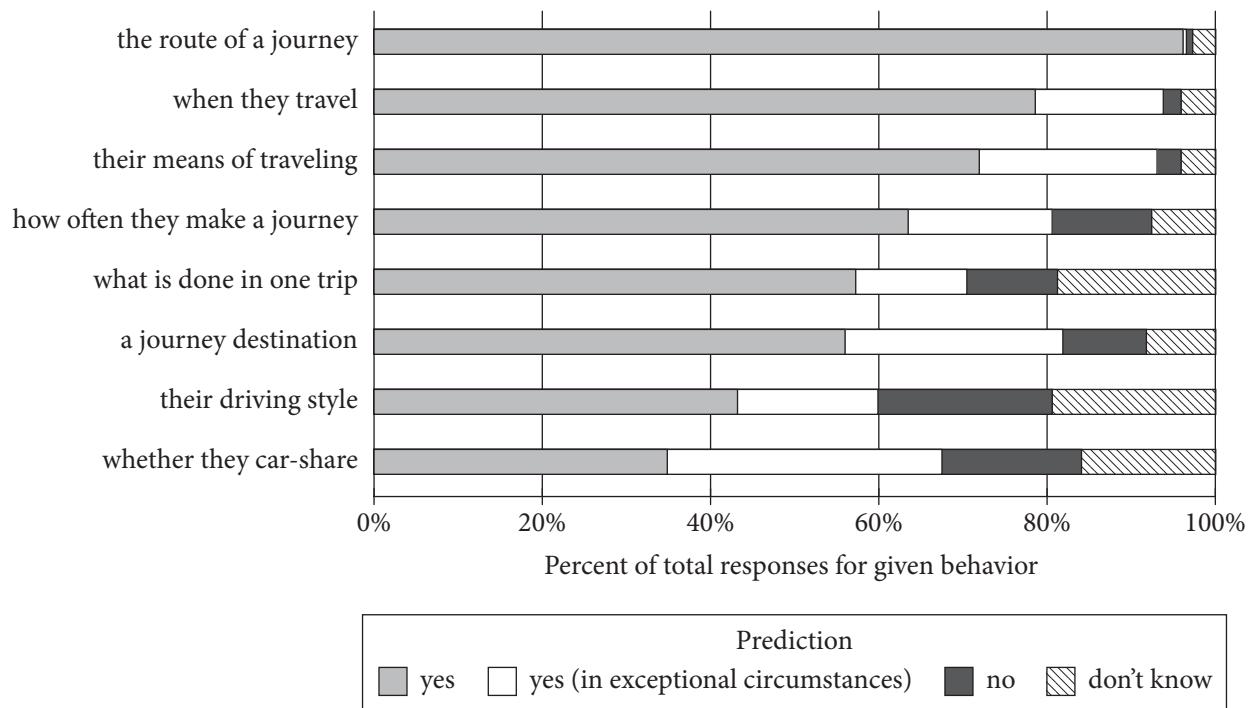
Region	Vehicles per day on altered road		Vehicles per day on surrounding roads		Change in traffic*
	Before alteration	After alteration	Before alteration	After alteration	
Rathausplatz, Nürnberg	24,584	0	67,284	55,824	-146.6%
Southampton city center	5,316	3,081	26,522	24,101	-87.5%
Tower Bridge, London	44,242	0	103,262	111,999	-80.3%
New York highway	110,000	50,000	540,000	560,000	-36.4%
Kinnaird Bridge, Edmonton	1,300	0	2,130	2,885	-41.9%

\*Change in regional traffic in proportion to traffic previously using the altered road

**Figure 2**

Could a significant road space reallocation result in some people changing ...

### Survey of Transportation Engineers' Predictions of Driver Behavior



Figures adapted from S. Cairns et al., "Disappearing Traffic? The Story So Far." ©2002 by UCL.

11

The main purpose of the passage is to

- A) provide support for the claim that efforts to reduce traffic actually increase traffic.
- B) dispute the widely held belief that building and improving mass transit systems is good for the environment.
- C) discuss the negative environmental consequences of car-focused development and suburban sprawl.
- D) argue that one way to reduce the negative environmental effects of traffic is to make driving less agreeable.

12

Which choice best supports the idea that the author assumes that, all things being equal, people would rather drive than take mass transit?

- A) Lines 1-5 ("Building . . . car")
- B) Lines 5-8 ("To have . . . overall")
- C) Lines 15-18 ("But they're . . . productive")
- D) Lines 19-22 ("One . . . commutes")

13

As used in line 9, “backed up” most nearly means

- A) supported.
- B) copied.
- C) substituted.
- D) jammed.

14

In the first paragraph, the author concedes that his recommendations are

- A) costly to implement.
- B) not widely supported.
- C) strongly opposed by experts.
- D) environmentally harmful in the short term.

15

Based on the passage, how would the author most likely characterize many attempts to improve traffic?

- A) They are doomed to fail because most people like driving too much to change their habits.
- B) They overestimate how tolerant people are of long commutes.
- C) They are well intentioned but ultimately lead to environmental harm.
- D) They will only work if they make driving more economical and productive.

16

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 8-14 (“That . . . tolls”)
- B) Lines 22-26 (“That . . . enough”)
- C) Lines 31-40 (“If, in . . . worse”)
- D) Lines 64-67 (“Moving . . . use”)

17

According to the passage, reducing commuting time for drivers can have which of the following effects?

- A) Drivers become more productive employees than they previously were.
- B) Mass transit gets extended farther into suburban areas than it previously was.
- C) Mass transit carries fewer passengers and receives less government funding than it previously did.
- D) Drivers become more willing to live farther from their places of employment than they previously were.

18

As used in line 72, “promotes” most nearly means

- A) upgrades.
- B) serves.
- C) advocates.
- D) develops.

19

According to figure 1, how many vehicles traveled on the altered road through the Southampton city center per day before the route was altered?

- A) 3,081
- B) 5,316
- C) 24,101
- D) 26,522

20

Do the data in figure 1 support or weaken the argument of the author of the passage, and why?

- A) Support, because the data show that merely moving drivers out of cars can induce traffic.
- B) Support, because the data show that reducing road capacity can lead to a net reduction in traffic.
- C) Weaken, because the data show that in some cases road alterations lead to greater traffic on surrounding roads.
- D) Weaken, because the data show that traffic reductions due to road alterations tend to be brief.

21

Based on figure 2, the engineers surveyed were most skeptical of the idea that in the event of a reallocation of road space, drivers would change

- A) when they travel.
- B) their means of traveling.
- C) how often they make a journey.
- D) their driving style.

**Questions 22-32 are based on the following passage.**

This passage is adapted from Sabrina Richards, "Pleasant to the Touch." ©2012 by The Scientist.

In the early 1990s, textbooks acknowledged that humans had slow-conducting nerves, but asserted that those nerves only responded to two types of Line stimuli: pain and temperature. Sensations of pressure 5 and vibration were believed to travel only along myelinated, fast-signaling nerve fibers, which also give information about location. Experiments blocking nerve fibers supported this notion. Preventing fast fibers from firing (either by clamping 10 the relevant nerve or by injecting the local anesthetic lidocaine) seemed to eliminate the sensation of pressure altogether, but blocking slow fibers only seemed to reduce sensitivity to warmth or a small painful shock.

15 Håkan Olausson and his Gothenburg University colleagues Åke Vallbo and Johan Wessberg wondered if slow fibers responsive to gentle pressure might be active in humans as well as in other mammals. In 1993, they corralled 28 young 20 volunteers and recorded nerve signals while gently brushing the subjects' arms with their fingertips. Using a technique called microneurography, in which a fine filament is inserted into a single nerve to capture its electrical impulses, the scientists were able 25 to measure how quickly—or slowly—the nerves fired. They showed that soft stroking prompted two different signals, one immediate and one delayed. The delay, Olausson explains, means that the signal from a gentle touch on the forearm will 30 reach the brain about a half second later. This delay identified nerve impulses traveling at speeds characteristic of slow, unmyelinated fibers—about 1 meter/second—confirming the presence of these 35 fibers in human hairy skin. (In contrast, fast-conducting fibers, already known to respond to touch, signal at a rate between 35 and 75 m/s.)

Then, in 1999, the group looked more closely at the characteristics of the slow fibers. They named these "low-threshold" nerves "C-tactile," or CT, 40 fibers, said Olausson, because of their "exquisite sensitivity" to slow, gentle tactile stimulation, but unresponsiveness to noxious stimuli like pinpricks.

But why exactly humans might have such fibers, which respond only to a narrow range of rather 45 subtle stimuli, was initially mystifying. Unlike other types of sensory nerves, CT fibers could be found

only in hairy human skin—such as the forearm and thigh. No amount of gentle stroking of hairless skin, such as the palms and soles of the feet, prompted 50 similar activity signatures. Olausson and his colleagues decided that these fibers must be conveying a different dimension of sensory information than fast-conducting fibers.

Although microneurography can give 55 information about how a single nerve responds to gentle brushing and pressure, it cannot tease out what aspect of sensation that fiber relays, says Olausson. He wanted to know if that same slow nerve can distinguish *where* the brush touches the 60 arm, and whether it can discern the difference between a goat-hair brush and a feather. Most importantly, could that same fiber convey a pleasant sensation?

To address the question, Olausson's group sought 65 out a patient known as G.L. who had an unusual nerve defect. More than 2 decades earlier, she had developed numbness across many parts of her body after taking penicillin to treat a cough and fever. Testing showed that she had lost responsiveness to 70 pressure, and a nerve biopsy confirmed that G.L.'s quick-conducting fibers were gone, resulting in an inability to sense any pokes, prods, or pinpricks below her nose. But she could still sense warmth, suggesting that her slow-conducting unmyelinated 75 fibers were intact.

Upon recruiting G.L., Olausson tested her by brushing her arm gently at the speed of between 2–10 centimeters per second. She had more trouble distinguishing the direction or pressure of the brush 80 strokes than most subjects, but reported feeling a pleasant sensation. When the researchers tried brushing her palm, where CT fibers are not found, she felt nothing.

Olausson used functional MRI studies to examine 85 which areas of the brain lit up when G.L.'s arm was gently brushed to activate CT fibers. In normal subjects, both the somatosensory and insular cortices were activated, but only the insular cortex [which processes emotion] was active when researchers 90 brushed G.L.'s arm. This solidified the notion that CT fibers convey a more emotional quality of touch, rather than the conscious aspect that helps us describe what we are sensing. CT fibers, it seemed, specifically provide pleasurable sensations.

22

Based on the passage, textbook authors in the early 1990s would most likely have expected which condition to result from the blocking of fast fibers?

- A) The rate at which other nerve fibers fired would increase.
- B) The test subject would perceive gentle stimuli as painful.
- C) The body would compensate by using slow fibers to sense pressure.
- D) The ability to perceive vibrations would be impaired.

23

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 1-4 (“In the . . . temperature”)
- B) Lines 4-7 (“Sensations . . . location”)
- C) Lines 12-14 (“blocking . . . shock”)
- D) Lines 34-36 (“In contrast . . . 75 m/s”)

24

As used in line 18, “active” most nearly means

- A) present.
- B) attentive.
- C) movable.
- D) restless.

25

As used in line 24, “capture” most nearly means

- A) occupy.
- B) seize.
- C) record.
- D) influence.

26

Which conclusion is best supported by the findings of Olausson’s 1993 experiment?

- A) Stimulation at bodily extremities can be sensed as rapidly as stimulation closer to the brain.
- B) The presence of hairs in human skin lessens the speed with which nerves conduct signals.
- C) Gentle pressure is sensed not only by fast fibers but also by slow fibers.
- D) The speed at which a nerve fires is dependent on the strength of pressure applied to the nerve.

27

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 22-26 (“Using . . . fired”)
- B) Lines 26-28 (“They . . . delayed”)
- C) Lines 28-30 (“The delay . . . later”)
- D) Lines 37-38 (“Then . . . fibers”)

28

The sentence in lines 43-45 (“But . . . mystifying”) serves mainly to

- A) identify factors that Olausson had previously failed to consider.
- B) propose a solution to a dilemma encountered by Olausson.
- C) anticipate a potential criticism of Olausson by the reader.
- D) show a problem from the perspective of Olausson’s team.

29

It can reasonably be inferred that one of the intended goals of the 1999 experiment was to determine the

- A) precise nature of sensations that CT fibers can convey.
- B) relationship between body hair and CT fiber function.
- C) role played by CT fibers in the perception of pain.
- D) effect of microneurography on CT fiber signaling.

30

The main purpose of the sixth paragraph (lines 64-75) is to

- A) identify those of G.L.'s neurological conditions that might be relieved by the experiment.
- B) contextualize the nerve function of G.L. by comparing it with that of other adults.
- C) detail procedures that G.L. had experienced during previous experiments.
- D) indicate why G.L.'s medical condition was of value to Olausson's experiment.

31

According to the passage, G.L. differed from Olausson's other test subjects in terms of the

- A) number of cortices activated in the brain during gentle brushing.
- B) physical dimensions of the somatosensory cortex.
- C) intensity of nerve signals required to activate the insular cortex.
- D) effect of MRI scanning on the basic function of brain cortices.

32

According to the passage, humans experience an emotional aspect of touch when

- A) brain cortices are shielded from nerve signals.
- B) CT fibers are exposed to a stimulus.
- C) nerve fibers that sense pain are suppressed.
- D) conscious aspects of sensation are ignored.

**Questions 33-42 are based on the following passages.**

Passage 1 is adapted from a speech delivered in 1898 by Albert J. Beveridge, "March of the Flag." Passage 2 is adapted from a speech delivered in 1900 by William Jennings Bryan, "Imperialism."

**Passage 1**

Fellow-Citizens: It is a noble land that God has given us; a land that can feed and clothe the world; a land whose coast lines would enclose half the *Line* countries of Europe; a land set like a sentinel between 5 the two imperial oceans of the globe; a greater England with a nobler destiny. It is a mighty people that He has planted on this soil; a people sprung from the most masterful blood of history; a people perpetually revitalized by the virile . . . working-folk 10 of all the earth; a people imperial by virtue of their power, by right of their institutions, by authority of their heaven-directed purposes—the propagandists and not the misers of liberty. It is a glorious history our God has bestowed upon His chosen people; a 15 history whose keynote was struck by Liberty Bell; a history heroic with faith in our mission and our future; a history of statesmen, who flung the boundaries of the Republic out into unexplored lands . . . a history of soldiers, who carried the flag 20 across blazing deserts and through the ranks of hostile mountains, even to the gates of sunset; a history of a multiplying people, who overran a continent in half a century . . . a history divinely logical, in the process of whose tremendous 25 reasoning we find ourselves to-day. . . .

Think of the thousands of Americans who will pour into Hawaii and Porto Rico when the Republic's laws cover those islands with justice and safety! Think of the tens of thousands of Americans 30 who will invade . . . the Philippines when a liberal government . . . shall establish order and equity there! Think of the hundreds of thousands of Americans who will build a . . . civilization of energy and industry in Cuba, when a government of law 35 replaces the double reign of anarchy and tyranny!—think of the prosperous millions that Empress of Islands will support when, obedient to the law of political gravitation, her people ask for the highest honor liberty can bestow, the sacred Order of the 40 Stars and Stripes, the citizenship of the Great Republic!

**Passage 2**

If it is right for the United States to hold the Philippine Islands permanently and imitate European empires in the government of colonies, the 45 Republican party ought to state its position and defend it, but it must expect the subject races to protest against such a policy and to resist to the extent of their ability.

The Filipinos do not need any encouragement 50 from Americans now living. Our whole history has been an encouragement not only to the Filipinos, but to all who are denied a voice in their own government. If the Republicans are prepared to censure all who have used language calculated to 55 make the Filipinos hate foreign domination, let them condemn the speech of Patrick Henry. When he uttered that passionate appeal, "Give me liberty or give me death," he exprest a sentiment which still echoes in the hearts of men.

60 Let them censure Jefferson; of all the statesmen of history none have used words so offensive to those who would hold their fellows in political bondage. Let them censure Washington, who declared that the colonists must choose between liberty and slavery. 65 Or, if the statute of limitations has run against the sins of Henry and Jefferson and Washington, let them censure Lincoln, whose Gettysburg speech will be quoted in defense of popular government when the present advocates of force and conquest are 70 forgotten.

Some one has said that a truth once spoken can never be recalled. It goes on and on, and no one can set a limit to its ever-widening influence. But if it were possible to obliterate every word written or 75 spoken in defense of the principles set forth in the Declaration of Independence, a war of conquest would still leave its legacy of perpetual hatred, for it was God himself who placed in every human heart the love of liberty. He never made a race of people so 80 low in the scale of civilization or intelligence that it would welcome a foreign master.

Those who would have this Nation enter upon a career of empire must consider, not only the effect of imperialism on the Filipinos, but they must also 85 calculate its effects upon our own nation. We cannot repudiate the principle of self-government in the Philippines without weakening that principle here.

33

- In Passage 1, Beveridge asserts that the resources and immensity of the United States constitute a
- A) safeguard against foreign invasion.
  - B) replication of conditions in Europe.
  - C) divine gift to the American people.
  - D) source of envy for people in other countries.

34

- In the second paragraph of Passage 1 (lines 26–41), the commands given by Beveridge mainly serve to
- A) remind the audience of its civic responsibilities.
  - B) anticipate the benefits of a proposed policy.
  - C) emphasize the urgency of a national problem.
  - D) refute arguments that opponents have advanced.

35

- As used in line 72, “recalled” most nearly means
- A) repeated.
  - B) retracted.
  - C) rejected.
  - D) remembered.

36

- It can reasonably be inferred from Passage 2 that Bryan considers the preference for national sovereignty over foreign rule to be a
- A) reaction to the excesses of imperial governments in the modern era.
  - B) sign that the belief in human equality is widespread.
  - C) testament to the effects of the foreign policy of the United States.
  - D) manifestation of an innate drive in humans toward self-rule.

37

- Which choice provides the best evidence for the answer to the previous question?
- A) Lines 53–56 (“If the . . . Henry”)
  - B) Lines 72–73 (“It goes . . . influence”)
  - C) Lines 79–81 (“He never . . . master”)
  - D) Lines 82–85 (“Those . . . nation”)

38

- As used in line 85, “calculate” most nearly means
- A) evaluate.
  - B) design.
  - C) assume.
  - D) multiply.

39

- In developing their respective arguments, Beveridge (Passage 1) and Bryan (Passage 2) both express admiration for the
- A) founding and history of the United States.
  - B) vibrancy and diversity of American culture.
  - C) worldwide history of struggles for independence.
  - D) idealism that permeates many aspects of American society.

40

Which choice best describes a central difference between how Beveridge (Passage 1) and Bryan (Passage 2) view the concept of liberty as it is realized in the United States?

- A) Beveridge presents it as the direct inheritance of European colonization, whereas Bryan presents it as a sharp break from earlier governments in Europe.
- B) Beveridge considers it so exemplary as to justify conquest of other regions, whereas Bryan warns that its exemplary quality would be undermined by imperial expansion.
- C) Beveridge argues that it arose organically as the United States matured, whereas Bryan argues that it was present from the country's beginnings.
- D) Beveridge regards it as a model that should be shared with other countries, whereas Bryan believes that it is unique to the United States and could not work elsewhere.

41

It can most reasonably be inferred from Passage 2 that Bryan would criticize the vision of American governance of island territories that Beveridge presents in Passage 1 for being

- A) unrealistic, since most Americans would be unwilling to relocate to distant islands.
- B) deceptive, since economic domination would be the true goal of the American government.
- C) impractical, since the islanders would insist upon an equal distribution of resources.
- D) naive, since the islanders would object to being governed by Americans.

42

Which choice from Passage 2 provides the best evidence for the answer to the previous question?

- A) Lines 42-48 (“If it . . . ability”)
- B) Lines 49-50 (“The Filipinos . . . living”)
- C) Lines 50-53 (“Our . . . government”)
- D) Lines 56-59 (“When . . . men”)

**Questions 43–52 are based on the following passage and supplementary material.**

This passage is adapted from Peter A. Ensminger, *Life Under the Sun*. ©2001 by Peter A. Ensminger.

Many millennia before the invention of herbicides, farmers simply plowed their fields to control weeds. Even today, plowing can constitute a *Line* valuable part of an integrated weed-management 5 program. Although plowing kills standing weeds, farmers have long known that it often leads to the emergence of new weed seedlings in a few weeks.

Ecologists have shown that a farmer's field can have 50,000 or more weed seeds per square meter 10 buried beneath the soil surface. Plant physiologists have shown that seeds buried more than about one centimeter below the soil surface do not receive enough light to germinate. Do the blades of a plow, which can reach more than a foot beneath the soil 15 surface, bring some of these buried seeds to the surface where their germination is induced by exposure to sunlight?

Two ecologists, Jonathan Sauer and Gwendolyn Struik, began to study this question in the 1960s. In a 20 relatively simple experiment, they went to ten different habitats in Wisconsin during the night and collected pairs of soil samples. They stirred up the soil in one sample of each pair in the light and stirred up the other sample of each pair in the dark. They then 25 exposed all ten pairs to natural sunlight in a greenhouse. For nine of the ten pairs of soil samples, weed growth was greater in the samples stirred up in light. They concluded that soil disturbance gives weed seeds a "light break," and this stimulates their 30 germination.

More recently, Karl Hartmann of Erlangen University in Germany reasoned that when farmers plowed their fields during the day, the buried weed seeds are briefly exposed to sunlight as the soil is 35 turned over, and that this stimulates their germination. Although the light exposures from plowing may be less than one millisecond, that can be enough to induce seed germination. Thus the germination of weed seeds would be minimized if 40 farmers simply plowed their fields during the night, when the photon fluence rate [the rate at which photons hit the surface] is below  $10^{15}$  photons per square meter per second. Although even under these

conditions hundreds of millions of photons strike 45 each square millimeter of ground each second, this illumination is below the threshold needed to stimulate the germination of most seeds.

Hartmann says that he was very skeptical when he first came up with this idea because he assumed 50 that such a simple method of weed control as plowing at nighttime must be ineffective or it would have been discovered long ago. But the subsequent experiments, first presented at a 1989 scientific meeting in Freiburg, Germany, clearly demonstrated 55 that the method can be effective.

Hartmann tested his idea by plowing two agricultural strips near Altershausen, Germany. The farmer Karl Seydel cultivated one strip, repeated threefold, at around midday and the other strip 60 at night. No crops were planted in these pilot experiments, to avoid possible competition with the emerging weeds. The results were dramatic. More than 80 percent of the surface of the field plowed in daylight was covered by weeds, whereas 65 only about 2 percent of the field plowed at night was covered by weeds.

This method of weed control is currently being used by several farmers in Germany. Because many of the same weed species that invade farmers' fields 70 in Germany also invade fields elsewhere in the world, this method should be successful elsewhere. In fact, recent studies at universities in Nebraska, Oregon, Minnesota, Denmark, Sweden, and Argentina support this idea.

Number of Emerged Seedlings in Soil Samples  
One Month after Soil Was Disturbed

Sample	Source of soil	Number of emerged seedlings in soil disturbed in	
		light	darkness
A	deciduous woods	4	0
B	deciduous woods	2	1
C	deciduous woods	6	2
D	conifer plantation	8	3
E	conifer plantation	2	1
F	tall-grass prairie	5	1
G	old pasture	0	2
H	old pasture	2	1
I	muck field	14	2
J	muck field	5	3

Adapted from Jonathan Sauer and Gwendolyn Struik, "A Possible Ecological Relation between Soil Disturbance, Light-Flash, and Seed Germination." ©1964 by Jonathan Sauer and Gwendolyn Struik.

