

**NOVEMBER 5, 2016
US**

The SAT®

Test Book

IMPORTANT REMINDERS

1

A No. 2 pencil is required for the test.
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2

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Test begins on the next page.

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 Anita Desai, *Clear Light of Day*. ©1980 by Anita Desai. Raja, Bim, and Tara are siblings living in Old Delhi, India.

As they grew into adolescence it seemed to Raja, Bim and Tara that they were suffocating in some great grey mass through which they tried to thrust as
Line Raja had thrust through the thorny hedge, and
5 emerge into a different atmosphere. How was it to be different? Oh, they thought, it should have colour and event and company, be rich and vibrant with possibilities. Only they could not—the greyness was so massed as to baffle them and defeat their attempts
10 to fight through. Only Raja sometimes did. On his bicycle, cycling off to the cinema in Kashmere Gate, or in the wrestling pit with Hamid, or rattling down the drive in the soda-man’s cart, or flying kites on the terrace in the evenings, he seemed to come alive and
15 glow, even if briefly, to be followed by a long trough of brooding sullenness and irritability.

Raja also had the faculty of coming alive to ideas, to images picked up in the books he read. The usual boyhood adventure stories, *Robin Hood* and
20 *Beau Geste*, set him on fire till he almost blazed with enthusiasm as he showed Hamid how to fashion swords out of bamboo poles and battle with him, or pictured himself in the desert, in the Foreign Legion, playing some outsize, heroic role in a splendid
25 battle. He cycled to Connaught Place and bought cheap paperbacks printed specially for the American Army and sold on the pavements,

and took them home to share with his sisters. ‘Book worms, book worms,’ Aunt Mira called them, 30 rather proudly and indulgently, as they lay stretched on their beds under the stickily revolving fans, reading with almost audible concentration.

The sisters, however, read themselves not into a blaze but a stupor, sinking lower and lower under 35 the dreadful weight of *Gone with the Wind* and *Lorna Doone*, their eyes growing glazed so that characters never quite emerged into the bright light of day and only made vague, blurred impressions on their drowsy, drugged minds, rather than vivid and 40 clear-cut ones. They hadn’t the vitality that Raja had, to participate in what they read—they were passive receivers, bulging with all they read, sinking with its weight like water-logged rafts.

While Tara would be dragged helplessly into the 45 underworld of semi-consciousness by the romances she read, Bim was often irritated and would toss them aside in dissatisfaction. She began to realize they were not what she wanted. What did she want? Oh, she jerked her shoulders in irritation, something 50 different—facts, history, chronology, preferably. She was bored by the books Raja brought her and tried not to disappoint him by showing her boredom but of course Raja saw and was hurt. Bim began to read, laboriously, sitting up at a table with her elbow 55 placed on either side of the book, Gibbon’s *Decline and Fall*¹ that she had found on the drawing-room bookshelf. Raja secretly admired her for it as he could not have tackled a study of such length himself, but would not show it and said only 60 that she did not know what she was missing, that she

had no imagination: to him, the saddest sin. That hurt and puzzled Bim: what need of imagination when one could have knowledge instead?

That created a gap between them, a trough or a
65 channel that the books they shared did not bridge.

¹ *The History of the Decline and Fall of the Roman Empire* by eighteenth-century British historian Edward Gibbon

1

The passage is told from the point of view of an

- A) omniscient observer.
- B) unbiased parent.
- C) elderly relative.
- D) envious sibling.

2

The main purpose of the passage is to

- A) reveal how the adult personalities of the main characters were shaped during their youth.
- B) summarize how the main characters were influenced by their families.
- C) account for the different career aspirations of the main characters.
- D) describe an important transitional period in the lives of the main characters.

3

The narrator suggests that Raja sometimes overcomes the “great grey mass” (line 3) by

- A) engaging in playful activities.
- B) fleeing the company of his sisters.
- C) focusing on school.
- D) constructing a false identity.

4

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

- A) Lines 6-10 (“Oh, they . . . through”)
- B) Lines 17-18 (“Raja . . . read”)
- C) Lines 18-25 (“The usual . . . battle”)
- D) Lines 25-28 (“He cycled . . . sisters”)

5

As used in line 7, “event” most nearly means

- A) predicament.
- B) competition.
- C) outcome.
- D) spectacle.

6

The third paragraph (lines 33-43) mainly serves to

- A) point out the types of books that Bim and Tara are accustomed to reading.
- B) explain the negative attitudes of Bim and Tara toward the novels Raja brings them.
- C) contrast the effect reading has on Bim and Tara with the effect it has on Raja.
- D) imply that Bim and Tara read literature that is less interesting than the literature Raja reads.

7

The narrator implies that Bim differs from her siblings in that she

- A) appreciates books that stimulate her imagination.
- B) values learning about history more than reading works of fiction.
- C) does not consider reading an appealing pastime.
- D) enjoys the solitude that reading books provides.

