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# October 2018 QAS<sup>®</sup>

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## GENERAL DIRECTIONS

- You may work on one section at a time.
- If you finish a section before time is called, check your work on that section. You may NOT turn to any other section.

## MARKING ANSWERS

- Be sure to mark your answer sheet properly.

COMPLETE MARK ● EXAMPLES OF INCOMPLETE MARKS 

- You must use a No. 2 pencil.
- Carefully mark only one answer for each question.
- Make sure you fill the entire circle darkly and completely.
- Do not make any stray marks on your answer sheet.
- If you erase, do so completely. Incomplete erasures may be scored as intended answers.
- Use only the answer rows that correspond to the question numbers.

## USING YOUR TEST BOOK

- You may use the test book for scratch work, but you will not receive credit for anything that you write in your test book.
- After time has been called, you may not transfer answers from your test book to your answer sheet or fill in circles.
- You may not fold or remove pages or portions of a page from this book, or take the book or answer sheet from the testing room.

## SCORING

- For each correct answer, you receive one point.
- You do not lose points for wrong answers; therefore, you should try to answer every question even if you are not sure of the correct answer.

**DO NOT OPEN THIS TEST BOOK UNTIL YOU ARE INSTRUCTED TO DO SO**

# 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*, ©2010 by Mary Helen Stefaniak. Narrator Gladys Cailiff is eleven years old in 1938 when a new, well-traveled young schoolteacher, Miss Grace Spivey, turns a small Georgia town upside down.

Line  
5  
10  
15  
20  
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 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 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 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 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 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 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 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 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 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 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.

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 room—was the pearly white button hanging on a string in front

of the blackboard behind the teacher’s desk up front.

60 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  
65 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  
70 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  
75 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  
80 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,”  
85 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  
90 for having enlightened the rest of us, Miss Spivey simply said, “That’s right.”

<sup>1</sup> The Works Progress Administration (WPA) was a central part of President Franklin D. Roosevelt’s “New Deal.” It was established in 1935 as a means of creating government jobs for some of the nation’s many unemployed.

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 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 39) in one situation and “marched” (line 47) 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 79-81 (“She looked... thought”)
- B) Lines 82-83 (“We all... up”)
- C) Lines 84-86 (“She means... room”)
- D) Lines 87-91 (“Instead... right”)

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

This passage is adapted from David Owen, "Traffic Congestion Is Not an Environmental Problem" from *The Conundrum*. ©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%, 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

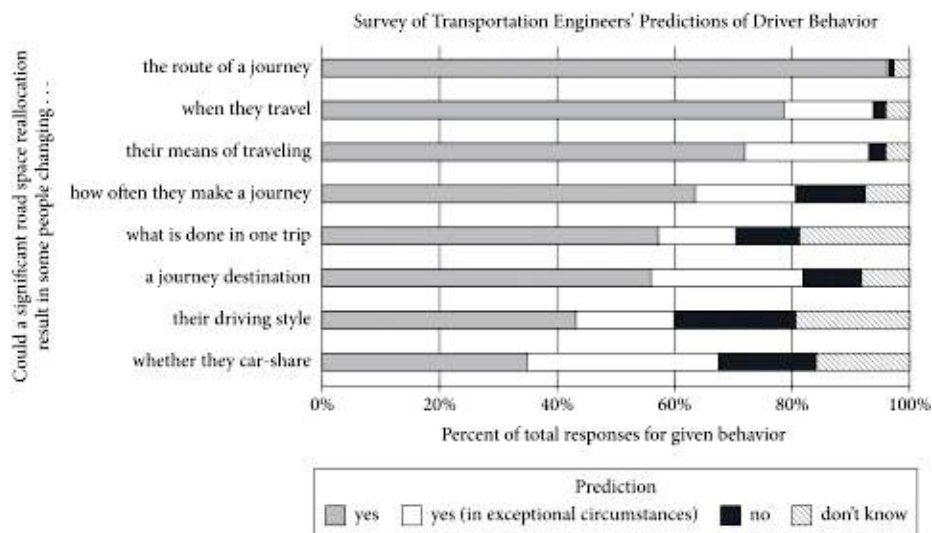
Effect of Route Capacity Reduction in Selected Regions

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.