43

According to the passage, exposure to light allows seeds to

- A) begin to develop.
- B) absorb necessary nutrients.
- C) withstand extreme temperatures.
- D) achieve maximum growth.

44

The question in the second paragraph (lines 13-17) primarily serves to

- A) emphasize the provisional nature of the findings discussed in the passage.
- B) introduce the specific research topic addressed in the passage.
- C) suggest the hypothetical impact of the studies analyzed in the passage.
- D) indicate the level of disagreement about the methods explored in the passage.

45

As used in line 16, "induced" most nearly means

- A) lured.
- B) established.
- C) convinced.
- D) stimulated.

46

Which choice best supports the idea that seeds present in fields plowed at night are exposed to some amount of light?

- A) Lines 31-36 ("More . . . germination")
- B) Lines 36-38 ("Although . . . germination")
- C) Lines 43-47 ("Although . . . seeds")
- D) Lines 48-52 ("Hartmann . . . ago")

47

The passage suggests that if Seydel had planted wheat or corn on the two agricultural strips in Hartmann's experiment, the percentage of the surface of each strip covered with weeds would likely have been

- A) lower than the percentage that Hartmann found.
- B) higher than the percentage that Hartmann had predicted.
- C) nearly impossible for Hartmann to determine.
- D) comparable to Hartmann's original projection.

48

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 56-60 ("Hartmann . . . night")
- B) Lines 60-62 ("No crops . . . weeds")
- C) Line 62 ("The results . . . dramatic")
- D) Lines 63-66 ("More . . . weeds")

49

As used in line 62, “dramatic” most nearly means

- A) theatrical.
- B) sudden.
- C) impressive.
- D) emotional.

50

According to the table, in which soil sample disturbed in darkness did the fewest number of seedlings emerge?

- A) Sample A
- B) Sample B
- C) Sample C
- D) Sample D

51

As presented in the table, which sample produced the most seedlings when the soil was disturbed in light?

- A) Sample G
- B) Sample H
- C) Sample I
- D) Sample J

52

The data presented in the table most directly support which claim from the passage?

- A) Lines 1-3 (“Many . . . weeds”)
- B) Lines 8-10 (“Ecologists . . . surface”)
- C) Lines 10-13 (“Plant . . . germinate”)
- D) Lines 38-43 (“Thus . . . second”)

**STOP**

**If you finish before time is called, you may check your work on this section only.**

**Do not turn to any other section.**

# Writing and Language Test

**35 MINUTES, 44 QUESTIONS**

**Turn to Section 2 of your answer sheet to answer the questions in this section.**

## DIRECTIONS

Each passage below is accompanied by a number of questions. For some questions, you will consider how the passage might be revised to improve the expression of ideas. For other questions, you will consider how the passage might be edited to correct errors in sentence structure, usage, or punctuation. A passage or a question may be accompanied by one or more graphics (such as a table or graph) that you will consider as you make revising and editing decisions.

Some questions will direct you to an underlined portion of a passage. Other questions will direct you to a location in a passage or ask you to think about the passage as a whole.

After reading each passage, choose the answer to each question that most effectively improves the quality of writing in the passage or that makes the passage conform to the conventions of standard written English. Many questions include a “NO CHANGE” option. Choose that option if you think the best choice is to leave the relevant portion of the passage as it is.

**Questions 1–11 are based on the following passage.**

### How a Cat in a Hat Changed Children’s Education

In a 1954 *Life* magazine article, author John Hersey expressed concern that children in the United States were disengaged from learning how to read. Among other problems, Hersey noted, the reading material available to grade-schoolers had a hard time competing with television, radio, 1 and other media for children’s attention. One solution he proposed was to make

1

- A) NO CHANGE
- B) and with
- C) and also
- D) and competing with

children's books more **2** interesting, since "an individual's sense of wholeness . . . follows, and cannot precede, a sense of accomplishment."

The story of *The Cat in the Hat*'s publication began when William **3** Spaulding, the director of the education division at the publishing company Houghton Mifflin, read Hersey's article and had an idea. Spaulding agreed that there was a need for appealing books for beginning **4** readers. He thought he knew who should write one. He arranged to have dinner with Theodor Geisel, who wrote and illustrated children's books under the name "Dr. Seuss," and issued him a challenge: "Write me a story that first graders can't put down!"

**2**

The writer wants to include a quotation by Hersey that supports the topic of the passage. Which choice best accomplishes this goal?

- A) NO CHANGE
- B) interesting, since "learning starts with failure; the first failure is the beginning of education."
- C) interesting because "journalism allows its readers to witness history; fiction gives its readers an opportunity to live it."
- D) interesting with "drawings like those of the wonderfully imaginative geniuses among children's illustrators."

**3**

- A) NO CHANGE
- B) Spaulding the director
- C) Spaulding, the director,
- D) Spaulding—the director

**4**

Which choice most effectively combines the sentences at the underlined portion?

- A) readers, and he
- B) readers—namely, he
- C) readers; and Spaulding
- D) readers, and meanwhile he

Having **5** known Spaulding for many years and having maintained a professional relationship with him, Geisel was an experienced writer and illustrator.

**6** However, this new project presented him with an obstacle. Spaulding told Geisel to write his entire book using a restricted vocabulary from an elementary school list of 348 words. Geisel started two stories, only to abandon them when he found that he needed to use words that were not on the list. On the verge of giving up,

**7** Geisel's story finally hit upon an image that became its basis: a cat wearing a battered stovepipe hat. His main character established, Geisel commenced the difficult task of writing a book with a limited vocabulary. **8** At the end of a duration nine months long, *The Cat in the Hat* was complete.

**5**

Which choice best supports the information that follows in the sentence?

- A) NO CHANGE
- B) acquired a reputation for perfectionism and for setting high standards for his work,
- C) been interested in politics before breaking into the genre of children's literature,
- D) published nine children's books and having received three nominations for the prestigious Caldecott Medal,

**6**

- A) NO CHANGE
- B) For example,
- C) Furthermore,
- D) At any rate,

**7**

- A) NO CHANGE
- B) an image that Geisel finally hit upon became the basis of his story:
- C) Geisel finally hit upon the image that became the basis for his story:
- D) the story was finally based on an image that Geisel hit upon:

**8**

- A) NO CHANGE
- B) After thirty-six weeks—or nine months—had passed,
- C) After a length of nine months had elapsed,
- D) Nine months later,

The book was a hit. Children were entertained by its plot about the antics of a mischievous cat and **9** is captivated by its eye-catching illustrations and memorable rhythms and rhymes. Its sales inspired another publishing company, Random House, to establish a series for early readers called Beginner Books, which featured works by Geisel and other writers, and other publishers quickly followed suit. In the years that **10** followed. Many talented writers and illustrators of children’s books imitated Geisel’s formula of restricted vocabulary and whimsical artwork. But perhaps the best proof of *The Cat in the Hat*’s success is not its influence on other books but its **11** limited vocabulary and appealing word choices.

9

- A) NO CHANGE
- B) was
- C) has been
- D) DELETE the underlined portion.

10

- A) NO CHANGE
- B) followed; many
- C) followed, many
- D) followed—many

11

The writer wants a conclusion that restates the main themes of the passage. Which choice best accomplishes this goal?

- A) NO CHANGE
- B) impressive worldwide sales that continue to remain high to this day.
- C) enduring ability to delight children and engage them in learning how to read.
- D) important role in the history of illustration in the twentieth century.

Questions 12–22 are based on the following passage.

### Keep Student Volunteering Voluntary

A growing number of public schools in the United States require students to complete community service hours to graduate. Such volunteering, be it helping at a local animal shelter, **12** when they pick up litter, or working at a health-care facility, has obvious benefits for the community it serves and teaches students important life skills. But critics say that making volunteerism compulsory misses the point of the act.

**13** By its very definition, volunteer work is done willingly. By requiring students to do community service in order to graduate, school **14** officials' are taking away students' choice to give up their time for nonprofit activities, making volunteerism less meaningful and pleasurable. According to a psychological concept called the reactance theory, the loss of freedom in choosing an activity can cause a negative reaction. For instance, instead of focusing on the good they are doing, students may become resentful of the demands that compulsory volunteering places on their schedules.

12

- A) NO CHANGE
- B) to pick up litter,
- C) litter collection,
- D) picking up litter,

13

The writer wants a transition from the previous paragraph that highlights the criticism of compulsory volunteering mentioned in the previous paragraph. Which choice best accomplishes this goal?

- A) NO CHANGE
- B) Whatever the work may be,
- C) For many students,
- D) Fortunately for communities in need,

14

- A) NO CHANGE
- B) officials are taking away students
- C) officials are taking away student's
- D) officials are taking away students'

Proponents of compulsory **15** volunteering who are in favor of it point out that it allows young people to garner the benefits that volunteering offers. Students who volunteer report increased self-esteem, better relationship-building skills, and **16** increasingly busy schedules. Some studies have also found that students who do community service are more likely to volunteer as adults, and thus **17** effect society positively over the course of many years.

**15**

- A) NO CHANGE
- B) volunteering, advocating it,
- C) volunteering
- D) volunteering and its advocates

**16**

Which choice provides a supporting example that is most similar to the examples already in the sentence?

- A) NO CHANGE
- B) a closer connection with their community.
- C) less time spent engaging in social activities.
- D) little increase in academic achievement.

**17**

- A) NO CHANGE
- B) affect
- C) effecting
- D) affects

However, most research looks at students who volunteer in general, not making a distinction between students who are required to volunteer by their schools and those who volunteer willingly. One recent study by Sara E. Helms, assistant professor of economics at Samford University in Birmingham, Alabama, did focus specifically on **18** mandatory volunteering. She found that students who were required to volunteer rushed to complete their service hours in early high **19** school, they then did significantly less regular volunteer work in the twelfth grade **20** than the service hours of those not required to volunteer. Helms concluded that compulsory volunteering does not necessarily create lifelong volunteers.

18

- A) NO CHANGE
- B) coercive
- C) forcible
- D) imperative

19

- A) NO CHANGE
- B) school; they then,
- C) school. They, then
- D) school; they then

20

- A) NO CHANGE
- B) than did students who were
- C) than hours worked by students
- D) compared with students

Instead of requiring students to volunteer, schools

- 21** have to recognize that not all students are equally well suited to the same activities. Many studies show that when schools simply tell students about opportunities for community service and connect them with organizations that need help, more students volunteer of their own free will. **22**

21

Which choice most effectively sets up the point made in the next sentence?

- A) NO CHANGE
- B) should allow students to spend their time participating in athletics and other extracurricular activities.
- C) should focus on offering arrangements that make volunteering an easy and attractive choice.
- D) are advised to recognize the limits of their ability to influence their students.

22

The writer wants a conclusion that states the main claim of the passage. Which choice best accomplishes this goal?

- A) It is imperative that schools do their part to find volunteers for the many worthwhile organizations in the United States.
- B) Schools that do this will produce more engaged, enthusiastic volunteers than schools that require volunteer work.
- C) Studies in the fields of psychology and economics have revolutionized researchers' understanding of volunteerism.
- D) It is important that students choose charitable work that suits their interests and values.

Questions 23–33 are based on the following passage and supplementary material.

### Marsupials Lend a Hand to Science

Marsupials (mammals that carry their young in a pouch) are a curiosity among biologists because they lack a corpus callosum, the collection of nerve fibers connecting the two hemispheres of the brain. In most other mammals, the left hemisphere of the brain controls the right side of the body, the right hemisphere controls the left, and the corpus callosum allows communication between the hemispheres. Scientists 23 are long believing that this structure enables complex tasks by sequestering skilled movement to a single hemisphere without sacrificing coordination between both sides of the body; this sequestration would explain handedness, the tendency to consistently prefer 24 one hand over the other, in humans. However, a recent finding of handedness in marsupials suggests that a 25 trait other than the presence of a corpus callosum 26 links as handedness: bipedalism.

23

- A) NO CHANGE
- B) will long be believing
- C) have long believed
- D) long believe

24

- A) NO CHANGE
- B) and favor the use of one hand over the other,
- C) one hand over the other that could be chosen,
- D) one hand on a regular basis,

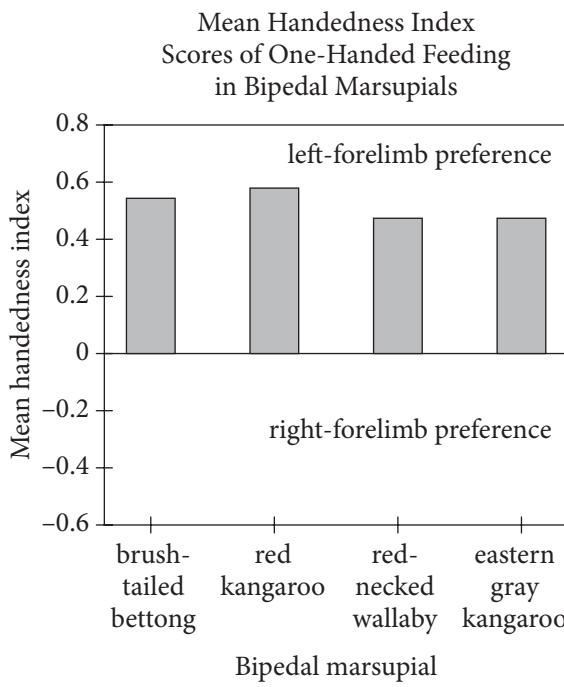
25

- A) NO CHANGE
- B) trait,
- C) trait;
- D) trait:

26

- A) NO CHANGE
- B) correlates with
- C) correlates from
- D) links on

Researchers at Saint Petersburg State University and the University of Tasmania observed marsupials walking on either two legs (bipeds) or four (quadrupeds) and performing tasks such as bringing food to their mouths. The scientists employed a mean handedness index; **27** negative scores indicated a left-forelimb preference and positive scores indicated a right-forelimb preference. While eating, the eastern gray kangaroo, red-necked wallaby, red **28** kangaroo and, brush-tailed bettong, all bipedal marsupials, preferred using their left forelimb, as revealed by **29** positive mean handedness index values less than 0.2 for all four species. These results suggest handedness among these animals.



Adapted from Andrey Giljov et al., "Parallel Emergence of True Handedness in the Evolution of Marsupials and Placentals." ©2015 by Elsevier Ltd.

27

Which choice accurately reflects the information in the graph?

- A) NO CHANGE
- B) scores of 0 or less indicated a left-forelimb preference and positive scores indicated a lack of forelimb preference.
- C) positive scores indicated a lack of forelimb preference and negative scores indicated a right-forelimb preference.
- D) positive scores indicated a left-forelimb preference and negative scores indicated a right-forelimb preference.

28

- A) NO CHANGE
- B) kangaroo, and
- C) kangaroo; and
- D) kangaroo—and,

29

Which choice most accurately reflects the data in the graph?

- A) NO CHANGE
- B) positive mean handedness index values greater than 0.6
- C) positive mean handedness index values between 0.4 and 0.6
- D) mean handedness index values of 0

**30** Having four feet, quadrupedal marsupials in the study did not show a strong preference for the use of one forelimb. For instance, gray short-tailed opossums and sugar gliders were assigned mean handedness values very close to zero—they used their right and left forelimbs nearly equally. In effect, the study provided no evidence of handedness among quadrupedal marsupials.

30

Which choice provides the best transition from the previous paragraph?

- A) NO CHANGE
- B) Like most other mammals,
- C) In contrast to their bipedal counterparts,
- D) While using their forelimbs for eating,

31 Kangaroos, though, still do not exhibit handedness to the extent that humans do. As the researchers noted, the quadrupeds typically live in trees and employ all four limbs in climbing. The bipeds, on the other hand, are far less arboreal, leaving their forelimbs relatively free for tasks in 32 whom handedness may confer an evolutionary advantage. Why the majority of marsupials studied preferred their left forelimbs while the majority of humans prefer their right remains a mystery, however, 33 as does the mechanism by which, in the absence of a corpus callosum, the hemispheres of the marsupial brain communicate.

31

Which choice presents a main claim of the passage?

- A) NO CHANGE
- B) For the marsupials in the study, then, handedness seems to be associated with bipedalism.
- C) There are many things scientists do not understand about the marsupial brain.
- D) Additional studies on this phenomenon will need to be performed with other mammals.

32

- A) NO CHANGE
- B) which
- C) what
- D) whose

33

The writer wants to conclude the passage by recalling a topic from the first paragraph that requires additional research. Which choice best accomplishes this goal?

- A) NO CHANGE
- B) though researchers should not neglect the sizable minority of humans who are left handed.
- C) and scientists believe that studies like this one may someday yield insights into the causes of certain neurological disorders.
- D) and an additional study is planned to study handedness in other animals that stand upright only some of the time.

Questions 34–44 are based on the following passage.

### An Employee Benefit That Benefits Employers

— 1 —

According to a 2014 report from the Society for Human Resource Management, 54 percent of surveyed companies provide tuition assistance to employees pursuing an undergraduate degree, and 50 percent do so for employees working toward a graduate degree.

34 Despite these findings, more companies should consider helping employees pay for education because doing so helps 35 increase customer satisfaction and improve the quality of the companies' business.

34

Which choice provides the most effective transition from the previous sentence to the information that immediately follows in this sentence?

- A) NO CHANGE
- B) In addition to the 2014 report,
- C) Although these levels are impressive,
- D) Whether they want to or not,

35

Which choice most effectively establishes the main idea of the passage?

- A) NO CHANGE
- B) solve the problem of rising tuition costs
- C) strengthen the US economy
- D) attract and retain employees

— 2 —

Tuition-reimbursement programs signal that employers offer their **36** workers' opportunities for personal and professional development. According to professor of management Peter Cappelli, such opportunities are appealing to highly motivated and disciplined individuals and may attract applicants with these desirable qualities. Many in the business community concur. Explaining his company's decision to expand its tuition-assistance program, John Fox, the director of dealer training at Fiat Chrysler Automobiles in the United States, **37** who stressed the importance of drawing skilled employees to Fiat Chrysler's car dealerships: "This is a benefit that can surely bring top talent to our dealers," he said.

36

- A) NO CHANGE
- B) workers opportunities'
- C) workers opportunities
- D) worker's opportunity's

37

- A) NO CHANGE
- B) stressed
- C) stressing
- D) and he stressed

— 3 —

Paying for tuition also helps businesses retain employees. Retaining employees is important not only because it ensures a skilled and experienced workforce but also because it mitigates the considerable costs of finding, hiring, and training new workers. Employees whose tuition is reimbursed often stay with their employer even after they complete their degrees. Because their new qualifications give them opportunities for advancement within the company. The career of Valerie Lincoln, an employee at the aerospace company United Technologies Corporation (UTC) is a significant success story for her company's tuition-reimbursement program. In eight years at UTC, Lincoln earned associate and bachelor's degrees in business and advanced from an administrative assistant position to an accounting associate position. This allowed UTC to retain an employee with a deep knowledge of her industry and years of valuable experience.

38

Which choice most effectively combines the sentences at the underlined portion?

- A) employees, and this retention
- B) employees, the retaining of whom
- C) employees, which
- D) employees; that

39

- A) NO CHANGE
- B) degrees: because
- C) degrees because
- D) degrees; because

40

- A) NO CHANGE
- B) (UTC)—
- C) (UTC):
- D) (UTC),

41

- A) NO CHANGE
- B) hidden
- C) large
- D) spacious

— 4 —

Tuition reimbursement can be expensive, and many companies would find it impractical to pay for multiple degrees for all employees. Businesses have succeeded in **42** minimizing and keeping down costs and ensuring the relevance of employees' coursework by offering fixed amounts of reimbursement each year and stipulating which subjects workers can study. Even with these methods, tuition reimbursement may not be appropriate in all cases, especially if classes are likely **43** to divert employees' time and energy from their jobs.

**Question 44 asks about the previous passage as a whole.**

42

- A) NO CHANGE
- B) minimizing costs associated with employees' coursework
- C) being effective at keeping down costs
- D) keeping down costs

43

- A) NO CHANGE
- B) diverted
- C) in diverting
- D) diversions for

**Think about the previous passage as a whole as you answer question 44.**

44

The writer wants to insert the following sentence.

Still, since securing an excellent workforce is crucial to a business's success, employers should give serious thought to investing in reimbursement programs.

To make the passage most logical, the sentence should be placed immediately after the last sentence in paragraph

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

# STOP

**If you finish before time is called, you may check your work on this section only.  
Do not turn to any other section.**



# Math Test – No Calculator

**25 MINUTES, 20 QUESTIONS**

Turn to Section 3 of your answer sheet to answer the questions in this section.

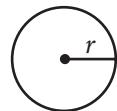
## DIRECTIONS

For questions 1–15, solve each problem, choose the best answer from the choices provided, and fill in the corresponding bubble on your answer sheet. For questions 16–20, solve the problem and enter your answer in the grid on the answer sheet. Please refer to the directions before question 16 on how to enter your answers in the grid. You may use any available space in your test booklet for scratch work.

## NOTES

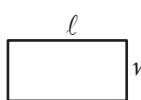
1. The use of a calculator is not permitted.
2. All variables and expressions used represent real numbers unless otherwise indicated.
3. Figures provided in this test are drawn to scale unless otherwise indicated.
4. All figures lie in a plane unless otherwise indicated.
5. Unless otherwise indicated, the domain of a given function  $f$  is the set of all real numbers  $x$  for which  $f(x)$  is a real number.

## REFERENCE

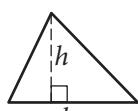


$$A = \pi r^2$$

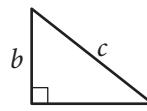
$$C = 2\pi r$$



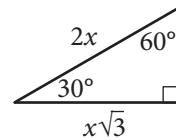
$$A = lw$$



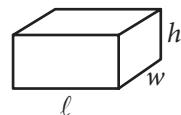
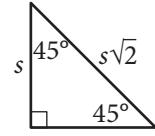
$$A = \frac{1}{2}bh$$



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



Special Right Triangles



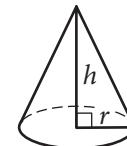
$$V = lwh$$



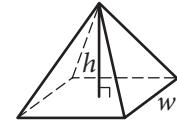
$$V = \pi r^2 h$$



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



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



$$V = \frac{1}{3}lwh$$

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

The number of radians of arc in a circle is  $2\pi$ .

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



1

$$2z + 1 = z$$

What value of  $z$  satisfies the equation above?

A)  $-2$

B)  $-1$

C)  $\frac{1}{2}$

D)  $1$

2

A television with a price of \$300 is to be purchased with an initial payment of \$60 and weekly payments of \$30. Which of the following equations can be used to find the number of weekly payments,  $w$ , required to complete the purchase, assuming there are no taxes or fees?

A)  $300 = 30w - 60$

B)  $300 = 30w$

C)  $300 = 30w + 60$

D)  $300 = 60w - 30$

3

#### Shipping Charges

Merchandise weight (pounds)	Shipping charge
5	\$16.94
10	\$21.89
20	\$31.79
40	\$51.59

The table above shows shipping charges for an online retailer that sells sporting goods. There is a linear relationship between the shipping charge and the weight of the merchandise. Which function can be used to determine the total shipping charge  $f(x)$ , in dollars, for an order with a merchandise weight of  $x$  pounds?

A)  $f(x) = 0.99x$

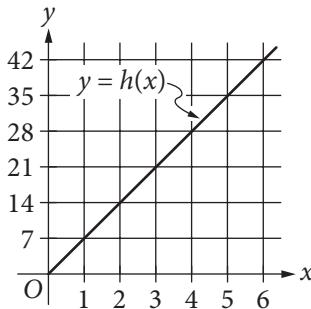
B)  $f(x) = 0.99x + 11.99$

C)  $f(x) = 3.39x$

D)  $f(x) = 3.39x + 16.94$



4



The line in the  $xy$ -plane above represents the relationship between the height  $h(x)$ , in feet, and the base diameter  $x$ , in feet, for cylindrical Doric columns in ancient Greek architecture. How much greater is the height of a Doric column that has a base diameter of 5 feet than the height of a Doric column that has a base diameter of 2 feet?

- A) 7 feet
- B) 14 feet
- C) 21 feet
- D) 24 feet

5

$$\sqrt{9x^2}$$

If  $x > 0$ , which of the following is equivalent to the given expression?

- A)  $3x$
- B)  $3x^2$
- C)  $18x$
- D)  $18x^4$

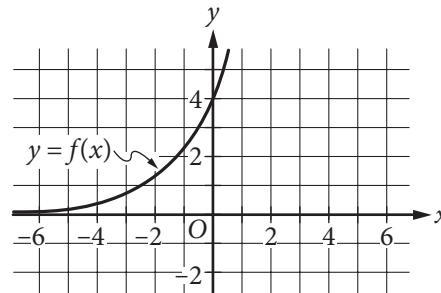
6

$$\frac{x^2 - 1}{x - 1} = -2$$

What are all values of  $x$  that satisfy the equation above?

- A)  $-3$
- B)  $0$
- C)  $1$
- D)  $-3$  and  $-1$

7

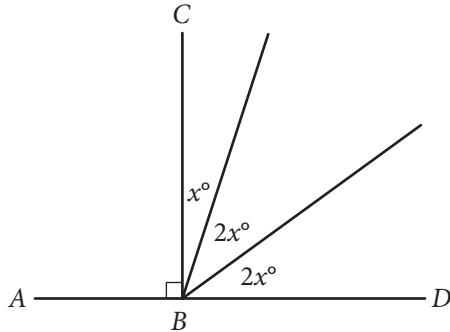


The graph of  $y = f(x)$  is shown in the  $xy$ -plane. What is the value of  $f(0)$ ?

- A) 0
- B) 2
- C) 3
- D) 4



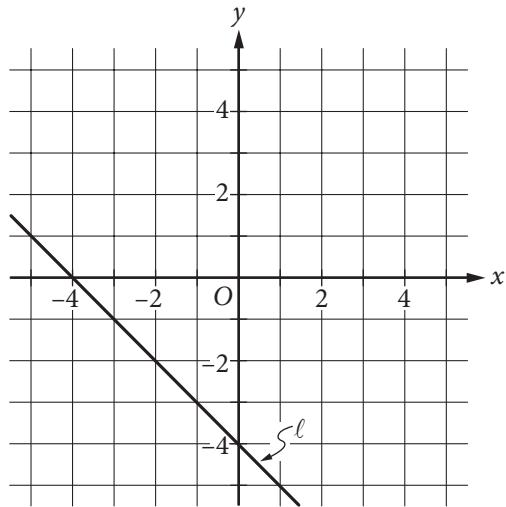
8



In the figure above, point  $B$  lies on  $\overline{AD}$ . What is the value of  $3x$ ?

- A) 18
- B) 36
- C) 54
- D) 72

9

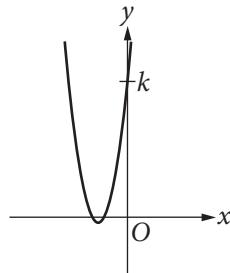


Which of the following is an equation of line  $\ell$  in the  $xy$ -plane above?

- A)  $x - y = -4$
- B)  $x - y = 4$
- C)  $x + y = -4$
- D)  $x + y = 4$



10



The graph of  $y = 2x^2 + 10x + 12$  is shown. If the graph crosses the  $y$ -axis at the point  $(0, k)$ , what is the value of  $k$ ?

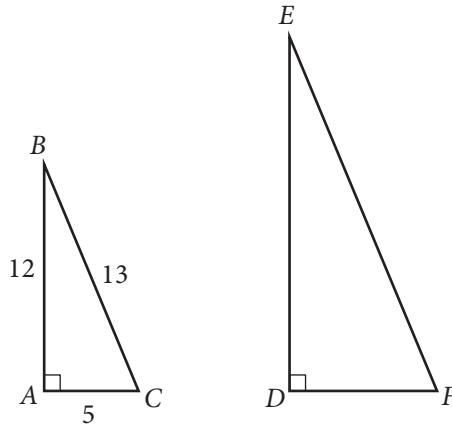
- A) 2
- B) 6
- C) 10
- D) 12

11

A circle in the  $xy$ -plane has center  $(5, 7)$  and radius 2. Which of the following is an equation of the circle?

- A)  $(x - 5)^2 + (y - 7)^2 = 4$
- B)  $(x + 5)^2 + (y + 7)^2 = 4$
- C)  $(x - 5)^2 + (y - 7)^2 = 2$
- D)  $(x + 5)^2 + (y + 7)^2 = 2$

12



In the figure above, triangle  $ABC$  is similar to triangle  $DEF$ . What is the value of  $\cos(E)$ ?

- A)  $\frac{12}{5}$
- B)  $\frac{12}{13}$
- C)  $\frac{5}{12}$
- D)  $\frac{5}{13}$



13

In the  $xy$ -plane, the graph of the function  $f(x) = x^2 + 5x + 4$  has two  $x$ -intercepts. What is the distance between the  $x$ -intercepts?

- A) 1
- B) 2
- C) 3
- D) 4

14

$$\sqrt{4x} = x - 3$$

What are all values of  $x$  that satisfy the given equation?

- I. 1
  - II. 9
- A) I only  
B) II only  
C) I and II  
D) Neither I nor II

15

$$-3x + y = 6$$

$$ax + 2y = 4$$

In the system of equations above,  $a$  is a constant. For which of the following values of  $a$  does the system have no solution?

- A) -6
- B) -3
- C) 3
- D) 6

**DIRECTIONS**

**For questions 16–20,** solve the problem and enter your answer in the grid, as described below, on the answer sheet.

- Although not required, it is suggested that you write your answer in the boxes at the top of the columns to help you fill in the bubbles accurately. You will receive credit only if the bubbles are filled in correctly.
- Mark no more than one bubble in any column.
- No question has a negative answer.
- Some problems may have more than one correct answer. In such cases, grid only one answer.
- Mixed numbers** such as  $3\frac{1}{2}$  must be gridded as 3.5 or  $\frac{7}{2}$ . (If  is entered into the grid, it will be interpreted as  $\frac{31}{2}$ , not  $3\frac{1}{2}$ .)
- Decimal answers:** If you obtain a decimal answer with more digits than the grid can accommodate, it may be either rounded or truncated, but it must fill the entire grid.

**Answer:  $\frac{7}{12}$**

7	/	1	2
---	---	---	---

← Fraction line

**Answer: 2.5**

	2	.	5
--	---	---	---

← Decimal point

Write answer in boxes.

Grid in result.

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

**Acceptable ways to grid  $\frac{2}{3}$  are:**

2	/	3
---	---	---

.	6	6	6
---	---	---	---

.	6	6	7
---	---	---	---

**Answer: 201 – either position is correct**

2	0	1	
---	---	---	--

2	0	1	
---	---	---	--

**NOTE:**

You may start your answers in any column, space permitting. Columns you don't need to use should be left blank.



16

$$T = 5c + 12f$$

A manufacturer shipped units of a certain product to two locations. The equation above shows the total shipping cost  $T$ , in dollars, for shipping  $c$  units to the closer location and shipping  $f$  units to the farther location. If the total shipping cost was \$47,000 and 3000 units were shipped to the farther location, how many units were shipped to the closer location?

17

$$|2x + 1| = 5$$

If  $a$  and  $b$  are the solutions to the equation above, what is the value of  $|a - b|$ ?

18

Juan purchased an antique that had a value of \$200 at the time of purchase. Each year, the value of the antique is estimated to increase 10% over its value the previous year. The estimated value of the antique, in dollars, 2 years after purchase can be represented by the expression  $200a$ , where  $a$  is a constant. What is the value of  $a$ ?

19

$$\begin{aligned}2x + 3y &= 1200 \\3x + 2y &= 1300\end{aligned}$$

Based on the system of equations above, what is the value of  $5x + 5y$ ?

20

If  $u + t = 5$  and  $u - t = 2$ , what is the value of  $(u - t)(u^2 - t^2)$ ?

**STOP**

**If you finish before time is called, you may check your work on this section only.  
Do not turn to any other section.**



# Math Test – Calculator

**55 MINUTES, 38 QUESTIONS**

Turn to Section 4 of your answer sheet to answer the questions in this section.

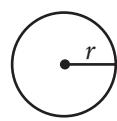
## DIRECTIONS

For questions 1–30, solve each problem, choose the best answer from the choices provided, and fill in the corresponding bubble on your answer sheet. For questions 31–38, solve the problem and enter your answer in the grid on the answer sheet. Please refer to the directions before question 31 on how to enter your answers in the grid. You may use any available space in your test booklet for scratch work.

## NOTES

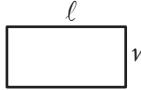
1. The use of a calculator is permitted.
2. All variables and expressions used represent real numbers unless otherwise indicated.
3. Figures provided in this test are drawn to scale unless otherwise indicated.
4. All figures lie in a plane unless otherwise indicated.
5. Unless otherwise indicated, the domain of a given function  $f$  is the set of all real numbers  $x$  for which  $f(x)$  is a real number.

## REFERENCE

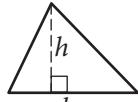


$$A = \pi r^2$$

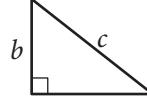
$$C = 2\pi r$$



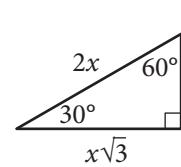
$$A = \ell w$$



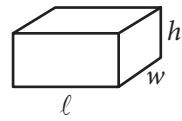
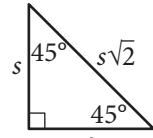
$$A = \frac{1}{2}bh$$



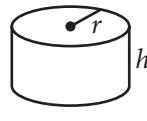
$$c^2 = a^2 + b^2$$



Special Right Triangles



$$V = \ell wh$$



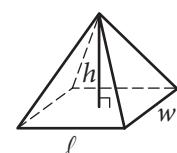
$$V = \pi r^2 h$$



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



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



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

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

The number of radians of arc in a circle is  $2\pi$ .

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



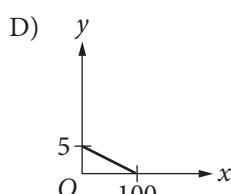
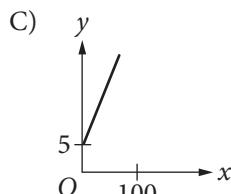
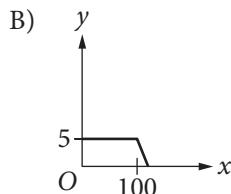
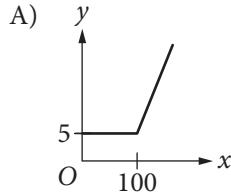
1

A helicopter, initially hovering 40 feet above the ground, begins to gain altitude at a rate of 21 feet per second. Which of the following functions represents the helicopter's altitude above the ground  $y$ , in feet,  $t$  seconds after the helicopter begins to gain altitude?

- A)  $y = 40 + 21$
- B)  $y = 40 + 21t$
- C)  $y = 40 - 21t$
- D)  $y = 40t + 21$

2

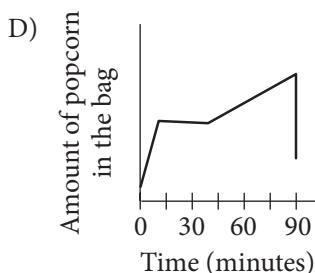
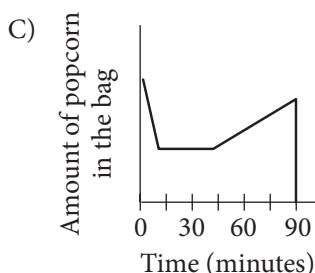
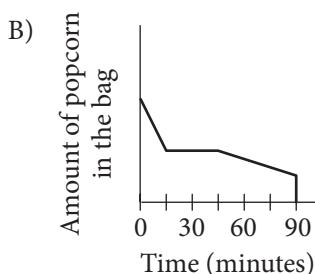
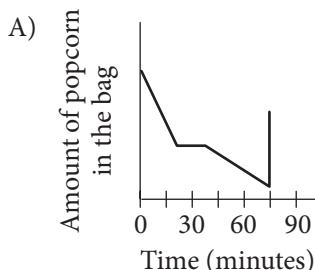
A text messaging plan charges a flat fee of \$5 per month for up to 100 text messages sent plus \$0.25 for each additional text message sent that month. Which of the following graphs represents the cost,  $y$ , of sending  $x$  texts in a month?





3

Jake buys a bag of popcorn at a movie theater. He eats half of the popcorn during the 15 minutes of previews. After eating half of the popcorn, he stops eating for the next 30 minutes. Then he gradually eats the popcorn until he accidentally spills all of the remaining popcorn. Which of the following graphs could represent the situation?



4

If  $20 - x = 15$ , what is the value of  $3x$ ?

- A) 5
- B) 10
- C) 15
- D) 35

5

$$f(x) = \frac{x+3}{2}$$

For the function  $f$  defined above, what is the value of  $f(-1)$ ?

- A) -2
- B) -1
- C) 1
- D) 2



6

Which of the following is equivalent to  $2x(x^2 - 3x)$ ?

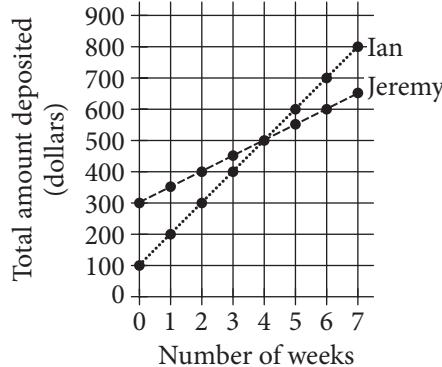
- A)  $-4x^2$
- B)  $3x^3 - x^2$
- C)  $2x^3 - 3x$
- D)  $2x^3 - 6x^2$

7

A retail company has 50 large stores located in different areas throughout a state. A researcher for the company believes that employee job satisfaction varies greatly from store to store. Which of the following sampling methods is most appropriate to estimate the proportion of all employees of the company who are satisfied with their job?

- A) Selecting one of the 50 stores at random and then surveying each employee at that store
- B) Selecting 10 employees from each store at random and then surveying each employee selected
- C) Surveying the 25 highest-paid employees and the 25 lowest-paid employees
- D) Creating a website on which employees can express their opinions and then using the first 50 responses

8



The two graphs above show the total amounts of money that Ian and Jeremy each have deposited into their savings accounts for the first seven weeks after opening their accounts. After they made their initial deposits, how much more did Ian deposit each week than Jeremy?

- A) \$200
- B) \$100
- C) \$50
- D) \$25

9

$$h(x) = 2^x$$

The function  $h$  is defined above. What is  $h(5) - h(3)$ ?

- A) 2
- B) 4
- C) 24
- D) 28



10

A researcher surveyed a random sample of students from a large university about how often they see movies. Using the sample data, the researcher estimated that 23% of the students in the population saw a movie at least once per month. The margin of error for this estimation is 4%. Which of the following is the most appropriate conclusion about all students at the university, based on the given estimate and margin of error?

- A) It is unlikely that less than 23% of the students see a movie at least once per month.
- B) At least 23%, but no more than 25%, of the students see a movie at least once per month.
- C) The researcher is between 19% and 27% sure that most students see a movie at least once per month.
- D) It is plausible that the percentage of students who see a movie at least once per month is between 19% and 27%.

12

A book was on sale for 40% off its original price. If the sale price of the book was \$18.00, what was the original price of the book? (Assume there is no sales tax.)

- A) \$7.20
- B) \$10.80
- C) \$30.00
- D) \$45.00

11

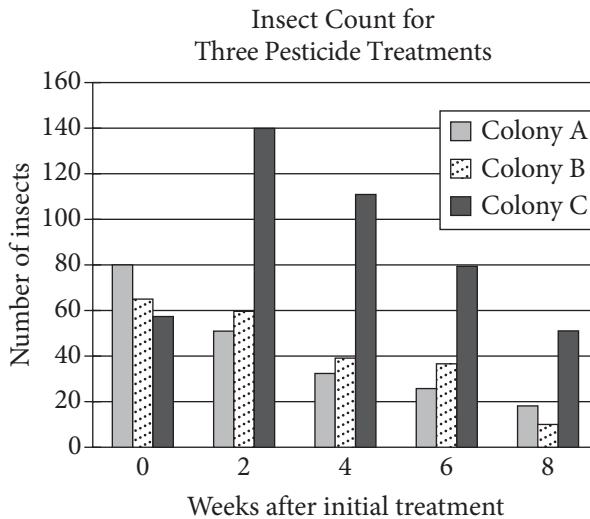
List A	1	2	3	4	5	6
List B	2	3	3	4	4	5

The table above shows two lists of numbers. Which of the following is a true statement comparing list A and list B?

- A) The means are the same, and the standard deviations are different.
- B) The means are the same, and the standard deviations are the same.
- C) The means are different, and the standard deviations are different.
- D) The means are different, and the standard deviations are the same.



**Questions 13 and 14 refer to the following information.**



Three colonies of insects were each treated with a different pesticide over an 8-week period to test the effectiveness of the three pesticides. Colonies A, B, and C were treated with Pesticides A, B, and C, respectively. Each pesticide was applied every 2 weeks to one of the three colonies over the 8-week period. The bar graph above shows the insect counts for each of the three colonies 0, 2, 4, 6, and 8 weeks after the initial treatment.

13

Which of the following colonies showed a decrease in size every two weeks after the initial treatment with pesticide?

- I. Colony A
  - II. Colony B
  - III. Colony C
- A) I only  
B) III only  
C) I and II only  
D) I, II, and III

14

Of the following, which is closest to the ratio of the total number of insects in all three colonies in week 8 to the total number of insects at the time of initial treatment?

- A) 2 to 5
- B) 1 to 4
- C) 3 to 5
- D) 1 to 2

15

A right circular cone has a volume of  $24\pi$  cubic inches. If the height of the cone is 2 inches, what is the radius, in inches, of the base of the cone?

- A)  $2\sqrt{3}$
- B) 6
- C) 12
- D) 36



16

In 2015 the populations of City X and City Y were equal. From 2010 to 2015, the population of City X increased by 20% and the population of City Y decreased by 10%. If the population of City X was 120,000 in 2010, what was the population of City Y in 2010?

- A) 60,000
- B) 90,000
- C) 160,000
- D) 240,000

17

The volume of a sphere is given by the formula

$$V = \frac{4}{3}\pi r^3, \text{ where } r \text{ is the radius of the sphere. Which}$$

of the following gives the radius of the sphere in

terms of the volume of the sphere?

- A)  $\frac{4\pi}{3V}$
- B)  $\frac{3V}{4\pi}$
- C)  $\sqrt[3]{\frac{4\pi}{3V}}$
- D)  $\sqrt[3]{\frac{3V}{4\pi}}$

18

#### Survey Results

Answer	Percent
Never	31.3%
Rarely	24.3%
Often	13.5%
Always	30.9%

The table above shows the results of a survey in which tablet users were asked how often they would watch video advertisements in order to access streaming content for free. Based on the table, which of the following is closest to the probability that a tablet user answered “Always,” given that the tablet user did not answer “Never”?

- A) 0.31
- B) 0.38
- C) 0.45
- D) 0.69

19

$$y = -(x - 3)^2 + a$$

In the equation above,  $a$  is a constant. The graph of the equation in the  $xy$ -plane is a parabola. Which of the following is true about the parabola?

- A) Its minimum occurs at  $(-3, a)$ .
- B) Its minimum occurs at  $(3, a)$ .
- C) Its maximum occurs at  $(-3, a)$ .
- D) Its maximum occurs at  $(3, a)$ .



20

The maximum value of a data set consisting of 25 positive integers is 84. A new data set consisting of 26 positive integers is created by including 96 in the original data set. Which of the following measures must be 12 greater for the new data set than for the original data set?

- A) The mean
- B) The median
- C) The range
- D) The standard deviation

21

$$0.10x + 0.20y = 0.18(x + y)$$

Clayton will mix  $x$  milliliters of a 10% by mass saline solution with  $y$  milliliters of a 20% by mass saline solution in order to create an 18% by mass saline solution. The equation above represents this situation. If Clayton uses 100 milliliters of the 20% by mass saline solution, how many milliliters of the 10% by mass saline solution must he use?

- A) 5
- B) 25
- C) 50
- D) 100

22

The first year Eleanor organized a fund-raising event, she invited 30 people. For each of the next 5 years, she invited double the number of people she had invited the previous year. If  $f(n)$  is the number of people invited to the fund-raiser  $n$  years after Eleanor began organizing the event, which of the following statements best describes the function  $f$ ?

- A) The function  $f$  is a decreasing linear function.
- B) The function  $f$  is an increasing linear function.
- C) The function  $f$  is a decreasing exponential function.
- D) The function  $f$  is an increasing exponential function.

23

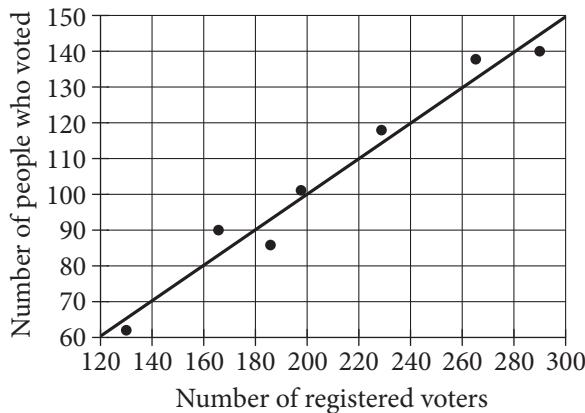
$x$	$a$	$3a$	$5a$
$y$	0	$-a$	$-2a$

Some values of  $x$  and their corresponding values of  $y$  are shown in the table above, where  $a$  is a constant. If there is a linear relationship between  $x$  and  $y$ , which of the following equations represents the relationship?

- A)  $x + 2y = a$
- B)  $x + 2y = 5a$
- C)  $2x - y = -5a$
- D)  $2x - y = 7a$



24



The scatterplot above shows the number of registered voters,  $x$ , and the number of people who voted in the last election,  $y$ , for seven districts in a town. A line of best fit for the data is also shown. Which of the following could be the equation of the line of best fit?

- A)  $y = -0.5x$
- B)  $y = 0.5x$
- C)  $y = -2x$
- D)  $y = 2x$

25

$$\begin{aligned}2.4x - 1.5y &= 0.3 \\1.6x + 0.5y &= -1.3\end{aligned}$$

The system of equations above is graphed in the  $xy$ -plane. What is the  $x$ -coordinate of the intersection point  $(x, y)$  of the system?

- A)  $-0.5$
- B)  $-0.25$
- C)  $0.8$
- D)  $1.75$

26

Keith modeled the growth over several hundred years of a tree population by estimating the number of the trees' pollen grains per square centimeter that were deposited each year within layers of a lake's sediment. He estimated there were 310 pollen grains per square centimeter the first year the grains were deposited, with a 1% annual increase in the number of grains per square centimeter thereafter. Which of the following functions models  $P(t)$ , the number of pollen grains per square centimeter  $t$  years after the first year the grains were deposited?