Adapted from David Owen, *The Conundrum*, ©2011 by David Owen and Penguin Books.

Figure 2



Adapted from Douglas C. Montgomery and George C. Runger, *Applied Statistics and Probability for Engineers* (6<sup>th</sup> edition), ©2013 by Douglas C. Montgomery and George C. Runger.

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 5-7 (“To have... overall”)
- C) Lines 14-17 (“But they’re... productive”)
- D) Lines 18-21 (“One... commutes”)

13

As used in lines 8-9, “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 8-13 (“That... tolls”)
- B) Lines 21-25 (“That... enough”)
- C) Lines 29-38 (“If, in... worse”)
- D) Lines 59-62 (“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 66, “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' article, "Pleasant to the Touch," which was originally published in September 2012 by *The Scientist* magazine. ©2012 by Sabrina Richards and *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 stimuli:

Line 5 pain and temperature. Sensations of pressure 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 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.

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 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 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 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 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 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 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 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 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 arm, and whether it can discern a 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 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 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 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 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 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 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 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 11-13 (“blocking... shock”)
- D) Lines 31-33 (“In contrast... 75m/s”)

24

As used in line 15, “active” most nearly means

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

25

As used in line 20, “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 20-23 (“Using... fired”)
- B) Lines 23-25 (“They... delayed”)
- C) Lines 25-27 (“The delay... later”)
- D) Lines 34-35 (“Then... fibers”)

28

The sentence in lines 40-42 (“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 54-63) 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 an excerpt from Albert J. Beveridge's Senate campaign speech, "March of the Flag," on September 16<sup>th</sup>, 1898. Passage 2 is adapted from William Jennings Bryan's speech, "The Paralyzing Influence of Imperialism," which he delivered to attendees of the Democratic National Convention in Kansas City, Missouri, on August 8<sup>th</sup>, 1900. Beveridge's speech helped him win the election and become a Senator for Indiana, which ultimately made him one of the leading advocates of American expansion.

**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 countries of Europe; a land set like a sentinel between 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 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 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 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 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 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 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 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 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 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 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 express a sentiment which still echoes in the hearts of men.

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. 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 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 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 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 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 24-37), 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 65, “recalled” most nearly means

- A) repeated.
- B) retracted.
- C) rejected.
- D) remembered.

36

It can be reasonably 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 47-51 (“If the... Henry”)
- B) Lines 65-66 (“It goes... influence”)
- C) Lines 71-73 (“He never... master”)
- D) Lines 74-77 (“Those... nation”)

38

As used in line 76, “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 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 38-43 (“If it... ability”)
- B) Lines 44-45 (“The Filipinos... living”)
- C) Lines 45-47 (“Our... government”)
- D) Lines 51-53 (“When... men”)

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

This passage is an excerpt from an essay by Peter A. Ensminger, "Control of Weeds by Plowing at Night," from his collection of essays *Life Under The Sun*. ©2001 by Peter A. Ensminger and Yale University Press.

Many millennia before the invention of herbicides, farmers simply plowed their fields to control weeds. Even today, plowing can constitute a valuable part of an integrated weed-management 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 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 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 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 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 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 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 farmers simply plowed their fields during the night, when the photon fluence rate (the rate at which photons hit the surface) is below 1015 photons per square meter per second. 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.

Hartmann says that he was very skeptical when he first came up with this idea because he assumed 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 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 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 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 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.