- A)  $P(t) = 310^t$
- B)  $P(t) = 310^{1.01t}$
- C)  $P(t) = 310(0.99)^t$
- D)  $P(t) = 310(1.01)^t$



27

$$\frac{2}{3}(9x - 6) - 4 = 9x - 6$$

Based on the equation above, what is the value of  $3x - 2$ ?

A)  $-4$

B)  $-\frac{4}{5}$

C)  $-\frac{2}{3}$

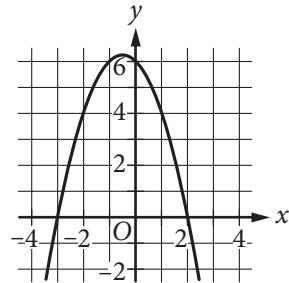
D)  $4$

28

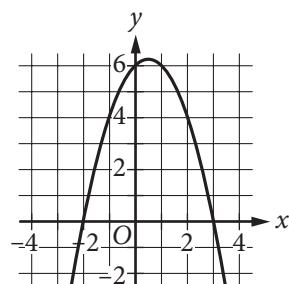
$$f(x) = (x + 3)(x - k)$$

The function  $f$  is defined above. If  $k$  is a positive integer, which of the following could represent the graph of  $y = f(x)$  in the  $xy$ -plane?

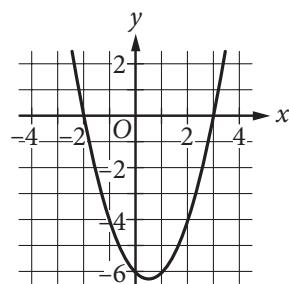
A)



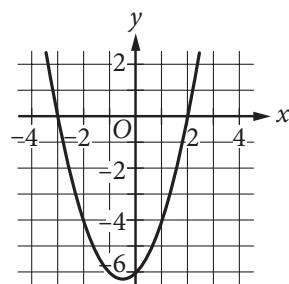
B)



C)



D)





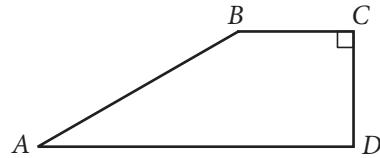
29

$$H = 1.88L + 32.01$$

The formula above can be used to approximate the height  $H$ , in inches, of an adult male based on the length  $L$ , in inches, of his femur. What is the meaning of 1.88 in this context?

- A) The approximate femur length, in inches, for a man with a height of 32.01 inches
- B) The approximate increase in a man's femur length, in inches, for each increase of 32.01 inches in his height
- C) The approximate increase in a man's femur length, in inches, for each one-inch increase in his height
- D) The approximate increase in a man's height, in inches, for each one-inch increase in his femur length

30



In quadrilateral  $ABCD$  above,  $\overline{AD} \parallel \overline{BC}$  and

$$CD = \frac{1}{2} AB. \text{ What is the measure of angle } B?$$

- A)  $150^\circ$
- B)  $135^\circ$
- C)  $120^\circ$
- D)  $90^\circ$

**DIRECTIONS**

For questions 31–38, solve the problem and enter your answer in the grid, as described below, on the answer sheet.

- Although not required, it is suggested that you write your answer in the boxes at the top of the columns to help you fill in the bubbles accurately. You will receive credit only if the bubbles are filled in correctly.
- Mark no more than one bubble in any column.
- No question has a negative answer.
- Some problems may have more than one correct answer. In such cases, grid only one answer.
- Mixed numbers** such as  $3\frac{1}{2}$  must be gridded as 3.5 or  $\frac{7}{2}$ . (If  is entered into the grid, it will be interpreted as  $\frac{31}{2}$ , not  $3\frac{1}{2}$ .)
- Decimal answers:** If you obtain a decimal answer with more digits than the grid can accommodate, it may be either rounded or truncated, but it must fill the entire grid.

Answer:  $\frac{7}{12}$

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

Write answer in boxes.  
Grid in result.

Answer: 2.5

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

← Fraction line  
← Decimal point

Acceptable ways to grid  $\frac{2}{3}$  are:

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

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

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

Answer: 201 – either position is correct

2	0	1
0	0	0
1	1	1
2	2	2
3	3	3

2	0	1	
0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3

**NOTE:**

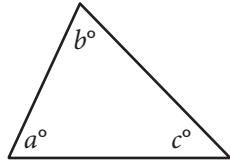
You may start your answers in any column, space permitting. Columns you don't need to use should be left blank.



31

Lynne has \$8.00 to spend on apples and oranges. Apples cost \$0.65 each, and oranges cost \$0.75 each. If there is no tax on this purchase and she buys 5 apples, what is the maximum number of whole oranges she can buy?

32



Note: Figure not drawn to scale.

In the triangle above,  $a = 34$ . What is the value of  $b + c$ ?

33

700, 1200, 1600, 2000,  $x$

If the mean of the five numbers above is 1600, what is the value of  $x$ ?

34

The relationship between  $x$  and  $y$  can be written as  $y = mx$ , where  $m$  is a constant. If  $y = 17$  when  $x = a$ , what is the value of  $y$  when  $x = 2a$ ?



35

$$a(x + b) = 4x + 10$$

In the equation above,  $a$  and  $b$  are constants. If the equation has infinitely many solutions for  $x$ , what is the value of  $b$ ?

36

In the  $xy$ -plane, a line that has the equation  $y = c$  for some constant  $c$  intersects a parabola at exactly one point. If the parabola has the equation  $y = -x^2 + 5x$ , what is the value of  $c$ ?

**Questions 37 and 38 refer to the following information.**

The peregrine falcon can reach speeds of up to 200 miles per hour while diving to catch prey, making it the fastest animal on the planet when in a dive.

37

What is a peregrine falcon's maximum speed while diving to catch prey, in feet per second? (Round your answer to the nearest whole number.  
1 mile = 5280 feet)

38

If a peregrine falcon dove at its maximum speed for half a mile to catch prey, how many seconds would the dive take? (Round your answer to the nearest second.)

**STOP**

**If you finish before time is called, you may check your work on this section only.  
Do not turn to any other section.**

## Answer Explanations

# SAT Practice Test #10

## Section 1: Reading Test

### QUESTION 1

**Choice A is the best answer.** Throughout the passage, the narrator refers to Miss Spivey's 1938 class as "we" and "us" and describes interactions between Miss Spivey and her students as a firsthand observer, indicating that the narrator was a member of this 1938 class. Therefore, the narrator of the passage can best be described as one of Miss Spivey's former students.

Choice B is incorrect because the narrator refers to Miss Spivey's predecessor, Miss Chandler, by name, not as "I" or "me," and therefore the narrator isn't Miss Spivey's predecessor. Choice C is incorrect because the passage identifies the narrator as a member of Miss Spivey's 1938 class and also mentions the narrator's mother and brother, Ralphord. Choice D is incorrect because the narrator refers to Miss Spivey by name and as "she" and "her," not as "I" or "me," and thus can't be Miss Spivey herself.

### QUESTION 2

**Choice B is the best answer.** The description of the train's arrival in the first paragraph suggests that Threestep is a rural town: instead of a paved platform, the tracks are lined with "burned grass." Meanwhile, the description of the school in the sixth paragraph implies that the community is small: instead of individual rooms for separate grade levels, the school's single room contains twenty-six students spread "across seven grade levels." Therefore, Threestep is mainly presented in the passage as a small rural town.

Choice A is incorrect because the narrator describes Threestep as uncomfortably hot for its residents, not as a summer retreat for vacationers. Choice C is incorrect because Miss Spivey refers to prominent universities located in other cities, not ones located in Threestep. Choice D is incorrect because in the first paragraph Threestep is characterized as a small rural town that is experiencing "hard times," not as a comfortable suburb.

### QUESTION 3

**Choice D is the best answer.** In the first paragraph, Miss Spivey remarks that the heat in Georgia is nothing compared to the heat she experienced in Timbuktu. Later in this paragraph the narrator states, “I believe her remark irritated some of the people gathered to welcome her on the burned grass alongside the tracks. When folks are sweating through their shorts, they don’t like to hear that this is *nothing* compared to someplace else.” Hence it can reasonably be inferred from the passage that some of the people at the train station regard Miss Spivey’s comment about the Georgia heat with resentment because they feel that she is minimizing their discomfort.

Choice A is incorrect because Miss Spivey informs the people at the train station that she has experienced even more extreme heat, so they wouldn’t have assumed that she is experiencing intense heat for the first time. Choice B is incorrect because the passage indicates that the people at the station know Miss Spivey is coming to Threestep to work, not that they doubt she will stay there very long. Choice C is incorrect because the passage doesn’t indicate that the people at the train station imagine that she is superior to them.

### QUESTION 4

**Choice B is the best answer.** The previous question asks what can be inferred from the passage about the reaction of the people at the train station to Miss Spivey’s comment about the Georgia heat. The answer, that it can be reasonably inferred from the passage that some of the people at the train station regard Miss Spivey’s comment about the Georgia heat with resentment because they feel that she’s minimizing their discomfort, is best supported in the first paragraph: “I believe her remark irritated some of the people gathered to welcome her on the burned grass alongside the tracks. When folks are sweating through their shorts, they don’t like to hear that this is *nothing* compared to someplace else.”

Choices A, C, and D are incorrect because the cited lines don’t provide the best evidence for the answer to the previous question. Instead, they describe Miss Spivey’s appearance (choice A), reflect on why people viewed her arrival positively in spite of their irritation over her remark (choice C), and outline her education (choice D).

### QUESTION 5

**Choice A is the best answer.** In the second paragraph, Miss Spivey describes a break she took from her formal education as a “fruitful intermission.” She explains that she “traveled extensively in the Near East and Africa with a friend of her grandmother’s, one Janet Miller” during this time. Therefore, Miss Spivey most likely uses the phrase “fruitful intermission” to indicate that she benefited from taking time off from her studies to travel.

Choice B is incorrect because Miss Spivey’s use of the phrase “fruitful intermission” doesn’t indicate that her travels with Janet Miller encouraged her to start medical school. Choice C is incorrect because Miss Spivey uses the phrase “fruitful intermission” to refer to a break in her formal education after boarding school, not during her early years there. Choice D is incorrect because Miss Spivey’s use of the phrase “fruitful intermission” doesn’t indicate that this break lasted longer than she had expected.

## QUESTION 6

**Choice A is the best answer.** In the second paragraph, Miss Spivey tells her class that she went to Barnard College in New York City, which prompts Ralphord to ask her what she studied at “Barnyard College.” In response, Miss Spivey explains that Barnard College “was the sister school of Columbia University, of which, she expected, we all had heard.” This interaction implies that, contrary to Miss Spivey’s expectations, the names of prestigious East Coast schools aren’t common knowledge among her pupils. Thus the interaction between Miss Spivey and Ralphord serves mainly to suggest that Miss Spivey has an exaggerated view of what information should be considered common knowledge.

Choice B is incorrect because the interaction between Miss Spivey and Ralphord establishes an atmosphere of misunderstanding, not friendliness. Choice C is incorrect because Ralphord’s question demonstrates his naivety rather than his precociousness. Choice D is incorrect because the passage doesn’t suggest that Ralphord’s question is an attempt to amuse Miss Spivey.

## QUESTION 7

**Choice D is the best answer.** The third paragraph describes Miss Spivey as having “wandered,” or walked aimlessly, into a lecture by John Dewey. Following her interactions with the professor, Miss Spivey was inspired to work as an educator; consequently, she “marched,” or walked purposefully, to sign up for the Teacher’s College. Hence, by describing Miss Spivey as having “wandered” in the former situation and “marched” in the latter, the narrator is most likely suggesting that Miss Spivey’s initial encounter with Dewey’s ideas was somewhat accidental but ultimately motivated her to decisive action.

Choices A and C are incorrect because the narrator’s description of Miss Spivey as having “wandered” into Dewey’s class and “marched” to sign up for the Teacher’s College suggests that her accidental encounter with him motivated her to begin studying to be a teacher, not that Dewey saw Miss Spivey as lacking confidence in her ability to teach (choice A) or that she was anxious to be in charge of her own classroom (choice C). Choice B is incorrect

because Miss Spivey didn't express a desire to teach in the poorest, most remote corner of America until two years after talking with Dewey over coffee.

## QUESTION 8

**Choice C is the best answer.** According to the third paragraph, after two years at the Teacher's College, Miss Spivey told a woman from the WPA that "she wanted to bring democracy and education to the poorest, darkest, most remote and forgotten corner of America." Consequently, "they sent her to Threestep, Georgia," according to the fourth paragraph. Thus Miss Spivey ended up in Threestep as a direct result of talking with a woman at the WPA.

Choices A and B are incorrect because Miss Spivey ended up in Threestep as a direct result of talking with a woman at the WPA, not as an immediate consequence of her friendship with Janet Miller (choice A), or her decision to attend college in New York City (choice B). Choice D is incorrect because Miss Chandler is mentioned as Miss Spivey's predecessor in Threestep, but Miss Spivey's arrival in town doesn't occur as a direct result of Miss Chandler's retirement.

## QUESTION 9

**Choice C is the best answer.** The ninth paragraph describes the students' reaction to Miss Spivey's announcement that she had seen camels on her trip to Baghdad: "We all hung there for a minute, thinking hard, until Mavis Davis spoke up." Mavis reminds the other students that camels appear in a story they are familiar with. Thus, when Miss Spivey announces that she had seen camels, the students' reaction suggests that they are baffled.

Choices A, B, and D are incorrect because when Miss Spivey announces that she had seen camels, the students' reaction suggests that they are baffled, not delighted (choice A), fascinated (choice B), or worried (choice D).

## QUESTION 10

**Choice B is the best answer.** The previous question asks what the students' reaction suggests about them when Miss Spivey announces that she had seen camels. The answer, that their reaction suggests that they are baffled, is best supported in the ninth paragraph: "We all hung there for a minute, thinking hard, until Mavis Davis spoke up."

Choices A, C, and D are incorrect because the cited lines don't provide the best evidence for the answer to the previous question. Instead, they describe Miss Spivey's anticipation of a delighted or amazed response to her announcement that she had seen camels (choice A),

relay Mavis’s reference to a story familiar to the students (choice C), and reflect on the subdued nature of Miss Spivey’s response to Mavis (choice D).

## QUESTION 11

**Choice D is the best answer.** Throughout the passage, the author contends that efforts to make driving more unpleasant can curtail the negative environmental effects of car use, such as the rapid growth of “energy-hungry subdivisions.” According to the second paragraph, “one of the few forces with a proven ability to slow the growth of suburban sprawl has been the ultimately finite tolerance of commuters for long, annoying commutes.” Consequently, according to the last paragraph, “from an environmental perspective, inconvenient travel is a worthy goal.” Thus the main purpose of the passage is to argue that one way to reduce the negative environmental effects of traffic is to make driving less agreeable.

Choice A is incorrect because the author introduces the claim that efforts to reduce traffic actually increase traffic as a supporting point, not as the main purpose of the passage. Choice B is incorrect because, in the second paragraph, the author does dispute the environmental value of making car travel more convenient, but this isn’t the main purpose of the passage. Choice C is incorrect because the negative environmental consequences of car-focused development and suburban sprawl are supporting details of the passage, not its main purpose.

## QUESTION 12

**Choice A is the best answer.** In the first paragraph, the author states, “Building good transit isn’t a bad idea, but it can actually backfire if the new trains and buses merely clear space on highway lanes for those who would prefer to drive—a group that, historically, has included almost everyone with access to a car.” In this sentence, the author bases his claim about the unintended consequences of building public transit on the expectation that most people would prefer to drive a car than take trains and buses. Hence this sentence best supports the idea that the author assumes that, all things being equal, people would rather drive than take mass transit.

Choices B, C, and D are incorrect because the cited lines don’t provide the best support for the idea that the author assumes that, all things being equal, people would rather drive than take mass transit. Instead, they argue that in order to have positive environmental effects, new transit options have to persuade a substantial number of people not to drive (choice B), contend that unpopular efforts to make driving less convenient are necessary to reduce driving (choice C), and connect increased commute times to a reduction in suburban sprawl (choice D).

## QUESTION 13

**Choice A is the best answer.** The first paragraph states, “That means that a new transit system has to be backed up by something that impels complementary reductions in car use.” In other words, new public transportation initiatives need to be supported, or reinforced, by policies that reduce car use. Thus “backed up,” as used in the passage, most nearly means supported.

Choices B, C, and D are incorrect because in the context of the passage, “backed up” means supported, not copied (choice B), substituted (choice C), or jammed (choice D).

## QUESTION 14

**Choice B is the best answer.** In the first paragraph, the author introduces some proposals for reducing car traffic by making driving slower and less convenient. However, he also acknowledges that “those ideas are not popular.” Thus, in the first paragraph, the author concedes that his recommendations aren’t widely supported.

Choice A is incorrect because, in the first paragraph, the author doesn’t indicate that his recommendations are costly to implement. Choice C is incorrect because the author concedes that his recommendations are unpopular with the general public, not strongly opposed by experts. Choice D is incorrect because the author suggests that his recommendations are environmentally beneficial in the long term, not environmentally harmful in the short term.

## QUESTION 15

**Choice C is the best answer.** In the second paragraph, the author argues that “if, in a misguided effort to do something of environmental value, municipalities take steps that make long-distance car commuting faster or more convenient . . . we actually make the sprawl problem worse.” That is, measures that make driving more convenient actually harm the environment because they encourage more people to live in suburban developments, which represents wasteful expansion in his view. Therefore, based on the passage, the author would most likely characterize many attempts to improve traffic as well intentioned but ultimately leading to environmental harm.

Choices A, B, and D are incorrect because the author doesn’t characterize attempts to improve traffic as doomed to fail due to drivers’ reluctance to change their behavior (choice A), as overestimating drivers’ tolerance of long commutes (choice B), or as viable only if they make driving more economical and productive (choice D).

## QUESTION 16

**Choice C is the best answer.** The previous question asks how the author would most likely characterize many attempts to improve traffic. The answer, that the author would most likely characterize such attempts as well intentioned but ultimately leading to environmental harm, is best supported in the second paragraph: “If, in a misguided effort to do something of environmental value, municipalities take steps that make long-distance car commuting faster or more convenient—by adding lanes, building bypasses, employing traffic-control measures that make it possible for existing roads to accommodate more cars with fewer delays, replacing tollbooths with radio-based systems that don’t require drivers even to slow down—we actually make the sprawl problem worse.”

Choices A, B, and D are incorrect because the cited lines don’t provide the best evidence for the answer to the previous question. Instead, they assert that public transit improvements must be supported by measures to reduce car use (choice A), indicate that tolerance for long commutes has grown recently, but has a natural limit (choice B), and elaborate on why improvements in public transport can fail to decrease road use (choice D).

## QUESTION 17

**Choice D is the best answer.** The second paragraph discusses how efforts to make commuting more convenient can have the unintended consequence of encouraging people to live farther away from their jobs: “If you cut commuting time by 10 percent, people who now drive fifty miles each way to work can justify moving five miles farther out, because their travel time won’t change.” Therefore, according to the passage, reducing commuting time for drivers can have the effect of making drivers more willing to live farther from their places of employment.

Choices A, B, and C are incorrect because the passage doesn’t suggest that reducing commuting time can make drivers more productive employees (choice A), can cause mass transit to be extended farther into suburban areas (choice B), or can result in less government funding for mass transit (choice C).

## QUESTION 18

**Choice C is the best answer.** The last paragraph asserts, “No one ever promotes a transit scheme by arguing that it would make traveling less convenient.” In other words, nobody advocates, or pushes for, changes to the transportation system by arguing that they would make traveling less convenient. Thus “promotes,” as used in the passage, most nearly means advocates.

Choices A, B, and D are incorrect because in the context of the passage, “promotes” means advocates, not upgrades (choice A), serves (choice B), or develops (choice D).

### QUESTION 19

**Choice B is the best answer.** Figure 1 presents data related to the effect of route capacity reduction on selected regions. In the row pertaining to Southampton city center, the number 5,316 appears under the heading “Vehicles per day on altered road” in the column that specifies “Before alteration.” Thus, according to figure 1, the number of vehicles that traveled on the altered road through Southampton city center per day before the route was altered is 5,316.

Choice A is incorrect because 3,081 is the number of vehicles per day that traveled on the Southampton city center road after it was altered, not before. Choice C is incorrect because 24,101 is the number of vehicles per day that traveled on roads surrounding the Southampton city center road after it was altered. Choice D is incorrect because 26,522 is the number of vehicles that traveled on roads surrounding the Southampton city center road before it was altered.

### QUESTION 20

**Choice B is the best answer.** In the first paragraph, the author of the passage argues that “to have environmental value . . . a new transit system has to be backed up by something that impels complementary reductions in car use—say, the physical elimination of traffic lanes.” According to figure 1, reducing route capacity resulted in a net reduction in regional traffic in all five areas studied. Therefore, the data in figure 1 support the author’s argument because the data show that reducing road capacity can lead to a net reduction in traffic.

Choice A is incorrect. Figure 1 data support the author’s argument that route capacity reduction results in a reduction of car use, but the figure doesn’t provide data relating to the “induced traffic” phenomenon. Choices C and D are incorrect because figure 1 data support, not weaken, the author’s argument that route capacity reduction such as elimination of traffic lanes results in reduction of traffic.

### QUESTION 21

**Choice D is the best answer.** Figure 2 presents data related to an opinion poll of transportation engineers. According to the y-axis label, the engineers were asked whether a significant road space reallocation could result in people changing various aspects of their driving. The graph shows four different answer possibilities: “yes,” “yes (in exceptional circumstances),” “no,” and “don’t know.” The question asks for the aspect of driver behavior that the engineers surveyed thought was least likely to change in the event of a reallocation of road space according to figure 2: when they travel,

their means of traveling, how often they make a journey, or their driving style. Of these four choices, “their driving style,” received the smallest percentage of “yes” and “yes (in exceptional circumstances)” responses and the largest percentage of “no” responses. Hence, based on figure 2, the engineers surveyed were most skeptical of the idea that, in the event of a reallocation of road space, drivers would change their driving style.

Choices A, B, and C are incorrect because, according to figure 2, when the engineers were asked whether they thought that drivers would change when they travel (choice A), their means of traveling (choice B), or how often they make a journey (choice C) in the event of a significant road space reallocation, they gave more “yes” or “yes (in exceptional circumstances)” answers, and fewer “no” answers than they gave in response to the question of whether they thought drivers would change their driving style. Thus the engineers were less skeptical of these potential changes than they were of the idea that drivers would change their driving style in the event of a significant road space reallocation.

## QUESTION 22

**Choice D is the best answer.** The first paragraph asserts that textbook authors in the early 1990s believed that “sensations of pressure and vibration . . . travel only along myelinated, fast-signaling nerve fibers.” Thus, based on the passage, textbook authors in the early 1990s would most likely have expected that the ability to perceive vibrations would be impaired as a result of blocking fast fibers.

Choices A, B, and C are incorrect because the passage indicates that textbook authors in the early 1990s believed blocking fast nerve fibers would impair sensations of vibration, not that blocking would increase the firing rate of other fibers (choice A), cause gentle stimuli to be perceived as painful (choice B), or make the body compensate by using slow fibers to sense pressure (choice C).

## QUESTION 23

**Choice B is the best answer.** The previous question asks what condition textbook authors in the early 1990s would most likely have expected to result from blocking fast fibers. The answer, that they would most likely have expected blocking fast fibers to result in an impairment of the ability to perceive vibrations, is best supported in the first paragraph, which refers to the views of textbook authors in the early 1990s: “Sensations of pressure and vibration were believed to travel only along myelinated, fast-signaling nerve fibers, which also give information about location.”

Choices A, C, and D are incorrect because the cited lines don’t provide the best evidence for the answer to the previous question. Instead, they assert that textbook authors in the early 1990s believed

slow-conducting nerves responded only to pain and temperature stimuli (choice A), noted that blocking slow fibers only seemed to reduce sensitivity to warmth or small painful shocks (choice C), and knew that fast-conducting fibers responded to touch at a signal rate of 35 to 75 m/s (choice D).

### QUESTION 24

**Choice A is the best answer.** The second paragraph states, “Håkan Olausson and his Gothenburg University colleagues Åke Vallbo and Johan Wessberg wondered if slow fibers responsive to gentle pressure might be active in humans as well as in other mammals.” In other words, the researchers wondered if these nerves were present, or existent, in humans and other mammals. Therefore, in the context of the passage, the word “active” most nearly means present.

Choices B, C, and D are incorrect because in the context of the passage, “active” most nearly means present, not attentive (choice B), movable (choice C), or restless (choice D).

### QUESTION 25

**Choice C is the best answer.** The second paragraph states, “Using a technique called microneurography, in which a fine filament is inserted into a single nerve to capture its electrical impulses, the scientists were able to measure how quickly—or slowly—the nerves fired.” In other words, the researchers used the technique known as microneurography to record, or register, the electrical signals sent by nerve fibers. Therefore, in the context of the passage, the word “capture” most nearly means record.

Choices A, B, and D are incorrect because in the context of the passage, “capture” most nearly means record, not occupy (choice A), seize (choice B), or influence (choice D).

### QUESTION 26

**Choice C is the best answer.** According to the passage, different types of nerve fibers carry signals at different speeds, either fast or slow. The second paragraph outlines a study led by Håkan Olausson in 1993 that measured the response time of nerves when exposed to gentle pressure. Olausson and his team found that “soft stroking prompted two different signals” in test subjects’ nerve fibers, “one immediate and one delayed.” Therefore, the conclusion that is best supported by the findings of Olausson’s 1993 experiment is that gentle pressure is sensed not only by fast fibers but also by slow fibers.

Choices A and D are incorrect because according to the passage, Olausson’s 1993 study didn’t compare how signal speed was affected by stimulation in different bodily areas (choice A) or by different

amounts of pressure applied to the nerve (choice D). Choice B is incorrect because the passage notes that only human hairy skin contains slow nerve fibers, not that hair causes signal speeds to slow.

## QUESTION 27

**Choice B is the best answer.** The previous question asks which conclusion is best supported by the findings of Olausson's 1993 experiment. The answer, that Olausson's 1993 experiment best supports the conclusion that gentle pressure is sensed not only by fast fibers but also by slow fibers, is best supported in the second paragraph: Olausson's team "showed that soft stroking prompted two different signals, one immediate and one delayed."

Choices A, C, and D are incorrect because the cited lines don't provide the best evidence for the answer to the previous question. Instead, they describe a technique used by Olausson's team (choice A), quantify the amount of time between the fast signals and the slow signals observed by Olausson's team (choice C), and introduce a further study conducted by Olausson's team in 1999 (choice D).

## QUESTION 28

**Choice D is the best answer.** This sentence from the fourth paragraph outlines a quandary that arose from the 1999 study conducted by Olausson's team: "But why exactly humans might have such fibers, which respond only to a narrow range of rather subtle stimuli, was initially mystifying." The passage presents this line of inquiry as a justification for the team's subsequent research on CT fibers. Thus this sentence serves mainly to show a problem from the perspective of Olausson's team.

Choices A, B, and C are incorrect. The cited lines serve mainly to show a problem from the perspective of Olausson's team, not to identify factors Olausson had previously failed to consider (choice A), propose a solution to a dilemma encountered by Olausson (choice B), or anticipate a potential criticism of Olausson by the reader (choice C).

## QUESTION 29

**Choice A is the best answer.** According to the fifth paragraph, Olausson set out to discover, in his team's 1999 research, whether a CT nerve "can distinguish *where* the brush touches the arm, and whether it can discern the difference between a goat-hair brush and a feather. Most importantly, could that same fiber convey a pleasant sensation?" Therefore, it can reasonably be inferred that one of the intended goals of the 1999 experiment was to determine the precise nature of sensations that CT fibers can convey.

Choices B, C, and D are incorrect because in their 1999 research, Olausson's team didn't seek to determine the relationship between human body hair and CT fiber function (choice B), the role played by CT fibers in the perception of pain (choice C), or the effects of microneurography on CT fiber signaling (choice D).

### QUESTION 30

**Choice D is the best answer.** In the 1999 study, Olausson's team conducted experiments on a patient known as G.L. The researchers wanted to learn more about what type of sensations slow-conducting CT nerve fibers transmit, and G.L. was of special interest to them, according to the sixth paragraph: "More than 2 decades earlier . . . she had lost responsiveness to pressure, and a nerve biopsy confirmed that G.L.'s quick-conducting fibers were gone. . . . But she could still sense warmth, suggesting that her slow-conducting unmyelinated fibers were intact." The fact that G.L.'s slow-conducting fibers were still intact while her other nerves were unresponsive allowed Olausson's team to study her slow-conducting CT fibers in isolation. Thus the main purpose of the sixth paragraph is to indicate why G.L.'s medical condition was of value to Olausson's experiment.

Choices A, B, and C are incorrect because the sixth paragraph doesn't indicate that Olausson's team set out to relieve any of the neurological conditions that G.L. exhibited (choice A), compare G.L.'s nerve function with that of other adults (choice B), or detail any procedures that G.L. had experienced during previous experiments (choice C).

### QUESTION 31

**Choice A is the best answer.** According to the last paragraph, "in normal subjects, both the somatosensory and insular cortices were activated [by gentle brushing], but only the insular cortex [which processes emotion] was active when researchers brushed G.L.'s arm." Therefore, according to the passage, G.L. differed from Olausson's other test subjects in terms of the number of cortices activated in the brain during gentle brushing.

Choice B is incorrect because the passage doesn't address the physical dimensions of the somatosensory cortex in G.L. or other test subjects. Choice C is incorrect because G.L. differed from other test subjects in terms of the number of cortices activated in the brain during gentle brushing, not in terms of the intensity of nerve signals required to activate the insular cortex. Choice D is incorrect because MRI scanning is discussed in the passage as a method used to locate brain activity, not as a focus of study in Olausson's research.

## QUESTION 32

**Choice B is the best answer.** According to the last paragraph, Olausson's 1999 research, in which CT fibers were stimulated, "solidified the notion that CT fibers convey a more emotional quality of touch." Hence humans experience an emotional aspect of touch when CT fibers are exposed to a stimulus, according to the passage.

Choice A is incorrect because the passage doesn't indicate that humans experience an emotional aspect of touch when brain cortices are shielded from nerve signals. Choice C is incorrect because the suppression of G.L.'s pain-sensing fibers did help Olausson study CT fibers in isolation and determine that they transmit an emotional aspect of touch, but the passage doesn't suggest that suppressing these fibers is what allows humans to experience this emotional aspect of touch. Choice D is incorrect because the passage indicates that CT fibers transmit an emotional aspect of touch rather than conscious aspects of sensation, not that humans must ignore the conscious aspects of sensation in order to experience the emotional aspects of touch.

## QUESTION 33

**Choice C is the best answer.** In the first paragraph of Passage 1, Beveridge portrays America as "a noble land that God has given us; a land that can feed and clothe the world; a land whose coast lines would enclose half the countries of Europe." Thus, in Passage 1, Beveridge asserts that the resources and immensity of the United States constitute a divine gift to the American people.

Choice A is incorrect because Beveridge envisions Americans occupying foreign lands, not being subject to foreign invasion; moreover, he asserts that the resources and immensity of the United States constitute a divine gift, not a safeguard against invasion. Choice B is incorrect because Beveridge asserts that American society constitutes an improvement on English society, not that the resources and immensity of the United States replicate conditions in Europe. Choice D is incorrect because Beveridge doesn't assert that the resources and immensity of the United States constitute a source of envy for people in other countries.

## QUESTION 34

**Choice B is the best answer.** In the second paragraph of Passage 1, Beveridge commands his audience several times to think of a future in which American laws and customs have been extended to foreign countries, leading American citizens to move to those places.

According to Beveridge, this will provide Hawaii and Puerto Rico with "justice and safety," the Philippines with "order and equity," and Cuba with a "civilization of energy and industry." Thus, in the second paragraph of Passage 1, the commands given by Beveridge mainly serve to anticipate the benefits of a proposed policy.

Choices A, C, and D are incorrect because Beveridge's commands serve to anticipate the benefits of a proposed foreign policy, not to remind the audience of its civic responsibilities (choice A), emphasize the urgency of a national problem (choice C), or refute an argument advanced by opponents (choice D).

### QUESTION 35

**Choice B is the best answer.** The fourth paragraph of Passage 2 asserts that “a truth once spoken can never be recalled. It goes on and on, and no one can set a limit to its ever-widening influence.” In other words, when a true idea has been introduced to the world, it can never be retracted, or taken back. Therefore, in the context of the passage, the word “recalled” most nearly means retracted.

Choices A, C, and D are incorrect because in the context of the passage, “recalled” most nearly means retracted, not repeated (choice A), rejected (choice C), or remembered (choice D).

### QUESTION 36

**Choice D is the best answer.** In the fourth paragraph of Passage 2, Bryan argues that the principle of self-rule set forth in the Declaration of Independence is, in fact, a value that all people instinctively aspire to. Indeed, for Bryan, “[God] never made a race of people so low in the scale of civilization or intelligence that it would welcome a foreign master.” Therefore, it can reasonably be inferred from Passage 2 that Bryan considers the preference for national sovereignty over foreign rule to be a manifestation of an innate drive in humans toward self-rule.

Choices A and C are incorrect because it can reasonably be inferred that Bryan considers the preference for national sovereignty over foreign rule to be a manifestation of a universal drive in humans that’s independent of circumstances, not a reaction to the excesses of imperial governments in the modern era (choice A) or a testament to the effects of the foreign policy of the United States (choice C). Choice B is incorrect because Bryan indicates that a preference for self-rule is universal, not that belief in human equality is widespread.

### QUESTION 37

**Choice C is the best answer.** The previous question asks what can reasonably be inferred from Passage 2 about Bryan’s views on the preference for national sovereignty over foreign rule. The answer, that Bryan considers the preference to be a manifestation of an innate drive in humans toward self-rule, is best supported in the fourth paragraph of Passage 2: “[God] never made a race of people so low in the scale of civilization or intelligence that it would welcome a foreign master.”

Choices A, B, and D are incorrect because the cited lines don't provide the best evidence for the answer to the previous question. Instead, they indicate that explicitly promoting imperialism would run counter to the words of American founding father Patrick Henry (choice A), assert that once a truth is uttered, its influence will continually grow (choice B), and introduce the notion that, in Bryan's view, an imperial project in the Philippines would hurt not only the people of that nation but also the people of the United States (choice D).

## QUESTION 38

**Choice A is the best answer.** The last paragraph of Passage 2 states, "Those who would have this Nation enter upon a career of empire must consider, not only the effect of imperialism on the Filipinos, but they must also calculate its effects upon our own nation." In other words, proponents of imperial conquest must evaluate, or assess, the consequences of this policy for the United States. Therefore, in the context of the passage, the word "calculate" most nearly means evaluate.

Choices B, C, and D are incorrect because in the context of the passage, "calculate" most nearly means evaluate, not design (choice B), assume (choice C), or multiply (choice D).

## QUESTION 39

**Choice A is the best answer.** In the first paragraph of Passage 1, Beveridge references the founding and history of the United States as "a glorious history" that was bestowed upon God's "chosen people," a history heroic with faith in its mission and future, and "statesmen, who flung the boundaries of the Republic out into unexplored lands." Similarly, in the second paragraph of Passage 2, Bryan declares, "Our whole history has been an encouragement . . . to all who are denied a voice in their own government." Bryan goes on to extol the virtues of several figures who were instrumental in the founding of the United States, including Thomas Jefferson and George Washington. Hence, in developing their respective arguments, Beveridge (Passage 1) and Bryan (Passage 2) both express admiration for the founding and history of the United States.

Choice B is incorrect because neither Bryan, in Passage 1, nor Beveridge, in Passage 2, expresses admiration for the vibrancy and diversity of American culture. Choice C is incorrect because Bryan expresses admiration for the worldwide history of struggles for independence, but Beveridge doesn't. Choice D is incorrect because Beveridge expresses admiration for the idealism that permeates many aspects of American society, but Bryan doesn't.

## QUESTION 40

**Choice B is the best answer.** In the first paragraph of Passage 1, Beveridge argues that Americans are “imperial by virtue of their power” and are therefore justified in being “the propagandists . . . of liberty.” In the second paragraph, he extols the benefits that will arise from American administration of various island nations. Meanwhile, in the last sentence of Passage 2, Bryan cautions, “We cannot repudiate the principle of self-government in the Philippines without weakening that principle here”; in other words, imperial expansion by the United States would erode a key American value. Therefore, the difference between how the speakers view liberty as it is realized in the United States is that Beveridge considers it so exemplary as to justify the conquest of other regions, whereas Bryan warns that its exemplary quality would be undermined by imperial expansion.

Choice A is incorrect because Beveridge doesn’t present the concept of liberty as it’s realized in the United States as the direct inheritance of European colonization. Choice C is incorrect because Beveridge doesn’t argue that the concept of liberty as it’s realized in the United States arose organically as the country matured; instead, both Beveridge and Bryan emphasize the divinely inspired, intrinsic nature of the American concept of liberty. Choice D is incorrect because Bryan views the concept of liberty as it’s realized in the United States as encompassing a desire for self-rule and argues that this desire is universal and not unique to the United States.

## QUESTION 41

**Choice D is the best answer.** In Passage 1, Beveridge advocates for American administration of island nations, such as the Philippines. However, in the first paragraph of Passage 2, Bryan warns, “If it is right for the United States to hold the Philippine Islands permanently and imitate European empires in the government of colonies, the Republican party . . . must expect the subject races to protest against such a policy and to resist to the extent of their ability.” Thus it can most reasonably be inferred from Passage 2 that Bryan would criticize the vision of American governance of island territories that Beveridge presents in Passage 1 for being naive, since the islanders would object to being governed by Americans.

Choices A, B, and C are incorrect because, in Passage 2, Bryan doesn’t imply that Beveridge’s vision of American governance of island territories is unrealistic due to most Americans’ unwillingness to relocate to distant islands (choice A), deceptive due to the fact that economic domination would be the true goal of the American government (choice B), or impractical due to the islanders’ insistence upon an equal distribution of resources (choice C).

## QUESTION 42

**Choice A is the best answer.** The previous question asks what criticism Bryan would most likely make of Beveridge's vision of American governance of island territories. The answer, that Bryan would criticize this vision for being naive, since islanders would object to being governed by Americans, is best supported by the first paragraph of Passage 2: "If it is right for the United States to hold the Philippine Islands permanently and imitate European empires in the government of colonies, the Republican party ought to state its position and defend it, but it must expect the subject races to protest against such a policy and to resist to the extent of their ability."

Choices B, C, and D are incorrect because the cited lines don't provide the best evidence for the answer to the previous question. Instead, they assert that the people of the Philippines don't need encouragement from Americans to resist imperialism (choice B), state that American history encourages resistance to imperialism by all people, including the people of the Philippines (choice C), and note the enduring resonance of Patrick Henry's famous quote about liberty (choice D).

## QUESTION 43

**Choice A is the best answer.** The passage summarizes research on the relationship between plowing and weed growth. According to the fourth paragraph, the research of Karl Hartmann suggests that plowing fields during the day leads to weed growth because exposure to even small amounts of light can "induce seed germination," or cause seeds to sprout. Thus, according to the passage, exposure to light allows seeds to begin to develop.

Choices B and D are incorrect because the passage indicates that small amounts of light cause seeds to sprout, but it doesn't explicitly assert that light exposure allows seeds to absorb necessary nutrients (choice B) and doesn't discuss whether light exposure helps seeds achieve maximum growth (choice D). Choice C is incorrect because the passage doesn't indicate that light exposure can help seeds withstand extreme temperatures.

## QUESTION 44

**Choice B is the best answer.** In the second paragraph of the passage, the following question is posed: "Do the blades of a plow, which can reach more than a foot beneath the soil surface, bring some of these buried seeds to the surface where their germination is induced by exposure to sunlight?" The passage goes on to describe research conducted both in the laboratory and in the field that sought to answer this question. Hence the question in the second paragraph primarily serves to introduce the specific research topic addressed in the passage.

Choice A is incorrect because the question in the second paragraph doesn't primarily serve to emphasize the provisional nature of the findings discussed in the passage. Sauer and Struik's 1960s lab experiments, described in the third paragraph, produced findings that could be characterized as provisional; however, Karl Hartmann's research described in the fourth paragraph clearly demonstrated that plowing at night can be an effective way to reduce weed growth. Choice C is incorrect because the impact of the studies analyzed in the passage has been real and practical, not hypothetical. Choice D is incorrect because the question in the second paragraph doesn't indicate that there is any significant disagreement about the methods explored in the passage.

### QUESTION 45

**Choice D is the best answer.** The last sentence of the second paragraph asks, "Do the blades of a plow . . . bring some of these buried seeds to the surface where their germination is induced by exposure to sunlight?" In other words, does some farm equipment bring buried seeds to the surface where their sprouting is stimulated, or activated, by exposure to sunlight? Therefore, in the context of the passage, the word "induced" most nearly means stimulated.

Choices A, B, and C are incorrect because in the context of the passage, "induced" most nearly means stimulated, not lured (choice A), established (choice B), or convinced (choice C).

### QUESTION 46

**Choice C is the best answer.** The question asks which selection from the passage best supports the idea that seeds present in fields plowed at night are exposed to some amount of light. The fourth paragraph asserts that plowing at night can reduce the germination of weed seeds. The paragraph concludes that "although even under these conditions hundreds of millions of photons strike each square millimeter of ground each second, this illumination is below the threshold needed to stimulate the germination of most seeds." Thus this sentence best supports the idea that seeds present in fields plowed at night are exposed to some amount of light.

Choices A, B, and D are incorrect because the cited lines don't provide the best support for the idea that seeds present in fields plowed at night are exposed to some amount of light. Instead, they relay Hartmann's initial reasoning about seed exposure to light in fields plowed during the day (choice A), affirm that even minute durations of sunlight exposure can induce seed germination (choice B), and explain Hartmann's initial skepticism regarding his own idea about the effectiveness of nighttime plowing as a weed deterrent (choice D).

## QUESTION 47

**Choice A is the best answer.** The sixth paragraph describes an experiment conducted by Karl Hartmann with the help of farmer Karl Seydel. Seydel plowed one strip of land during the day and the other at night to see what effect this had on weed growth. However, “no crops were planted in these pilot experiments, to avoid possible competition with the emerging weeds.” Thus the passage suggests that if Seydel had planted wheat or corn on the two agricultural strips in Hartmann’s experiment, the percentage of the surface of each strip covered with weeds would likely have been lower than the percentage that Hartmann found.

Choice B is incorrect. If Seydel had planted wheat or corn crops on the two agricultural strips, the percentage of weeds wouldn’t have been higher than the percentage predicted because competition with the crops would have prevented some weed growth. Choice C is incorrect because a reduction in weed growth would have been easily observable, not nearly impossible for Hartmann to determine. Choice D is incorrect. Hartmann’s original projection was that plowing at night wouldn’t provide more effective weed control. Therefore, the dramatic drop in the percentage of weeds covering the strip plowed at night wouldn’t have been comparable with Hartmann’s original projection, regardless of whether crops were planted.

## QUESTION 48

**Choice B is the best answer.** The previous question asks what the passage suggests about the percentage of surface that would have been covered with weeds if Seydel had planted wheat or corn on the two agricultural strips in Hartmann’s experiment. The answer, that the percentage of surface with weeds would have been lower than the percentage Hartmann found, is best supported in the sixth paragraph: “No crops were planted in these pilot experiments, to avoid possible competition with the emerging weeds.”

Choices A, C, and D are incorrect because the cited lines don’t provide the best evidence for the answer to the previous question. Instead, they describe the conditions of Hartmann’s experiment (choice A), characterize the results of the experiment as dramatic (choice C), and report the results of the experiment (choice D).

## QUESTION 49

**Choice C is the best answer.** The sixth paragraph states, in reference to Hartmann’s experiment, “The results were dramatic. More than 80 percent of the surface of the field plowed in daylight was covered by weeds, whereas only about 2 percent of the field plowed at night was covered by weeds.” In other words, the outcome of the experiment was impressive, or striking. Therefore, in the context of the passage, the word “dramatic” most nearly means impressive.

Choices A, B, and D are incorrect because, in the context of the passage, “dramatic” most nearly means impressive, not theatrical (choice A), sudden (choice B), or emotional (choice D).

## QUESTION 50

**Choice A is the best answer.** According to the table, 0 weed seedlings emerged in sample A when the soil was disturbed in darkness. This is the lowest number of seedlings recorded among all the samples in the table when the soil was disturbed in darkness.

Choices B, C, and D are incorrect because sample B (choice B), sample C (choice C), and sample D (choice D) had 1, 2, and 3 seedlings emerge, respectively, when the soil was disturbed in darkness. These totals are all greater than 0, the number of seedlings that emerged from sample A when the soil was disturbed in darkness.

## QUESTION 51

**Choice C is the best answer.** According to the table, 14 weed seedlings emerged in sample I when the soil was disturbed in light. This is the highest number of seedlings recorded among all the samples in the table when the soil was disturbed in light.

Choices A, B, and D are incorrect because sample G (choice A), sample H (choice B), and sample J (choice D) had 0, 2, and 5 seedlings emerge, respectively, when the soil was disturbed in light. This is less than the 14 seedlings that emerged from sample I when the soil was disturbed in light.

## QUESTION 52

**Choice D is the best answer.** The data presented in the table show that in nine of the ten soil samples studied, fewer weeds grew in the soil when it was disturbed in darkness than when it was disturbed in light. The fourth paragraph relays Karl Hartmann’s hypothesis based on Sauer and Struik’s studies of weed growth in the 1960s: “Thus the germination of weed seeds would be minimized if farmers simply plowed their fields during the night, when the photon fluence rate [the rate at which photons hit the surface] is below  $10^{15}$  photons per square meter per second.” Therefore, the data presented in the table most directly support the claim made in the fourth paragraph of the passage.

Choices A, B, and C are incorrect because the cited lines aren’t directly supported by the data presented in the table. While the findings in the table report on weed growth in soil stirred up during the day and night, these lines discuss the prehistoric use of plowing to control weeds (choice A), the number of weed seeds buried beneath the soil surface (choice B), and the depth at which seeds are buried that prevents them from germinating (choice C).

## Section 2: Writing and Language Test

### QUESTION 1

**Choice A is the best answer.** The conjunction “and” appropriately separates the last two nouns in the series, “radio” and “other media.”

Choices B, C, and D are incorrect because “and with,” “and also,” and “and competing with” disrupt the parallel structure of the series of three nouns (“television,” “radio,” “[other] media”) introduced by “competing with.”

### QUESTION 2

**Choice D is the best answer.** The topic of the passage is the creation of *The Cat in the Hat* as a means of getting children more interested in learning to read. Hersey’s suggestion that one way of making children’s books more interesting was to use “drawings like those of the wonderfully imaginative geniuses among children’s illustrators” best supports the topic of the passage.

Choices A, B, and C are incorrect because they don’t support the topic of the passage. A sense of wholeness and accomplishment, the value of failure, and a difference between journalism and fiction don’t support the idea of making children’s literature more interesting.

### QUESTION 3

**Choice A is the best answer.** The comma after “Spaulding” is paired correctly with the comma after “Mifflin” to set off grammatically nonessential information.