**Figure 1**

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

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 13-16) 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 15, “induced” most nearly means

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

46

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

- A) Lines 29-33 (“More... germination”)
- B) Lines 33-35 (“Although... germination”)
- C) Lines 40-44 (“Although... seeds”)
- D) Lines 45-49 (“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 52-55 (“Hartmann... night”)
- B) Lines 55-57 (“No crops... weeds”)
- C) Lines 57-58 (“The results... dramatic”)
- D) Lines 58-61 (“More... weeds”)

49

As used in line 58, “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 1-2 (“Many... weeds”)
- B) Lines 8-10 (“Ecologists... surface”)
- C) Lines 10-12 (“Plant... germinate”)
- D) Lines 35-40 (“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 children’s books more

1

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

**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 sentence 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 game 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

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 the 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'

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.

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 students 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

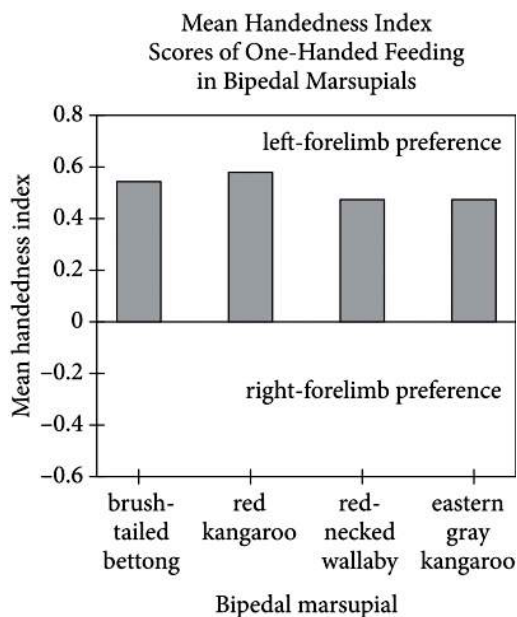
- A) NO CHANGE
- B) trait,
- C) trait;
- D) trait:

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.

**Figure 1**



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.

**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

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

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.

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.

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.

— 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

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

36

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

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.

— 3 —

Paying for tuition also helps businesses retain **38** 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 **39** degrees. Because their new qualifications give them opportunities for advancement within the company. The career of Valerie Lincoln, an employee

**37**

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

**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

at the aerospace company United Technologies Corporation **40** (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 **41** deep knowledge of her industry and years of valuable experience.

— 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

40

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

41

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

42

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



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. **44**

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

**43**

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

**44**

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.

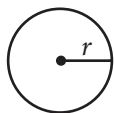
## DIRECTIONS

For questions 1-15, solve each problem, choose the best answer from the choices provided, and fill in the corresponding circle 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

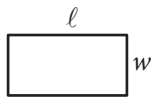
1. The use of a calculator **is not permitted**.
2. All variables and expressions used represent real numbers unless otherwise indicated.
3. Figures provided in this test are drawn to scale unless otherwise indicated.
4. All figures lie in a plane unless otherwise indicated.
5. Unless otherwise indicated,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

## REFERENCE

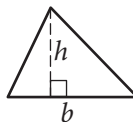


$$A = \pi r^2$$

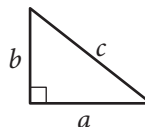
$$C = 2\pi r$$



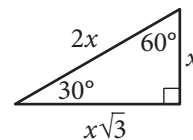
$$A = \ell w$$



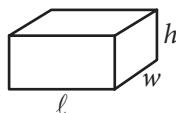
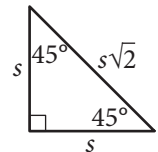
$$A = \frac{1}{2}bh$$



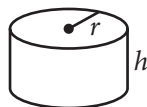
$$c^2 = a^2 + b^2$$



Special Right Triangles



$$V = \ell wh$$



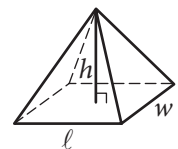
$$V = \pi r^2 h$$



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



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



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

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

$$2z + 1 = z$$

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

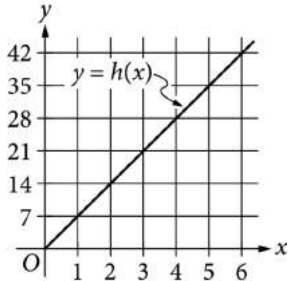
Merchandise weight (pounds)	Shipping charge (\$)
5	16.94
10	21.89
20	31.79
40	51.59