Choice B is incorrect because a comma is needed after “Spaulding” to set off the nonessential phrase that ends with “Mifflin.” Choice C is incorrect because placing a comma after “Spaulding” and after “director” wrongly indicates that “the director” could be deleted without changing the meaning of the sentence. Choice D is incorrect because a dash can’t be paired with a comma to set off grammatically nonessential information.

### QUESTION 4

**Choice A is the best answer.** This choice most effectively combines the sentences at the underlined portion because it’s concise and correctly indicates that Spaulding saw a need for appealing books for beginning readers at the same time that he thought he knew who should write one.

Choice B is incorrect because “namely” indicates that a more specific restatement of an earlier point or an example will follow. In this case, what follows the idea that Spaulding saw a need for appealing books is his thought about who should write one. Choice C is incorrect because the repetition of Spaulding’s name is unnecessary.

Choice D is incorrect because the adverb “meanwhile” is redundant; the conjunction “and” is sufficient to indicate that Spaulding had two thoughts simultaneously.

## QUESTION 5

**Choice D is the best answer.** This choice, which indicates that Geisel published nine children’s books and received three nominations for the prestigious Caldecott Medal, supports the information that follows in the sentence about Geisel being an experienced writer and illustrator.

Choices A, B, and C are incorrect. Geisel’s long relationship with Spaulding, Geisel’s reputation for perfectionism and for setting high standards, and his interest in politics don’t support the idea that Geisel was an experienced writer and illustrator.

## QUESTION 6

**Choice A is the best answer;** “however” correctly indicates that even though Geisel was an experienced writer and illustrator, the new project presented him with an obstacle.

Choices B, C, and D are incorrect because none of these transitional words or phrases shows the true relationship between the challenging nature of the new project and Geisel’s experience. “For example,” “furthermore,” and “at any rate” indicate that what follows is an instance of, additional to, or unrelated to what was stated in the previous sentence.

## QUESTION 7

**Choice C is the best answer.** The introductory phrase “on the verge of giving up” doesn’t have its own subject. Instead, the subject appears at the beginning of the sentence’s main clause and makes clear what is being described in the introductory phrase. “Geisel” is the logical subject of the sentence because he can be described as being “on the verge of giving up.”

Choices A, B, and D are incorrect because “Geisel’s story,” “an image,” and “the story” can’t be described as being “on the verge of giving up.”

## QUESTION 8

**Choice D is the best answer.** This choice concisely indicates that it took Geisel nine months to complete *The Cat in the Hat*.

Choices A, B, and C are incorrect because they’re repetitive. “Duration” and “long” (choice A), “thirty-six weeks” (choice B), and “length” (choice C) unnecessarily repeat the idea that nine months had passed.

## QUESTION 9

**Choice D is the best answer.** The underlined portion should be deleted because it isn't necessary. Since “were entertained” appears earlier in the sentence, the past participle “captivated” is sufficient without the repetition of “were.”

Choices A, B, and C are incorrect because “is captivated,” “was captivated,” and “has been captivated” are singular verbs that don’t agree in number with the plural subject “children.”

## QUESTION 10

**Choice C is the best answer.** The comma after “followed” is used correctly to separate the dependent phrase “in the years that followed” from the independent clause that begins with “many.”

Choices A, B, and D are incorrect because a period, a semicolon, or a dash can’t be used in this way to separate an introductory dependent phrase from an independent clause.

## QUESTION 11

**Choice C is the best answer.** This choice indicates that *The Cat in the Hat*’s success is attributable to its enduring ability to delight children and engage them in learning how to read. This idea restates the main themes of the passage, which are the need to make books appealing to beginning readers and the importance of engaging those readers through interesting plots and illustrations.

Choices A, B, and D are incorrect. The idea that the best proof of *The Cat in the Hat*’s success is its limited vocabulary and appealing word choices, its impressive worldwide sales, or its important role in the history of twentieth-century illustration doesn’t restate the main themes of the passage.

## QUESTION 12

**Choice D is the best answer.** The gerund “picking up” is parallel in structure to the other gerunds in the sentence, “helping” and “working.”

Choices A, B, and C are incorrect because they don’t maintain parallelism in the sentence. “When they pick up litter,” “to pick up litter,” and “litter collection” don’t contain gerunds.

## QUESTION 13

**Choice A is the best answer.** The transitional phrase “by its very definition” points to the criticism in the previous paragraph that when volunteering is compulsory, it’s no longer volunteerism.

Choices B, C, and D are incorrect because the reference to general work, students, or communities in need doesn't highlight the criticism of compulsory volunteering mentioned in the previous paragraph.

## QUESTION 14

**Choice D is the best answer.** The plural noun “officials” correctly refers to the people who require students to give up time for nonprofit activities. Additionally, the plural possessive noun “students” indicates that the choice to give up personal time is supposed to belong to multiple students.

Choice A is incorrect because “officials” is a plural possessive noun, but nothing belongs to the officials in this sentence. Choice B is incorrect because “students” is a plural noun, but the plural possessive noun “students” is needed to indicate that the choice is supposed to belong to students. Choice C is incorrect because “student’s” is a singular possessive noun, but the plural possessive noun “students” is needed to show that the choice is supposed to belong to multiple students.

## QUESTION 15

**Choice C is the best answer.** This choice is clear and concise and doesn't repeat the idea of proponents that begins the sentence.

Choices A, B, and D are incorrect because they're repetitive. Since proponents are people who support a cause, describing proponents of compulsory volunteering as being in favor of it, advocating it, or being advocates creates redundancy.

## QUESTION 16

**Choice B is the best answer.** This choice, a closer connection with their community, is a benefit of volunteering and provides a supporting example that is most similar to the other examples of benefits offered in the sentence: increased self-esteem and better relationship-building skills.

Choices A, C, and D are incorrect because they don't provide supporting examples that are similar to the examples in the sentence. Increasingly busy schedules, less time spent engaging in social activities, and little increase in academic achievement aren't benefits of volunteering.

## QUESTION 17

**Choice B is the best answer.** The infinitive “[to] affect” parallels the earlier infinitive “[to] volunteer” (“are more likely to volunteer,” “[are more likely to] affect”). Moreover, “affect,” meaning “to influence,” is used correctly to indicate that students who do community service positively influence society.

Choices A and C are incorrect because the verb “effect” generally means “to bring about” and the noun “effect” means “result,” neither of which makes sense in the sentence. Choice D is incorrect because the singular verb “affects” doesn’t work here, where the infinitive “affect” is required.

## QUESTION 18

**Choice A is the best answer;** “mandatory” is the most precise word to use when describing the volunteering that students are required to do.

Choices B, C, and D are incorrect because the meanings of these words don’t fit the context of the sentence. “Coercive” and “forcible” suggest that threats or force are used to make someone do something. “Imperative” suggests that something is very important or necessary. None of these words is appropriate to use when describing the volunteering that students are required to do.

## QUESTION 19

**Choice D is the best answer.** The semicolon is used correctly to separate the independent clause that begins with “she” from the independent clause that begins with “they.” In addition, this choice contains no unnecessary punctuation.

Choice A is incorrect because a comma can’t be used by itself to join two independent clauses. Choice B is incorrect because it’s unnecessary to place a comma between the adverb “then” and the verb “did,” which the adverb describes. Choice C is incorrect because no punctuation is needed to separate the subject “they” from the adverb “then.”

## QUESTION 20

**Choice B is the best answer** because “than did students who were” results in a logical comparison between two types of students: those who were required to volunteer (“they then did”) and those who weren’t (“than did those”).

Choices A and C are incorrect because each illogically compares “hours” to students (“they”). Choice D is incorrect because it results in a nonstandard expression; “less” is already comparative, meaning that “compared with” isn’t appropriate.

## QUESTION 21

**Choice C is the best answer.** The idea that schools should focus on offering arrangements that make volunteering an easy and attractive choice most effectively sets up the point made in the next sentence: more students willingly volunteer when schools tell them about volunteering opportunities and connect them with organizations.

Choices A, B, and D are incorrect because they don't effectively set up the point made in the next sentence. The ideas that schools have to recognize that not all students are equally well suited to the same activities, should allow students to spend their time participating in athletics and other extracurricular activities, and are advised to recognize the limits of their ability to influence their students don't set up the point that students willingly volunteer when schools connect them to volunteer opportunities and organizations.

## QUESTION 22

**Choice B is the best answer.** This choice provides a conclusion that states the main claim of the passage: schools that don't make volunteering compulsory will produce more engaged, enthusiastic volunteers than will schools that require volunteer work.

Choices A, C, and D are incorrect. The idea that schools should find volunteers for organizations in the United States, that psychological and economic studies have revolutionized understandings of volunteerism, or that students should choose charitable work that suits their interests and values doesn't state the passage's main claim that schools that don't require volunteering produce more engaged, enthusiastic volunteers.

## QUESTION 23

**Choice C is the best answer.** The present perfect tense verb "have believed" correctly indicates that scientists in the past believed that the corpus callosum enables complex tasks and that scientists continue to hold this belief in the present.

Choices A, B, and D are incorrect because they don't describe a belief that originated in the past and continues in the present. The present progressive tense verb "are believing," the future progressive tense verb "will be believing," and the simple present tense verb "believe" aren't appropriate to use in a case that requires a present perfect tense verb.

## QUESTION 24

**Choice A is the best answer.** This choice concisely defines handedness without unnecessarily repeating the ideas of preference or consistency.

Choices B and C are incorrect because "favor the use of" and "could be chosen," respectively, repeat the idea of "prefer," which appears earlier in the sentence. Choice D is incorrect because "on a regular basis" is synonymous with "consistently," which also appears earlier in the sentence.

## QUESTION 25

**Choice A is the best answer.** No punctuation is necessary between the noun “trait” and the preposition “other than.”

Choices B, C, and D are incorrect because neither a comma, a semicolon, nor a colon is necessary to separate the noun “trait” from the phrase that follows.

## QUESTION 26

**Choice B is the best answer.** The phrase “correlates with” is idiomatic when indicating that two things are directly related to each other. In the passage, handedness in marsupials is believed to be related to the trait of bipedalism in those mammals.

Choices A, C, and D are incorrect because “links as,” “correlates from,” and “links on” aren’t idiomatic when indicating that two things are directly related to each other.

## QUESTION 27

**Choice D is the best answer.** According to the graph, positive mean handedness index scores indicated a left-forelimb preference and negative scores indicated a right-forelimb preference.

Choices A, B, and C are incorrect because they don’t accurately reflect the information in the graph.

## QUESTION 28

**Choice B is the best answer.** The comma after “kangaroo” and before the conjunction “and” is used correctly to separate the last two items, “red kangaroo” and “brush-tailed bettong,” in the list of bipedal marsupials.

Choice A is incorrect because the comma needs to be placed immediately before the conjunction “and,” not after it. Choice C is incorrect because a semicolon isn’t used to separate individual items in a simple list. Choice D is incorrect because a dash isn’t used to separate items in a list, and the comma after “and” is unnecessary.

## QUESTION 29

**Choice C is the best answer.** According to the graph, the four bipedal marsupials had positive mean handedness index values between 0.4 and 0.6, which revealed their preference for using their left forelimbs.

Choices A, B, and D are incorrect because they don’t accurately reflect the data in the graph. The four bipedal marsupials didn’t have positive mean handedness index values less than 0.2 or greater than 0.6, and they didn’t have mean handedness index values of 0.

## QUESTION 30

**Choice C is the best answer.** The transitional phrase “in contrast to” provides the best transition from the previous paragraph, which illustrates bipedal marsupials’ forelimb preference, to this paragraph, which discusses how quadrupedal marsupials differ from their bipedal counterparts by not showing a strong forelimb preference.

Choices A, B, and D are incorrect because they don’t provide a transition from the previous paragraph. The introductory phrases “having four feet,” “like most other mammals,” and “while using their forelimbs for eating” don’t establish a connection between the discussion of bipedal marsupials’ forelimb preference in the previous paragraph and quadrupedal marsupials’ forelimb preference in this paragraph.

## QUESTION 31

**Choice B is the best answer.** A main claim of the passage is that scientists now believe there’s a correlation between bipedalism and handedness in marsupials. Choice B, by mentioning that bipedal marsupials in the study demonstrated handedness, references this main claim.

Choices A, C, and D are incorrect because they don’t present a main claim of the passage. The passage isn’t about how kangaroos still don’t exhibit handedness to the extent that humans do, the many things scientists don’t understand about the marsupial brain, or additional studies on the phenomenon of handedness that will need to be performed with other mammals.

## QUESTION 32

**Choice B is the best answer.** “Which” is a standard relative pronoun in reference to a concept such as a task.

Choice A is incorrect because “whom” is used to refer to people, not concepts. Choice C is incorrect because “what” isn’t a typical relative pronoun and isn’t idiomatic in context (“tasks in what handedness may confer an evolutionary advantage”). Choice D is incorrect because “whose” nonsensically suggests that tasks have handedness.

## QUESTION 33

**Choice A is the best answer.** No change is needed because this choice concludes the passage by recalling a topic from the first paragraph that requires additional research: scientists’ enduring question about how the left and right hemispheres of marsupials’ brains communicate since these mammals lack a corpus callosum.

Choices B, C, and D are incorrect because none of these choices concludes the passage by recalling a topic from the first paragraph that requires additional research. The first paragraph doesn't refer to the minority of humans who are left handed, the fact that studies like this one may someday yield insights into the causes of neurological disorders, or an additional study to examine handedness in other animals that sometimes stand upright.

### QUESTION 34

**Choice C is the best answer.** “Although these levels are impressive” provides the most effective transition from the previous sentence, which indicates the percent of surveyed companies that provide employees with tuition assistance, to the information that follows in this sentence, that even more companies should consider providing such assistance.

Choice A is incorrect because “despite these findings” suggests that regardless of the percentages, more companies should consider providing tuition assistance, which is illogical. Choice B is incorrect because the information that follows in the sentence isn’t additional to the 2014 study. Choice D is incorrect because the issue of whether companies want or don’t want to provide tuition assistance isn’t mentioned in the previous sentence.

### QUESTION 35

**Choice D is the best answer.** This choice most effectively establishes the main idea of the passage, which is that companies should offer tuition assistance because doing so helps attract and retain employees. This main idea is supported in the second paragraph, which argues that tuition assistance appeals to highly motivated and disciplined individuals, and in the third paragraph, which claims that employees receiving tuition assistance often stay with their employers even after they complete their degrees.

Choices A, B, and C are incorrect because they don’t establish the passage’s main idea. The passage isn’t about increasing customer satisfaction, solving the problem of rising tuition costs, or strengthening the US economy.

### QUESTION 36

**Choice C is the best answer.** The plural noun “workers” correctly indicates that companies have more than one worker. The plural noun “opportunities” indicates that employers offer workers multiple chances for personal and professional development.

Choices A and B are incorrect because the plural possessive nouns “workers” and “opportunities” should be the plural nouns “workers” and “opportunities,” since nothing belongs to the workers

or opportunities in the sentence. Choice D is incorrect because the singular nouns “worker” and “opportunity” should be plural, and the apostrophes indicating possession aren’t needed.

### QUESTION 37

**Choice B is the best answer.** The main verb “stressed” provides a simple predicate for the subject “John Fox” to create a grammatically complete sentence.

Choices A and C are incorrect because “who stressed” and “stressing” leave the sentence without an independent clause. Choice D is incorrect because although “he stressed” gives the sentence an independent clause, that clause is improperly joined by “and” to the phrases “John Fox” and “the director of dealer training at Fiat Chrysler Automobiles in the United States.”

### QUESTION 38

**Choice C is the best answer.** This choice most effectively combines the sentences at the underlined portion because the pronoun “which” creates a relative clause (“which . . . workers”) that clearly and concisely describes “retain.”

Choice A is incorrect because “retention” repeats the idea of “retain,” which is already mentioned in the sentence. Choice B is incorrect because “retaining” repeats the idea of “retain,” and the pronoun “whom” repeats the idea of “employees.” Choice D is incorrect because the pronoun “that” doesn’t have a clear antecedent and therefore creates a vague sentence.

### QUESTION 39

**Choice C is the best answer.** The subordinate conjunction “because” begins the dependent clause “because their new qualifications give them opportunities for advancement within the company.” No punctuation is needed to separate this dependent clause from the independent clause that directly precedes it.

Choices A and D are incorrect because placing a period or a semicolon after “degrees” results in a rhetorically ineffective sentence fragment. Choice B is incorrect because no punctuation is needed between the noun and subordinate conjunction. (Although colons can be used to introduce additional explanatory information in a sentence, they’re not typically used between a main clause and a dependent clause beginning with a subordinate conjunction such as “because.”)

### QUESTION 40

**Choice D is the best answer.** The comma after “(UTC)” is paired correctly with the comma after “Lincoln” to set off grammatically nonessential information. The information between the commas, which describes who Valerie Lincoln is, could be removed and the sentence would still make sense.

Choice A is incorrect because a comma is needed after “(UTC)” to set off the grammatically nonessential phrase. Choices B and C are incorrect because neither a dash nor a colon can be paired with a comma to set off grammatically nonessential information.

## QUESTION 41

**Choice A is the best answer.** The adjective “deep” is used idiomatically with “knowledge” to indicate that Lincoln possessed extensive, in-depth information about her industry.

Choice B is incorrect because “hidden” doesn’t make sense within the context of the sentence. A person whose knowledge is hidden wouldn’t be an asset to a company. Choices C and D are incorrect because “large” and “spacious” aren’t idiomatic when describing the extent of a person’s knowledge.

## QUESTION 42

**Choice D is the best answer.** “Keeping down costs” clearly and concisely identifies what businesses have succeeded in doing.

Choices A, B, and C are incorrect because they’re redundant. In choice A, the verbs “minimizing” and “keeping down” are synonyms, so only one is needed in the sentence. In choice B, “employees’ coursework” isn’t needed because this phrase already appears in the sentence. In choice C, “being effective” repeats the idea of “succeeded,” which appears earlier in the sentence.

## QUESTION 43

**Choice A is the best answer.** The infinitive “[to] divert” is grammatically correct when preceded by “are likely,” indicating that classes can redirect employees’ time and energy away from their jobs.

Choices B, C, and D are incorrect because “diverted,” “in diverting,” and “diversions for” create ungrammatical sentences.

## QUESTION 44

**Choice D is the best answer.** To make the passage most logical, the sentence should be placed after the last sentence of paragraph 4. The use of “still” in the inserted sentence indicates that a contrast to what was stated previously will follow. Paragraph 4 ends by stating that tuition reimbursement may not be appropriate in all cases, and the inserted sentence indicates that despite this fact, employers should give serious thought to investing in reimbursement programs. Moreover, the inserted sentence restates the passage’s main claim and, therefore, effectively concludes the passage.

Choices A, B, and C are incorrect because placing the sentence at the end of paragraph 1, 2, or 3 would result in an illogical passage.

## Section 3: Math Test – No Calculator

### QUESTION 1

**Choice B is correct.** Subtracting  $z$  from both sides of  $2z + 1 = z$  results in  $z + 1 = 0$ . Subtracting 1 from both sides of  $z + 1 = 0$  results in  $z = -1$ .

Choices A, C, and D are incorrect. When each of these values is substituted for  $z$  in the given equation, the result is a false statement. Substituting  $-2$  for  $z$  yields  $2(-2) + 1 = -2$ , or  $-3 = -2$ .

Substituting  $\frac{1}{2}$  for  $z$  yields  $2\left(\frac{1}{2}\right) + 1 = \frac{1}{2}$ , or  $2 = \frac{1}{2}$ . Lastly, substituting 1 for  $z$  yields  $2(1) + 1 = 1$ , or  $3 = 1$ .

### QUESTION 2

**Choice C is correct.** To complete the purchase, the initial payment of \$60 plus the  $w$  weekly payments of \$30 must be equivalent to the \$300 price of the television. The total, in dollars, of  $w$  weekly payments of \$30 can be expressed by  $30w$ . It follows that  $300 = 30w + 60$  can be used to find the number of weekly payments,  $w$ , required to complete the purchase.

Choice A is incorrect. Since the television is to be purchased with an initial payment and  $w$  weekly payments, the price of the television must be equivalent to the sum, not the difference, of these payments. Choice B is incorrect. This equation represents a situation where the television is purchased using only  $w$  weekly payments of \$30, with no initial payment of \$60. Choice D is incorrect. This equation represents a situation where the  $w$  weekly payments are \$60 each, not \$30 each, and the initial payment is \$30, not \$60. Also, since the television is to be purchased with weekly payments and an initial payment, the price of the television must be equivalent to the sum, not the difference, of these payments.

### QUESTION 3

**Choice B is correct.** Since the relationship between the merchandise weight  $x$  and the shipping charge  $f(x)$  is linear, a function in the form  $f(x) = mx + b$ , where  $m$  and  $b$  are constants, can be used. In this situation, the constant  $m$  represents the additional shipping charge, in dollars, for each additional pound of merchandise shipped, and the constant  $b$  represents a one-time charge, in dollars, for shipping any weight, in pounds, of merchandise. Using any two pairs of values from the table, such as  $(10, 21.89)$  and  $(20, 31.79)$ , and dividing the difference in the charges by the difference in the weights gives the value of  $m$ :  $m = \frac{31.79 - 21.89}{20 - 10}$ , which simplifies to  $\frac{9.9}{10}$ , or 0.99. Substituting the value of  $m$  and any pair of values from the table, such as  $(10, 21.89)$ , for  $x$  and  $f(x)$ , respectively, gives the value of  $b$ :  $21.89 = 0.99(10) + b$ , or  $b = 11.99$ . Therefore, the function  $f(x) = 0.99x + 11.99$  can be used to determine the total shipping charge  $f(x)$ , in dollars, for an order with a merchandise weight of  $x$  pounds.

Choices A, C, and D are incorrect. If any pair of values from the table is substituted for  $x$  and  $f(x)$ , respectively, in these functions, the result is false. For example, substituting 10 for  $x$  and 21.89 for  $f(x)$  in  $f(x) = 0.99x$  yields  $21.89 = 0.99(10)$ , or  $21.89 = 9.9$ , which is false. Similarly, substituting the values (10, 21.89) for  $x$  and  $f(x)$  into the functions in choices C and D results in  $21.89 = 33.9$  and  $21.89 = 50.84$ , respectively. Both are false.

## QUESTION 4

**Choice C is correct.** It's given that the graph represents  $y = h(x)$ , thus the  $y$ -coordinate of each point on the graph corresponds to the height, in feet, of a Doric column with a base diameter of  $x$  feet. A Doric column with a base diameter of 5 feet is represented by the point (5, 35), and a Doric column with a base diameter of 2 feet is represented by the point (2, 14). Therefore, the column with a base diameter of 5 feet has a height of 35 feet, and the column with a base diameter of 2 feet has a height of 14 feet. It follows that the difference in heights of these two columns is  $35 - 14$ , or 21 feet.

Choice A is incorrect. This value is the slope of the line and represents the increase in the height of a Doric column for each increase in the base diameter by 1 foot. Choice B is incorrect. This value represents the height of a Doric column with a base diameter of 2 feet, or the difference in height between a Doric column with base diameter of 5 feet and a Doric column with base diameter of 3 feet. Choice D is incorrect and may result from conceptual or calculation errors.

## QUESTION 5

**Choice A is correct.** The expression  $\sqrt{9x^2}$  can be rewritten as  $(\sqrt{9})(\sqrt{x^2})$ . The square root symbol in an expression represents the principal square root, or the positive square root, thus  $\sqrt{9} = 3$ . Since  $x > 0$ , taking the square root of the second factor,  $\sqrt{x^2}$ , gives  $x$ . It follows that  $\sqrt{9x^2}$  is equivalent to  $3x$ .