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

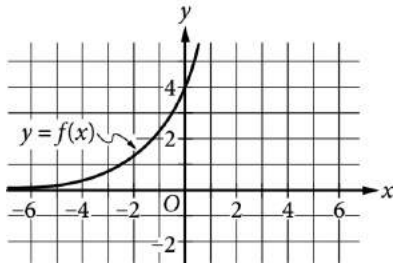
$$\frac{x^2 - 1}{x - 1} = -2$$

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

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



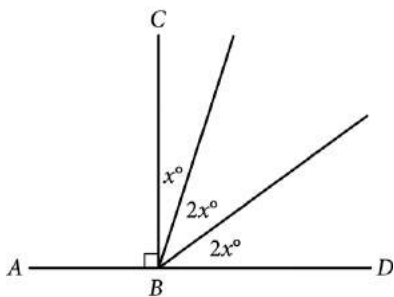
7



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

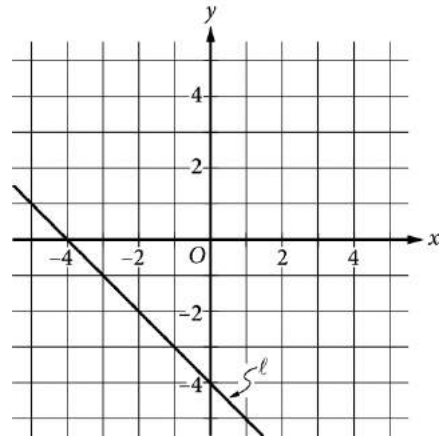
8



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

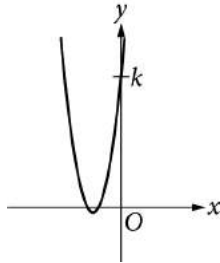


Which of the following is an equation of line  $\ell$  in the  $xy$ -plane above?

- 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  $k$ ?

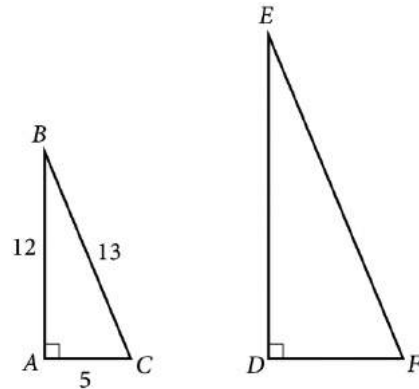
- A) 2
- B) 6
- C) 10
- D) 12

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 equation above?

- 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 circles accurately. You will receive credit only if the circles are filled in correctly.
- Mark no more than one circle 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  $7/2$ . (If  $\begin{array}{|c|c|c|c|} \hline 3 & 1 & / & 2 \\ \hline \bullet & \bullet & / & \bullet \\ \hline \end{array}$  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:  $\frac{7}{12}$       Answer: 2.5

Write answer in boxes. →      ← Fraction line      ← Decimal point

Grid in result.

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

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

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

	2	/	3
•	•	•	•
	0	0	0
①	①	①	①
②	•	②	②
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

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

•	6	6	7
•	•	•	•
	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
⑦	⑦	⑦	•
⑧	⑧	⑧	⑧
⑨	⑨	⑨	⑨

Answer: 201 – either position is correct

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

	2	0	1
•	•	•	•
	•	0	0
①	①	•	①
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.





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

$$2x + 3y = 1200$$

$$3x + 2y = 1300$$

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.

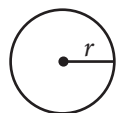
## DIRECTIONS

For questions 1-30, solve each problem, choose the best answer from the choices provided, and fill in the corresponding circle 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

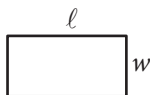
1. The use of a calculator **is permitted**.
2. All variables and expressions used represent real numbers unless otherwise indicated.
3. Figures provided in this test are drawn to scale unless otherwise indicated.
4. All figures lie in a plane unless otherwise indicated.
5. Unless otherwise indicated,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

## REFERENCE

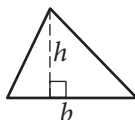


$$A = \pi r^2$$

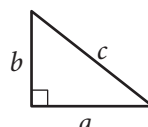
$$C = 2\pi r$$



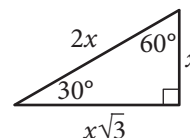
$$A = \ell w$$



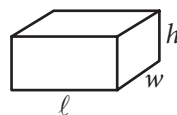
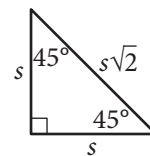
$$A = \frac{1}{2}bh$$



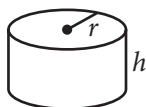
$$c^2 = a^2 + b^2$$



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.



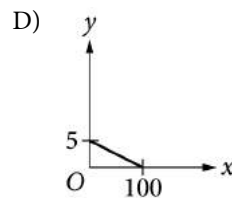
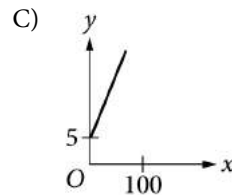
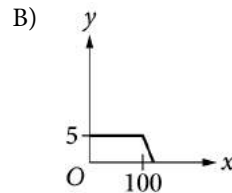
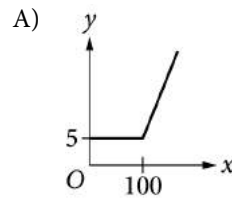
1

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

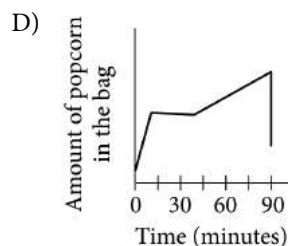
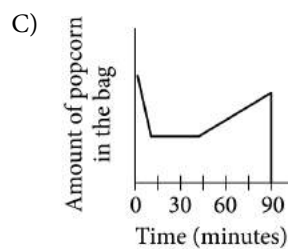
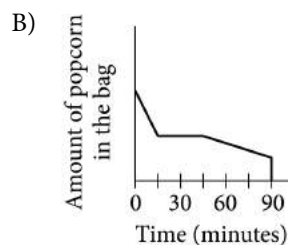
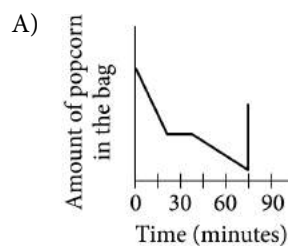
A text messaging plan charges a flat fee of \$5 per month for up to 100 text messages sent plus \$0.25 for each additional text message sent that month. Which of the following graphs represents the cost,  $y$ , of sending  $x$  texts in a month?





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  $2x(x^2 - 3x)$ ?

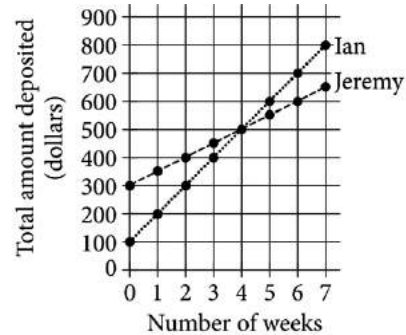
- A)  $-4x^2$
- B)  $3x^3 - x^2$
- C)  $2x^3 - 3x$
- D)  $2x^3 - 6x^2$

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%.