Choice B is incorrect and may result from rewriting  $\sqrt{9x^2}$  as  $(\sqrt{9})(x^2)$  rather than  $(\sqrt{9})(\sqrt{x^2})$ . Choices C and D are incorrect and may result from misunderstanding the operation indicated by a radical symbol. In both of these choices, instead of finding the square root of the coefficient 9, the coefficient has been multiplied by 2. Additionally, in choice D,  $x^2$  has been squared to give  $x^4$ , instead of taking the square root of  $x^2$  to get  $x$ .

## QUESTION 6

**Choice A is correct.** Factoring the numerator of the rational expression  $\frac{x^2 - 1}{x - 1}$  yields  $\frac{(x + 1)(x - 1)}{x - 1}$ . The expression  $\frac{(x + 1)(x - 1)}{x - 1}$  can be rewritten as  $\left(\frac{x + 1}{1}\right)\left(\frac{x - 1}{x - 1}\right)$ . Since  $\frac{x - 1}{x - 1} = 1$ , when  $x$  is not equal to 1, it follows that  $\left(\frac{x + 1}{1}\right)\left(\frac{x - 1}{x - 1}\right) = \left(\frac{x + 1}{1}\right)(1)$  or  $x + 1$ . Therefore, the given equation is equivalent to  $x + 1 = -2$ . Subtracting 1 from both sides of  $x + 1 = -2$  yields  $x = -3$ .

Choices B, C, and D are incorrect. Substituting 0, 1, or  $-1$ , respectively, for  $x$  in the given equation yields a false statement. Substituting 0 for  $x$  in the given equation yields  $\frac{0^2 - 1}{0 - 1} = -2$  or  $1 = -2$ , which is false. Substituting 1 for  $x$  in the given equation makes the left-hand side  $\frac{1^2 - 1}{1 - 1} = \frac{0}{0}$ , which is undefined and not equal to  $-2$ . Substituting  $-1$  for  $x$  in the given equation yields  $\frac{(-1)^2 - 1}{-1 - 1} = -2$ , or  $0 = -2$ , which is false. Therefore, these values don't satisfy the given equation.

## QUESTION 7

**Choice D is correct.** Since  $y = f(x)$ , the value of  $f(0)$  is equal to the value of  $f(x)$ , or  $y$ , when  $x = 0$ . The graph indicates that when  $x = 0$ ,  $y = 4$ . It follows that the value of  $f(0) = 4$ .

Choice A is incorrect. If the value of  $f(0)$  were 0, then when  $x = 0$ , the value of  $f(x)$ , or  $y$ , would be 0 and the graph would pass through the point  $(0, 0)$ . Choice B is incorrect. If the value of  $f(0)$  were 2, then when  $x = 0$ , the value of  $f(x)$ , or  $y$ , would be 2 and the graph would pass through the point  $(0, 2)$ . Choice C is incorrect. If the value of  $f(0)$  were 3, then when  $x = 0$ , the value of  $f(x)$ , or  $y$ , would be 3 and the graph would pass through the point  $(0, 3)$ .

## QUESTION 8

**Choice C is correct.** Since point  $B$  lies on  $\overline{AD}$ , angles  $ABC$  and  $CBD$  are supplementary. It's given that angle  $ABC$  is a right angle; therefore, its measure is  $90^\circ$ . It follows that the measure of angle  $CBD$  is  $180^\circ - 90^\circ$ , or  $90^\circ$ . By the angle addition postulate, the measure of angle  $CBD$  is equivalent to  $x^\circ + 2x^\circ + 2x^\circ$ . Therefore,  $90 = x + 2x + 2x$ . Combining like terms gives  $90 = 5x$ . Dividing both sides of this equation by 5 yields  $x = 18$ . Therefore, the value of  $3x$  is  $3(18)$ , or 54.

Choice A is incorrect. This is the value of  $x$ . Choice B is incorrect. This is the value of  $2x$ . Choice D is incorrect. This is the value of  $4x$ .

## QUESTION 9

**Choice C is correct.** The equation defining any line can be written in the form  $y = mx + b$ , where  $m$  is the slope of the line and  $b$  is the  $y$ -coordinate of the  $y$ -intercept. Line  $\ell$  passes through the point  $(0, -4)$ , which is the  $y$ -intercept. Therefore, for line  $\ell$ ,  $b = -4$ . The slope of a line is the ratio of the difference between the  $y$ -coordinates of any two points to the difference between the  $x$ -coordinates of the same points. Calculating the slope using two points that line  $\ell$  passes through,  $(-4, 0)$  and  $(0, -4)$ , gives  $m = \frac{0 - (-4)}{(-4) - 0} = \frac{4}{-4}$ , or  $-1$ . Since  $m = -1$  and  $b = -4$ , the equation of line  $\ell$  can be written as  $y = (-1)x + (-4)$ , or  $y = -x - 4$ . Adding  $x$  to both sides of  $y = -x - 4$  yields  $x + y = -4$ .

Choices A and B are incorrect. These equations both represent lines with a positive slope, but line  $\ell$  has a negative slope. Choice D is incorrect. This equation represents a line that passes through the points  $(4, 0)$  and  $(0, 4)$ , not the points  $(-4, 0)$  and  $(0, -4)$ .

## QUESTION 10

**Choice D is correct.** Since the graph represents the equation  $y = 2x^2 + 10x + 12$ , it follows that each point  $(x, y)$  on the graph is a solution to this equation. Since the graph crosses the  $y$ -axis at  $(0, k)$ , then substituting 0 for  $x$  and  $k$  for  $y$  in  $y = 2x^2 + 10x + 12$  creates a true statement:  $k = 2(0)^2 + 10(0) + 12$ , or  $k = 12$ .

Choice A is incorrect. If  $k = 2$  when  $x = 0$ , it follows that  $2 = 2(0)^2 + 10(0) + 12$ , or  $2 = 12$ , which is false. Choice B is incorrect. If  $k = 6$  when  $x = 0$ , it follows that  $6 = 2(0)^2 + 10(0) + 12$ , or  $6 = 12$ , which is false. Choice C is incorrect. If  $k = 10$  when  $x = 0$ , it follows that  $10 = 2(0)^2 + 10(0) + 12$ , or  $10 = 12$ , which is false.

## QUESTION 11

**Choice A is correct.** A circle in the  $xy$ -plane with center  $(h, k)$  and radius  $r$  is defined by the equation  $(x - h)^2 + (y - k)^2 = r^2$ . Therefore, an equation of a circle with center  $(5, 7)$  and radius 2 is  $(x - 5)^2 + (y - 7)^2 = 2^2$ , or  $(x - 5)^2 + (y - 7)^2 = 4$ .

Choice B is incorrect. This equation defines a circle with center  $(-5, -7)$  and radius 2. Choice C is incorrect. This equation defines a circle with center  $(5, 7)$  and radius  $\sqrt{2}$ . Choice D is incorrect. This equation defines a circle with center  $(-5, -7)$  and radius  $\sqrt{2}$ .

## QUESTION 12

**Choice B is correct.** Since figures are drawn to scale unless otherwise stated and triangle  $ABC$  is similar to triangle  $DEF$ , it follows that the measure of angle  $B$  is equal to the measure of angle  $E$ . Furthermore, it follows that side  $AB$  corresponds to side  $DE$  and that side  $BC$  corresponds to side  $EF$ . For similar triangles, corresponding sides are proportional, so  $\frac{AB}{BC} = \frac{DE}{EF}$ . In right triangle  $DEF$ , the cosine of angle  $E$ , or  $\cos(E)$ , is equal to the length of the side adjacent to angle  $E$  divided by the length of the hypotenuse in triangle  $DEF$ . Therefore,  $\cos(E) = \frac{DE}{EF}$ , which is equivalent to  $\frac{AB}{BC}$ . Therefore,  $\cos(E) = \frac{12}{13}$ .

Choice A is incorrect. This value represents the tangent of angle  $F$ , or  $\tan(F)$ , which is defined as the length of the side opposite angle  $F$  divided by the length of the side adjacent to angle  $F$ . Choice C is incorrect. This value represents the tangent of angle  $E$ , or  $\tan(E)$ , which is defined as the length of the side opposite angle  $E$  divided by the length of the side adjacent to angle  $E$ . Choice D is incorrect. This value represents the sine of angle  $E$ , or  $\sin(E)$ , which is defined as the length of the side opposite angle  $E$  divided by the length of the hypotenuse.

## QUESTION 13

**Choice C is correct.** The  $x$ -intercepts of the graph of  $f(x) = x^2 + 5x + 4$  are the points  $(x, f(x))$  on the graph where  $f(x) = 0$ . Substituting 0 for  $f(x)$  in the function equation yields  $0 = x^2 + 5x + 4$ . Factoring the right-hand side of  $0 = x^2 + 5x + 4$  yields  $0 = (x + 4)(x + 1)$ .

If  $0 = (x + 4)(x + 1)$ , then  $0 = x + 4$  or  $0 = x + 1$ . Solving both of these equations for  $x$  yields  $x = -4$  and  $x = -1$ . Therefore, the  $x$ -intercepts of the graph of  $f(x) = x^2 + 5x + 4$  are  $(-4, 0)$  and  $(-1, 0)$ . Since both points lie on the  $x$ -axis, the distance between  $(-4, 0)$  and  $(-1, 0)$  is equivalent to the number of unit spaces between  $-4$  and  $-1$  on the  $x$ -axis, which is 3.

Choice A is incorrect. This is the distance from the origin to the  $x$ -intercept  $(-1, 0)$ . Choice B is incorrect and may result from incorrectly calculating the  $x$ -intercepts. Choice D is incorrect. This is the distance from the origin to the  $x$ -intercept  $(-4, 0)$ .

## QUESTION 14

**Choice B is correct.** Squaring both sides of the equation  $\sqrt{4x} = x - 3$  yields  $4x = (x - 3)^2$ , or  $4x = (x - 3)(x - 3)$ . Applying the distributive property on the right-hand side of the equation  $4x = (x - 3)(x - 3)$  yields  $4x = x^2 - 3x - 3x + 9$ . Subtracting  $4x$  from both sides of  $4x = x^2 - 3x - 3x + 9$  yields  $0 = x^2 - 3x - 3x - 4x + 9$ , which can be rewritten as  $0 = x^2 - 10x + 9$ . Factoring the right-hand side of  $0 = x^2 - 10x + 9$  gives  $0 = (x - 1)(x - 9)$ . By the zero product property, if  $0 = (x - 1)(x - 9)$ , then  $0 = x - 1$  or  $0 = x - 9$ . Adding 1 to both sides of  $0 = x - 1$  gives  $x = 1$ . Adding 9 to both sides of  $0 = x - 9$  gives  $x = 9$ . Substituting these values for  $x$  into the given equation will determine whether they satisfy the equation. Substituting 1 for  $x$  in the given equation yields  $\sqrt{4(1)} = 1 - 3$ , or  $\sqrt{4} = -2$ , which is false. Therefore,  $x = 1$  doesn't satisfy the given equation. Substituting 9 for  $x$  in the given equation yields  $\sqrt{4(9)} = 9 - 3$  or  $\sqrt{36} = 6$ , which is true. Therefore,  $x = 9$  satisfies the given equation.

Choices A and C are incorrect because  $x = 1$  doesn't satisfy the given equation:  $\sqrt{4x}$  represents the principal square root of  $4x$ , which can't be negative. Choice D is incorrect because  $x = 9$  does satisfy the given equation.

## QUESTION 15

**Choice A is correct.** A system of two linear equations has no solution if the graphs of the lines represented by the equations are parallel and are not equivalent. Parallel lines have equal slopes but different  $y$ -intercepts. The slopes and  $y$ -intercepts for the two given equations can be found by solving each equation for  $y$  in terms of  $x$ , thus putting the equations in slope-intercept form. This yields  $y = 3x + 6$  and  $y = \left(-\frac{a}{2}\right)x + 2$ . The slope and  $y$ -intercept of the line with equation  $-3x + y = 6$  are 3 and  $(0, 6)$ , respectively. The slope and  $y$ -intercept of the line with equation  $ax + 2y = 4$  are represented by the expression  $-\frac{a}{2}$  and the point  $(0, 2)$ , respectively.

The value of  $a$  can be found by setting the two slopes equal to each other, which gives  $-\frac{a}{2} = 3$ . Multiplying both sides of this equation by  $-2$  gives  $a = -6$ . When  $a = -6$ , the lines are parallel and have different  $y$ -intercepts.

Choices B, C, and D are incorrect because these values of  $a$  would result in two lines that are not parallel, and therefore the resulting system of equations would have a solution.

## QUESTION 16

**The correct answer is 2200.** If the total shipping cost was \$47,000, then  $T = 47,000$ . If 3000 units were shipped to the farther location, then  $f = 3000$ . Substituting 47,000 for  $T$  and 3000 for  $f$  in the equation  $T = 5c + 12f$  yields  $47,000 = 5c + 12(3000)$ . Multiplying 12 by 3000 yields  $47,000 = 5c + 36,000$ . Subtracting 36,000 from both sides of the equation yields  $11,000 = 5c$ . Dividing both sides by 5 yields  $c = 2200$ . Therefore, 2200 units were shipped to the closer location.

## QUESTION 17

**The correct answer is 5.** By definition of absolute value, if  $|2x + 1| = 5$ , then  $2x + 1 = 5$  or  $-(2x + 1) = 5$ , which can be rewritten as  $2x + 1 = -5$ . Subtracting 1 from both sides of  $2x + 1 = 5$  and  $2x + 1 = -5$  yields  $2x = 4$  and  $2x = -6$ , respectively. Dividing both sides of  $2x = 4$  and  $2x = -6$  by 2 yields  $x = 2$  and  $x = -3$ , respectively. If  $a$  and  $b$  are the solutions to the given equation, then  $a = 2$  and  $b = -3$ . It follows then that  $|a - b| = |2 - (-3)| = |5|$ , which is 5. Similarly, if  $a = -3$  and  $b = 2$ , it follows that  $|a - b| = |-3 - 2| = |-5|$ , which is also 5.

## QUESTION 18

**The correct answer is 1.21.** It's given that each year, the value of the antique is estimated to increase by 10% over its value the previous year. Increasing a quantity by 10% is equivalent to the quantity increasing to 110% of its original value or multiplying the original quantity by 1.1. Therefore, 1 year after the purchase, the estimated value of the antique is  $200(1.1)$  dollars. Then, 2 years after purchase, the estimated value of the antique is  $200(1.1)(1.1)$ , or  $200(1.21)$  dollars. It's given that the estimated value of the antique after 2 years is  $200a$  dollars. Therefore,  $200(1.21) = 200a$ . It follows that  $a = 1.21$ .

## QUESTION 19

**The correct answer is 2500.** Adding the given equations yields  $(2x + 3y) + (3x + 2y) = (1200 + 1300)$ . Combining like terms yields  $5x + 5y = 2500$ . Therefore, the value of  $5x + 5y$  is 2500.

## QUESTION 20

**The correct answer is 20.** Factoring the expression  $u^2 - t^2$  yields  $(u - t)(u + t)$ . Therefore, the expression  $(u - t)(u^2 - t^2)$  can be rewritten as  $(u - t)(u - t)(u + t)$ . Substituting 5 for  $u + t$  and 2 for  $u - t$  in this expression yields  $(2)(2)(5)$ , which is equal to 20.

## Section 4: Math Test – Calculator

### QUESTION 1

**Choice B is correct.** It's given that the helicopter's initial height is 40 feet above the ground and that when the helicopter's altitude begins to increase, it increases at a rate of 21 feet per second. Therefore, the altitude gain  $t$  seconds after the helicopter begins rising is represented by the expression  $21t$ . Adding this expression to the helicopter's initial height gives the helicopter's altitude above the ground  $y$ , in feet,  $t$  seconds after the helicopter begins to gain altitude:  $y = 40 + 21t$ .

Choice A is incorrect. This is the helicopter's altitude above the ground 1 second after it began to gain altitude, not  $t$  seconds after it began to gain altitude. Choice C is incorrect because adding the expression  $-21t$  makes this function represent a decrease in altitude. Choice D is incorrect and is the result of using the initial height of 40 feet as the rate at which the helicopter's altitude increases per second and the rate of 21 feet per second as the initial height.

### QUESTION 2

**Choice A is correct.** The text messaging plan charges a flat fee of \$5 per month for up to 100 text messages. This is represented graphically with a constant value of  $y = 5$  for  $0 \leq x \leq 100$ . After 100 messages, each additional message sent costs \$0.25. This is represented graphically with an increase of 0.25 on the  $y$ -axis for every increase of 1 on the  $x$ -axis. Choice A matches these descriptions.

Choice B is incorrect. This choice shows a linear decrease after  $x = 100$ , indicating the price of the plan would decrease, rather than increase, after 100 text messages. Choices C and D are incorrect. These choices don't represent a constant value of  $y = 5$  for  $0 \leq x \leq 100$ , which is needed to represent the \$5 per month for the first 100 text messages.

### QUESTION 3

**Choice B is correct.** During the first 15 minutes Jake is in the theater, or from 0 to 15 minutes, Jake's popcorn amount decreases by half. This is represented graphically by a linear decrease. From 15 to 45 minutes, Jake stops eating popcorn. This is represented graphically by a constant  $y$ -value. From 45 to 90 minutes, Jake eats more popcorn. This is represented graphically by another linear decrease as the amount of popcorn in the bag gradually goes down. At 90 minutes, Jake spills all of his remaining popcorn. This is represented graphically by a vertical drop in the  $y$ -value to 0. Choice B matches these representations.

Choices A, C, and D are incorrect. At no point during this period of time did Jake buy more popcorn. All of these graphs represent an increase in the amount of popcorn in Jake's bag at some point during this period of time.

## QUESTION 4

**Choice C is correct.** Subtracting 20 from both sides of the given equation yields  $-x = -5$ . Dividing both sides of the equation  $-x = -5$  by  $-1$  yields  $x = 5$ . Lastly, substituting 5 for  $x$  in  $3x$  yields the value of  $3x$ , or  $3(5) = 15$ .

Choice A is incorrect. This is the value of  $x$ , not the value of  $3x$ .

Choices B and D are incorrect. If  $3x = 10$  or  $3x = 35$ , then it follows that  $x = \frac{10}{3}$  or  $x = \frac{35}{3}$ , respectively. Substituting  $\frac{10}{3}$  and  $\frac{35}{3}$  for  $x$  in the given equation yields  $\frac{50}{3} = 15$  and  $\frac{25}{3} = 15$ , respectively, both of which are false statements. Since  $3x = 10$  and  $3x = 35$  both lead to false statements, then  $3x$  can't be equivalent to either 10 or 35.

## QUESTION 5

**Choice C is correct.** The value of  $f(-1)$  can be found by substituting  $-1$  for  $x$  in the given function  $f(x) = \frac{x+3}{2}$ , which yields  $f(-1) = \frac{-1+3}{2}$ .

Rewriting the numerator by adding  $-1$  and 3 yields  $\frac{2}{2}$ , which equals 1.

Therefore,  $f(-1) = 1$ .

Choice A is incorrect and may result from miscalculating the value of  $\frac{-1+3}{2}$  as  $\frac{-4}{2}$ , or  $-2$ . Choice B is incorrect and may result from misinterpreting the value of  $x$  as the value of  $f(-1)$ . Choice D is incorrect and may result from adding the expression  $-1 + 3$  in the numerator.

## QUESTION 6

**Choice D is correct.** To determine which option is equivalent to the given expression, the expression can be rewritten using the distributive property by multiplying each term of the binomial  $(x^2 - 3x)$  by  $2x$ , which gives  $2x^3 - 6x^2$ .

Choices A, B, and C are incorrect and may result from incorrectly applying the laws of exponents or from various computation errors when rewriting the expression.

## QUESTION 7

**Choice B is correct.** Selecting employees from each store at random is most appropriate because it's most likely to ensure that the group surveyed will accurately represent each store location and all employees.

Choice A is incorrect. Surveying employees at a single store location will only provide an accurate representation of employees at that location, not at all 50 store locations. Choice C is incorrect. Surveying the highest- and lowest-paid employees will not give an accurate representation of employees across all pay grades at the company.

Choice D is incorrect. Collecting only the first 50 responses mimics the results of a self-selected survey. For example, the first 50 employees to respond to the survey could be motivated by an overwhelming positive or negative experience and thus will not accurately represent all employees.

## QUESTION 8

**Choice C is correct.** The graph for Ian shows that the initial deposit was \$100 and that each week the total amount deposited increased by \$100. Therefore, Ian deposited \$100 each week. The graph for Jeremy shows that the initial deposit was \$300 and that each week the total amount deposited increased by \$50. Therefore, Jeremy deposited \$50 each week. Thus, Ian deposited \$50 more than Jeremy did each week.

Choice A is incorrect. This is the difference between the initial deposits in the savings accounts. Choice B is incorrect. This is the amount Ian deposited each week. Choice D is incorrect. This is half the amount that Jeremy deposited each week.

## QUESTION 9

**Choice C is correct.** The value of the expression  $h(5) - h(3)$  can be found by substituting 5 and 3 for  $x$  in the given function. Substituting 5 for  $x$  in the function yields  $h(5) = 2^5$ , which can be rewritten as  $h(5) = 32$ . Substituting 3 for  $x$  in the function yields  $h(3) = 2^3$ , which can be rewritten as  $h(3) = 8$ . Substituting these values into the expression  $h(5) - h(3)$  produces  $32 - 8 = 24$ .

Choice A is incorrect. This is the value of  $5 - 3$ , not of  $h(5) - h(3)$ .  
Choice B is incorrect. This is the value of  $h(5 - 3)$ , or  $h(2)$ , not of  $h(5) - h(3)$ .  
Choice D is incorrect and may result from calculation errors.

## QUESTION 10

**Choice D is correct.** The margin of error is applied to the sample statistic to create an interval in which the population statistic most likely falls. An estimate of 23% with a margin of error of 4% creates an interval of  $23\% \pm 4\%$ , or between 19% and 27%. Thus, it's plausible that the percentage of students in the population who see a movie at least once a month is between 19% and 27%.

Choice A is incorrect and may result from interpreting the estimate of 23% as the minimum number of students in the population who see a movie at least once per month. Choice B is incorrect and may result from interpreting the estimate of 23% as the minimum number of students in the population who see a movie at least once per month and adding half of the margin of error to conclude that it isn't possible that more than 25% of students in the population see a movie at least once per month. Choice C is incorrect and may result from interpreting the sample statistic as the researcher's level of confidence in the survey results and applying the margin of error to the level of confidence.

## QUESTION 11

**Choice A is correct.** The mean number of each list is found by dividing the sum of all the numbers in each list by the count of the numbers

in each list. The mean of list A is  $\frac{1 + 2 + 3 + 4 + 5 + 6}{6} = 3.5$ , and

the mean of list B is  $\frac{2 + 3 + 3 + 4 + 4 + 5}{6} = 3.5$ . Thus, the means are the same. The standard deviations can be compared by inspecting the distances of the numbers in each list from the mean. List A contains two numbers that are 0.5 from the mean, two numbers that are 1.5 from the mean, and two numbers that are 2.5 from the mean. List B contains four numbers that are 0.5 from the mean and two numbers that are 1.5 from the mean. Overall, list B contains numbers that are closer to the mean than are the numbers in list A, so the standard deviations of the lists are different.

Choice B is incorrect and may result from assuming that two data sets with the same mean must also have the same standard deviation.

Choices C and D are incorrect and may result from an error in calculating the means.