11

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

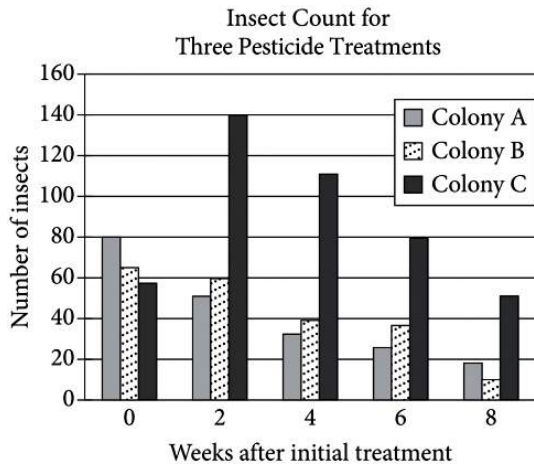
12

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



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



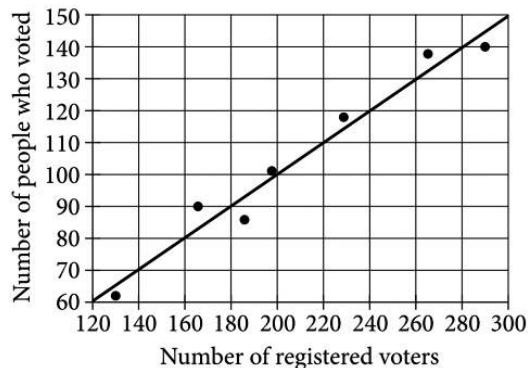
23

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

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

$$2.4x - 1.5y = 0.3$$

$$1.6x + 0.5y = -1.3$$

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

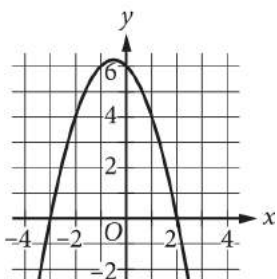


28

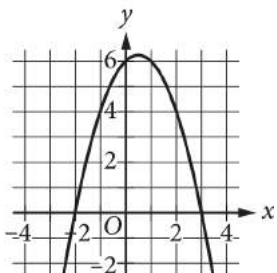
$$f(x) = (x+3)(x-k)$$

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?

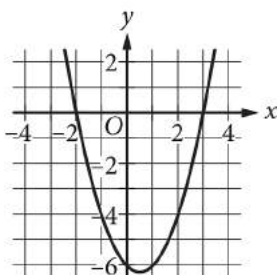
A)



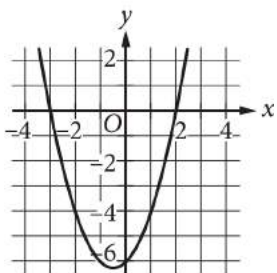
B)



C)



D)



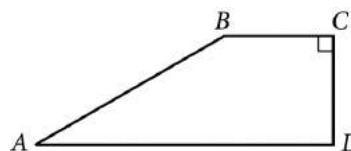
29

$$H = 1.88L + 32.01$$

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,  $AD \parallel BC$  and  $CD = \frac{1}{2}AB$ . 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 circles accurately. You will receive credit only if the circles are filled in correctly.
- Mark no more than one circle 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  $7/2$ . (If  $\begin{array}{|c|c|c|c|} \hline 3 & 1 & / & 2 \\ \hline \circ & \circ & \circ & \circ \\ \hline \end{array}$  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.

Write answer in boxes. →

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

7	/	1	2
○	○	○	○
○	○	○	○
○	○	○	○
○	○	○	○
○	○	○	○
○	○	○	○
○	○	○	○
○	○	○	○
○	○	○	○
○	○	○	○

← Fraction line

Grid in result.

Answer: 2.5

	2	.	5
○	○	○	○
○	○	○	○
○	○	○	○
○	○	○	○
○	○	○	○
○	○	○	○
○	○	○	○
○	○	○	○
○	○	○	○
○	○	○	○

← Decimal point

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	
○	○	○	○
○	○	○	○
○	○	○	○
○	○	○	○
○	○	○	○
○	○	○	○
○	○	○	○
○	○	○	○
○	○	○	○

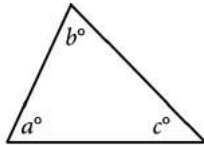
**NOTE:** You may start your answers in any column, space permitting. Columns you don't need to use should be left blank.



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  $c$ ?





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**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.**