## QUESTION 12

**Choice C is correct.** Let  $x$  represent the original price of the book.

Then, 40% off of  $x$  is  $(1 - 0.40)x$ , or  $0.60x$ . Since the sale price is \$18.00, then  $0.60x = 18$ . Dividing both sides of this equation by 0.60 yields  $x = 30$ . Therefore, the original price of the book was \$30.

Choice A is incorrect and may result from computing 40% of the sale price. Choice B is incorrect and may result from computing 40% off the sale price instead of the original price. Choice D is incorrect and may result from computing the original price of a book whose sale price is \$18 when the sale is for 60% off the original price.

## QUESTION 13

**Choice C is correct.** According to the bar graph, the number of insects in colony A at week 0 was approximately 80, and this number decreased over each respective two-week period to approximately 50, 32, 25, and 18. Similarly, the graph shows that the number of insects in colony B at week 0 was approximately 64, and this number also decreased over each respective two-week period to approximately 60, 40, 38, and 10. Finally, the graph shows that the number of insects in colony C at week 0 was approximately 58; however, the number of insects increased in week 2, to approximately 140. Therefore, only colony A and colony B showed a decrease in size every two weeks after the initial treatment.

Choice A is incorrect. Colony B also showed a decrease in size every two weeks. Choices B and D are incorrect. Colony C showed an increase in size between weeks 0 and 2.

## QUESTION 14

**Choice A is correct.** According to the bar graph, the total number of insects in all three colonies in week 8 was approximately  $20 + 10 + 50 = 80$ , and the total number of insects at the time of initial treatment (week 0) was approximately  $80 + 65 + 55 = 200$ . The ratio of these approximations is 80 to 200, which is equivalent to 2 to 5. Therefore, the ratio 2 to 5 is closest to the ratio of the total number of insects in all three colonies in week 8 to the total number of insects at the time of initial treatment.

Choices B, C, and D are incorrect and may result from setting up ratios using weeks other than week 8 and week 0 or from calculation errors.

## QUESTION 15

**Choice B is correct.** The formula for the volume  $V$  of a right circular cone is  $V = \frac{1}{3}\pi r^2 h$ , where  $r$  is the radius of the base and  $h$  is the height of the cone. It's given that the cone's volume is  $24\pi$  cubic inches and its height is 2 inches. Substituting  $24\pi$  for  $V$  and 2 for  $h$  yields  $24\pi = \frac{1}{3}\pi r^2(2)$ . Rewriting the right-hand side of this equation yields  $24\pi = \left(\frac{2\pi}{3}\right)r^2$ , which is equivalent to  $36 = r^2$ . Taking the square root of both sides of this equation gives  $r = \pm 6$ . Since the radius is a measure of length, it can't be negative. Therefore, the radius of the base of the cone is 6 inches.

Choice A is incorrect and may result from using the formula for the volume of a right circular cylinder instead of a right circular cone. Choice C is incorrect. This is the diameter of the cone. Choice D is incorrect and may result from not taking the square root when solving for the radius.

## QUESTION 16

**Choice C is correct.** It's given that the population of City X was 120,000 in 2010, and that it increased by 20% from 2010 to 2015. Therefore, the population of City X in 2015 was  $120,000(1 + 0.20) = 144,000$ . It's also given that the population of City Y decreased by 10% from 2010 to 2015. If  $y$  represents the population of City Y in 2010, then  $y(1 - 0.10) = 144,000$ . Solving this equation for  $y$  yields  $y = \frac{144,000}{1 - 0.10}$ . Simplifying the denominator yields  $\frac{144,000}{0.90}$ , or 160,000.

Choice A is incorrect. If the population of City Y in 2010 was 60,000, then the population of City Y in 2015 would have been  $60,000(0.90) = 54,000$ , which is not equal to the City X population in 2015 of 144,000. Choice B is incorrect because  $90,000(0.90) = 81,000$ , which is not equal to the City X population in 2015 of 144,000. Choice D is incorrect because  $240,000(0.90) = 216,000$ , which is not equal to the City X population in 2015 of 144,000.

## QUESTION 17

**Choice D is correct.** Dividing both sides of the equation  $V = \frac{4}{3}\pi r^3$  by  $\frac{4}{3}\pi$  results in  $\frac{3V}{4\pi} = r^3$ . Taking the cube root of both sides produces  $\sqrt[3]{\frac{3V}{4\pi}} = r$ . Therefore,  $\sqrt[3]{\frac{3V}{4\pi}}$  gives the radius of the sphere in terms of the volume of the sphere.

Choice A is incorrect. This expression is equivalent to the reciprocal of  $r^3$ . Choice B is incorrect. This expression is equivalent to  $r^3$ . Choice C is incorrect. This expression is equivalent to the reciprocal of  $r$ .

## QUESTION 18

**Choice C is correct.** It's given that the tablet user did not answer "Never," so the tablet user could have answered only "Rarely," "Often," or "Always." These answers make up  $24.3\% + 13.5\% + 30.9\% = 68.7\%$  of the answers the tablet users gave in the survey. The answer "Always" makes up 30.9% of the answers tablet users gave in the survey. Thus, the probability is  $\frac{30.9\%}{68.7\%}$ , or  $\frac{0.309}{0.687} = 0.44978$ , which rounds up to 0.45.

Choice A is incorrect. This reflects the tablet users in the survey who answered "Always." Choice B is incorrect. This reflects all tablet users who did not answer "Never" or "Always." Choice D is incorrect. This reflects all tablet users in the survey who did not answer "Never."

## QUESTION 19

**Choice D is correct.** The vertex form of a quadratic equation is  $y = n(x - h)^2 + k$ , where  $(h, k)$  gives the coordinates of the vertex of the parabola in the  $xy$ -plane and the sign of the constant  $n$  determines whether the parabola opens upward or downward. If  $n$  is negative, the parabola opens downward and the vertex is the maximum. The given equation has the values  $h = 3$ ,  $k = a$ , and  $n = -1$ . Therefore, the vertex of the parabola is  $(3, a)$  and the parabola opens downward. Thus, the parabola's maximum occurs at  $(3, a)$ .

Choice A is incorrect and may result from interpreting the given equation as representing a parabola in which the vertex is a minimum, not a maximum, and from misidentifying the value of  $h$  in the given equation as  $-3$ , not  $3$ . Choice B is incorrect and may result from interpreting the given equation as representing a parabola in which the vertex is a minimum, not a maximum. Choice C is incorrect and may result from misidentifying the value of  $h$  in the given equation as  $-3$ , not  $3$ .

## QUESTION 20

**Choice C is correct.** Let  $m$  be the minimum value of the original data set. The range of a data set is the difference between the maximum value and the minimum value. The range of the original data set is therefore  $84 - m$ . The new data set consists of the original set and the positive integer 96. Thus, the new data set has the same minimum  $m$  and a maximum of 96. Therefore, the range of the new data set is  $96 - m$ . The difference in the two ranges can be found by subtracting the ranges:  $(96 - m) - (84 - m)$ . Using the distributive property, this can be rewritten as  $96 - m - 84 + m$ , which is equal to 12. Therefore, the range of the new data set must be 12 greater than the range of the original data set.

Choices A, B, and D are incorrect. Only the maximum value of the original data set is known, so the amount that the mean, median, and standard deviation of the new data set differ from those of the original data set can't be determined.

## QUESTION 21

**Choice B is correct.** It's given that Clayton uses 100 milliliters of the 20% by mass solution, so  $y = 100$ . Substituting 100 for  $y$  in the given equation yields  $0.10x + 0.20(100) = 0.18(x + 100)$ , which can be rewritten as  $0.10x + 20 = 0.18x + 18$ . Subtracting  $0.10x$  and 18 from both sides of the equation gives  $2 = 0.08x$ . Dividing both sides of this equation by 0.08 gives  $x = 25$ . Thus, Clayton uses 25 milliliters of the 10% by mass saline solution.

Choices A, C, and D are incorrect and may result from calculation errors.

## QUESTION 22

**Choice D is correct.** It's given that the number of people Eleanor invited the first year was 30 and that the number of people invited doubles each of the following years, which is the same as increasing by a constant factor of 2. Therefore, the function  $f$  can be defined by  $f(n) = 30(2)^n$ , where  $n$  is the number of years after Eleanor began organizing the event. This is an increasing exponential function.

Choices A and B are incorrect. Linear functions increase or decrease by a constant number over equal intervals, and exponential functions increase or decrease by a constant factor over equal intervals. Since the number of people invited increases by a constant factor each year, the function  $f$  is exponential rather than linear. Choice C is incorrect. The value of  $f(n)$  increases as  $n$  increases, so the function  $f$  is increasing rather than decreasing.

## QUESTION 23

**Choice A is correct.** The slope-intercept form of a linear equation in the  $xy$ -plane is  $y = mx + b$ , where  $m$  is the slope of the graph of the equation and  $b$  is the  $y$ -coordinate of the  $y$ -intercept of the graph. Any two ordered pairs  $(x_1, y_1)$  and  $(x_2, y_2)$  that satisfy a linear equation can be used to compute the slope of the graph of the equation using the formula  $m = \frac{y_2 - y_1}{x_2 - x_1}$ . Substituting the two pairs  $(a, 0)$  and  $(3a, -a)$  from the table into the formula gives  $m = \frac{-a - 0}{3a - a}$ , which can be rewritten as  $\frac{-a}{2a}$ , or  $-\frac{1}{2}$ . Substituting this value for  $m$  in the slope-intercept form of the equation produces  $y = -\frac{1}{2}x + b$ . Substituting values from the ordered pair  $(a, 0)$  in the table into this equation produces  $0 = -\frac{1}{2}(a) + b$ , which simplifies to  $b = \frac{a}{2}$ . Substituting this value for  $b$  in the slope-intercept form of the equation produces  $y = -\frac{1}{2}x + \frac{a}{2}$ . Rewriting this equation in standard form by adding  $\frac{1}{2}x$  to both sides and then multiplying both sides by 2 gives the equation  $x + 2y = a$ .

Choice B is incorrect and may result from a calculation error when determining the  $y$ -intercept of the graph of the equation. Choices C and D are incorrect and may result from an error in calculation when determining the slope of the graph of the equation.

## QUESTION 24

**Choice B is correct.** The slope-intercept form of a linear equation is  $y = mx + b$ , where  $m$  is the slope of the graph of the equation and  $b$  is the  $y$ -coordinate of the  $y$ -intercept of the graph. Any two ordered pairs  $(x_1, y_1)$  and  $(x_2, y_2)$  that satisfy a linear equation can be used to compute the slope of the graph of the equation using the formula  $m = \frac{y_2 - y_1}{x_2 - x_1}$ . Substituting the coordinates of  $(120, 60)$  and  $(160, 80)$ , which lie on the line of best fit, into this formula gives  $m = \frac{80 - 60}{160 - 120}$ , which simplifies to  $\frac{20}{40}$ , or  $0.5$ . Substituting this value for  $m$  in the slope-intercept form of the equation produces  $y = 0.5x + b$ . Substituting values from the ordered pair  $(120, 60)$  into this equation produces  $60 = 0.5(120) + b$ , so  $b = 0$ . Substituting this value for  $b$  in the slope-intercept form of the equation produces  $y = 0.5x + 0$ , or  $y = 0.5x$ .

Choices A, C, and D are incorrect and may result from an error in calculation when determining the slope of the line of best fit.

## QUESTION 25

**Choice A is correct.** The intersection point  $(x, y)$  of the two graphs can be found by multiplying the second equation in the system  $1.6x + 0.5y = -1.3$  by 3, which gives  $4.8x + 1.5y = -3.9$ . The  $y$ -terms in the equation  $4.8x + 1.5y = -3.9$  and the first equation in the system  $2.4x - 1.5y = 0.3$  have coefficients that are opposites. Adding the left- and right-hand sides of the equations  $4.8x + 1.5y = -3.9$  and  $2.4x - 1.5y = 0.3$

produces  $7.2x + 0.0y = -3.6$ , which is equivalent to  $7.2x = -3.6$ . Dividing both sides of the equation by 7.2 gives  $x = -0.5$ . Therefore, the  $x$ -coordinate of the intersection point  $(x, y)$  of the system is  $-0.5$ .

Choice B is incorrect. An  $x$ -value of  $-0.25$  produces  $y$ -values of  $-0.6$  and  $-1.8$  for each equation in the system, respectively. Since the same ordered pair doesn't satisfy both equations, neither point can be the intersection point. Choice C is incorrect. An  $x$ -value of  $0.8$  produces  $y$ -values of  $1.08$  and  $-5.16$  for each equation in the system, respectively. Since the same ordered pair doesn't satisfy both equations, neither point can be the intersection point. Choice D is incorrect. An  $x$ -value of  $1.75$  produces  $y$ -values of  $2.6$  and  $-8.2$  for each equation in the system, respectively. Since the same ordered pair doesn't satisfy both equations, neither point can be the intersection point.

## QUESTION 26

**Choice D is correct.** A model for a quantity that increases by  $r\%$  per time period is an exponential function of the form  $P(t) = I\left(1 + \frac{r}{100}\right)^t$ , where  $I$  is the initial value at time  $t = 0$  and each increase of  $t$  by 1 represents 1 time period. It's given that  $P(t)$  is the number of pollen grains per square centimeter and  $t$  is the number of years after the first year the grains were deposited. There were 310 pollen grains at time  $t = 0$ , so  $I = 310$ . This number increased 1% per year after year  $t = 0$ , so  $r = 1$ . Substituting these values into the form of the exponential function gives  $P(t) = 310\left(1 + \frac{1}{100}\right)^t$ , which can be rewritten as  $P(t) = 310(1.01)^t$ .

Choices A, B, and C are incorrect and may result from errors made when setting up an exponential function.

## QUESTION 27

**Choice A is correct.** Subtracting  $\left(\frac{2}{3}\right)(9x - 6)$  from both sides of the given equation yields  $-4 = \left(\frac{1}{3}\right)(9x - 6)$ , which can be rewritten as  $-4 = 3x - 2$ .

Choices B and D are incorrect and may result from errors made when manipulating the equation. Choice C is incorrect. This is the value of  $x$ .

## QUESTION 28

**Choice D is correct.** The graph of a quadratic function in the form  $f(x) = a(x - b)(x - c)$  intersects the  $x$ -axis at  $(b, 0)$  and  $(c, 0)$ . The graph will be a parabola that opens upward if  $a$  is positive and downward if  $a$  is negative. For the function  $f$ ,  $a = 1$ ,  $b = -3$ , and  $c = k$ . Therefore, the graph of the function  $f$  opens upward and intersects the  $x$ -axis at  $(-3, 0)$  and  $(k, 0)$ . Since  $k$  is a positive integer, the intersection point  $(k, 0)$  will have an  $x$ -coordinate that is a positive integer. The only graph that opens upward, passes through the point  $(-3, 0)$ , and has another  $x$ -intercept with a positive integer as the  $x$ -coordinate is choice D.

Choices A and B are incorrect. Both graphs open downward rather than upward. Choice C is incorrect. The graph doesn't pass through the point  $(-3, 0)$ .

### QUESTION 29

**Choice D is correct.** It's given that  $L$  is the femur length, in inches, and  $H$  is the height, in inches, of an adult male. Because  $L$  is multiplied by 1.88 in the equation, for every increase in  $L$  by 1, the value of  $H$  increases by 1.88. Therefore, the meaning of 1.88 in this context is that a man's height increases by approximately 1.88 inches for each one-inch increase in his femur length.

Choices A, B, and C are incorrect and may result from misinterpreting the context and the values the variables are representing.

### QUESTION 30

**Choice A is correct.** A segment can be drawn inside of quadrilateral  $ABCD$  from point  $B$  to point  $F$  (not shown) on segment  $AD$  such that segment  $BF$  is perpendicular to segment  $AD$ . This will create rectangle  $FBCD$  such that  $FB = CD$ . This will also create right triangle  $ABF$  such that  $FB = \frac{1}{2}AB$ . An acute angle in a right triangle has measure  $30^\circ$  if and only if the side opposite this angle is half the length of the hypotenuse. (Such a triangle is called a  $30^\circ$ - $60^\circ$ - $90^\circ$  triangle.) Since  $AB$  is the hypotenuse of right triangle  $ABF$  and  $FB = \frac{1}{2}AB$ , triangle  $ABF$  must be a  $30^\circ$ - $60^\circ$ - $90^\circ$  triangle and angle  $ABF$  must measure  $60^\circ$ . The measure of angle  $ABC$  equals the sum of the measures of angles  $ABF$  and  $FBC$ . Because angle  $FBC$  is in rectangle  $FBCD$ , it has a measure of  $90^\circ$ . Therefore, the measure of angle  $ABC$ , or angle  $B$  shown in the original figure, is  $60^\circ + 90^\circ = 150^\circ$ .

Choice B is incorrect and may result from identifying triangle  $ABF$  as a  $45^\circ$ - $45^\circ$ - $90^\circ$  triangle and the measure of angle  $ABF$  as  $45^\circ$ . Choice C is incorrect and may result from adding the measures of angles  $BAF$  and  $FBC$  rather than angles  $ABF$  and  $FBC$ . Choice D is incorrect and may result from finding the measure of angle  $D$  rather than angle  $B$ .

### QUESTION 31

**The correct answer is 6.** It's given that apples cost \$0.65 each and oranges cost \$0.75 each. If  $x$  is the number of apples, the cost for buying  $x$  apples is  $0.65x$  dollars. If  $y$  is the number of oranges, the cost for buying  $y$  oranges is  $0.75y$  dollars. Lynne has \$8.00 to spend; therefore, the inequality for the number of apples and oranges Lynne can buy is  $0.65x + 0.75y \leq 8.00$ . Since Lynne bought 5 apples,  $x = 5$ . Substituting 5 for  $x$  yields  $0.65(5) + 0.75y \leq 8.00$ , which can be rewritten as  $3.25 + 0.75y \leq 8.00$ . Subtracting 3.25 from both sides of the inequality yields  $0.75y \leq 4.75$ . Dividing both sides of this inequality by 0.75 yields  $y \leq 6.33$ . Therefore, the maximum number of whole oranges Lynne can buy is 6.

## QUESTION 32

**The correct answer is 146.** According to the triangle sum theorem, the sum of the measures of the three angles of a triangle is  $180^\circ$ . This triangle is made up of angles with measures of  $a^\circ$ ,  $b^\circ$ , and  $c^\circ$ . Therefore,  $a + b + c = 180$ . Substituting 34 for  $a$  yields  $34 + b + c = 180$ . Subtracting 34 from each side of the equation yields  $b + c = 146$ .

## QUESTION 33

**The correct answer is 2500.** The mean number of the list is found by dividing the sum of all the numbers in the list by the count of numbers in the list. It's given that the mean of the five numbers in this list is 1600; therefore,  $\frac{700 + 1200 + 1600 + 2000 + x}{5} = 1600$ . Multiplying both sides of this equation by 5 gives  $700 + 1200 + 1600 + 2000 + x = 8000$ . The left-hand side of this equation can be rewritten as  $5500 + x = 8000$ . Subtracting 5500 from both sides of this equation gives  $x = 2500$ .

## QUESTION 34

**The correct answer is 34.** Substituting the values  $y = 17$  and  $x = a$  into the equation  $y = mx$  yields  $17 = ma$ . Solving for  $a$  gives  $a = \frac{17}{m}$ . This can be substituted for  $a$  in  $x = 2a$ , which yields  $x = 2\left(\frac{17}{m}\right)$ , or  $x = \frac{34}{m}$ . Substituting  $x = \frac{34}{m}$  into the equation  $y = mx$  yields  $y = m\left(\frac{34}{m}\right)$ . This equation can be rewritten as  $y = 34$ .

## QUESTION 35

**The correct answer is  $\frac{5}{2}$ .** Applying the distributive property of multiplication on the left-hand side of  $a(x + b) = 4x + 10$  yields  $ax + ab = 4x + 10$ . If  $a(x + b) = 4x + 10$  has infinitely many solutions, then  $ax + ab = 4x + 10$  must be true for all values of  $x$ . It follows that  $ax = 4x$  and  $ab = 10$ . Since  $ax = 4x$ , it follows that  $a = 4$ . Substituting 4 for  $a$  in  $ab = 10$  yields  $4b = 10$ . Dividing both sides of  $4b = 10$  by 4 yields  $b = \frac{10}{4}$ , which simplifies to  $\frac{5}{2}$ . Either  $5/2$  or 2.5 may be entered as the correct answer.

## QUESTION 36

**The correct answer is  $\frac{25}{4}$ .** If a line intersects a parabola at a point, the coordinates of the intersection point must satisfy the equation of the line and the equation of the parabola. Since the equation of the line is  $y = c$ , where  $c$  is a constant, the  $y$ -coordinate of the intersection point must be  $c$ . It follows then that substituting  $c$  for  $y$  in the equation for the parabola will result in another true equation:  $c = -x^2 + 5x$ . Subtracting  $c$  from both sides of  $c = -x^2 + 5x$  and then dividing both sides by  $-1$  yields  $0 = x^2 - 5x + c$ . The solution to this quadratic equation would give the  $x$ -coordinate(s) of the point(s) of intersection.

Since it's given that the line and parabola intersect at exactly one point, the equation  $0 = x^2 - 5x + c$  has exactly one solution. A quadratic equation in the form  $0 = ax^2 + bx + c$  has exactly one solution when its discriminant  $b^2 - 4ac$  is equal to 0. In the equation  $0 = x^2 - 5x + c$ ,  $a = 1$ ,  $b = -5$ , and  $c = c$ . Therefore,  $(-5)^2 - 4(1)(c) = 0$ , or  $25 - 4c = 0$ . Subtracting 25 from both sides of  $25 - 4c = 0$  and then dividing both sides by  $-4$  yields  $c = \frac{25}{4}$ . Therefore, if the line  $y = c$  intersects the parabola defined by  $y = -x^2 + 5x$  at exactly one point, then  $c = \frac{25}{4}$ . Either  $\frac{25}{4}$  or 6.25 may be entered as the correct answer.

### QUESTION 37

**The correct answer is 293.** It's given that a peregrine falcon's maximum speed while diving is 200 miles per hour and that 1 mile = 5280 feet. Therefore, a peregrine falcon's maximum speed while diving is  $\left(\frac{200 \text{ miles}}{1 \text{ hour}}\right)\left(\frac{5280 \text{ feet}}{1 \text{ mile}}\right) = 1,056,000 \text{ feet per hour}$ . There are 60 minutes in 1 hour and 60 seconds in each minute, so there are  $(60)(60) = 3600$  seconds in 1 hour. A peregrine falcon's maximum speed while diving is therefore  $\left(\frac{1,056,000 \text{ feet}}{1 \text{ hour}}\right)\left(\frac{1 \text{ hour}}{3600 \text{ seconds}}\right)$ , which is approximately 293.33 feet per second. To the nearest whole number, this is 293 feet per second.

### QUESTION 38

**The correct answer is 9.** If  $x$  is the number of hours it will take the falcon to dive 0.5 mile, then the speed of 200 miles per hour can be used to create the proportion  $\frac{200 \text{ miles}}{1 \text{ hour}} = \frac{0.5 \text{ mile}}{x \text{ hours}}$ . This proportion can be rewritten as  $x \text{ hours} = \frac{0.5 \text{ mile}}{200 \frac{\text{miles}}{\text{hour}}}$ , which gives  $x = 0.0025$ . There are 60 minutes in 1 hour and 60 seconds in each minute, so there are  $(60)(60) = 3600$  seconds in one hour. Therefore, 0.0025 hour is equivalent to  $(0.0025 \text{ hour})\left(\frac{3600 \text{ seconds}}{1 \text{ hour}}\right) = 9$  seconds.