8

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

- A) Lines 40-41 (“They hadn’t . . . read”)
- B) Lines 44-47 (“While . . . dissatisfaction”)
- C) Lines 48-50 (“What . . . preferably”)
- D) Lines 64-65 (“That created . . . bridge”)

9

As used in line 58, “tackled” most nearly means

- A) undertaken.
- B) obstructed.
- C) secured.
- D) seized.

10

According to the passage, Raja reacts to Bim’s choice of reading material by

- A) praising the ideas in her books while faulting their lack of literary style.
- B) resenting Bim’s contempt for the books he gave her.
- C) sharing in Bim’s academic interests despite finding the texts very difficult to follow.
- D) criticizing Bim’s actions aloud while privately respecting her.

Questions 11-20 are based on the following passages.

Passage 1 is adapted from a speech delivered in 1850 by senator Daniel Webster, “The Constitution and the Union.” Passage 2 is adapted from a speech delivered in 1854 by Henry David Thoreau, “Slavery in Massachusetts.”

Passage 1

It is in the nature of man, manifested by his whole history, that religious disputes are apt to become warm, and men’s strength of conviction is proportionate to their views of the magnitude of the 5 questions. In all such disputes, there will sometimes be men found with whom everything is absolute—absolutely wrong, or absolutely right. They see the right clearly; they think others ought so to see it, and they are disposed to establish a broad line of 10 distinction between what is right, and what is wrong. And they are not seldom willing to establish that line upon their own convictions of the truth and the justice of their own opinions; and are ready to mark and guard that line, by placing along it a series 15 of dogmas, as lines of boundary are marked by posts and stones. There are men, who, with clear perceptions, as they think, of their own duty, do not see how too hot a pursuit of one duty may involve them in the violation of another, or how too warm an 20 embracement of one truth may lead to a disregard of other truths equally important. As I heard it stated strongly, not many days ago, these persons are disposed to mount upon some particular duty as upon a warhorse, and to drive furiously on, and 25 upon, and over all other duties, that may stand in the way. These are men, who, in times of that sort, and disputes of that sort, are of opinion, that human duties may be ascertained with the exactness of mathematics. They deal with morals as with 30 mathematics, and they think what is right, may be distinguished from what is wrong, with the precision of an algebraic equation. They have, therefore, none too much charity toward others who differ with them. They are apt, too, to think that nothing is good 35 but what is perfect, and that there are no compromises or modifications to be made in submission to difference of opinion, or in deference to other men’s judgment. . . .

Now, sir, in this state of sentiment, upon the 40 general nature of slavery, lies the cause of a great portion of those unhappy divisions, exasperations, and reproaches which find vent and support in different parts of the Union.

Passage 2

Will mankind never learn that policy is not
 45 morality—that it never secures any moral right, but
 considers merely what is expedient? chooses the
 available candidate—who is invariably the
 Devil—and what right have his constituents to be
 surprised, because the Devil does not behave like an
 50 angel of light? What is wanted is men, not of policy,
 but of probity—who recognize a higher law than the
 Constitution, or the decision of the majority. The fate
 of the country does not depend on how you vote at
 the polls—the worst man is as strong as the best at
 55 that game; it does not depend on what kind of paper
 you drop into the ballot-box once a year, but on what
 kind of man you drop from your chamber into the
 street every morning.

What should concern Massachusetts is not the
 60 Nebraska Bill, nor the Fugitive Slave Bill, but her own
 slaveholding and servility. Let the State dissolve her
 union with the slaveholder. She may wriggle and
 hesitate, and ask leave to read the Constitution once
 more; but she can find no respectable law or
 65 precedent which sanctions the continuance of such a
 union for an instant.

Let each inhabitant of the State dissolve his union
 with her, as long as she delays to do her duty. . . .

Covered with disgrace, the State has sat down
 70 coolly to try for their lives and liberties the men who
 attempted to do its duty for it.¹ And this is called
justice! They who have shown that they can behave
 particularly well may perchance be put under bonds
 for *their good behavior*. They whom truth requires at
 75 present to plead guilty are, of all the inhabitants of
 the State, preeminently innocent. While the
 Governor, and the Mayor, and countless officers of
 the Commonwealth are at large, the champions of
 liberty are imprisoned.

80 Only they are guiltless who commit the crime of
 contempt of such a court. It behooves every man to
 see that his influence is on the side of justice, and let
 the courts make their own characters. My sympathies
 in this case are wholly with the accused, and wholly
 85 against their accusers and judges.

¹ A reference to the abolitionists who were arrested after storming
 the Boston Courthouse on May 26, 1854, in an attempt to free the
 imprisoned runaway slave Anthony Burns

11

In Passage 1, Webster makes which claim about the
 nature of people's moral beliefs?

- A) People's moral beliefs about an issue tend to evolve over the course of a lifetime.
- B) People's beliefs about what is morally right are more firmly held than their beliefs about what is morally wrong.
- C) The intensity of people's beliefs about a moral issue reflects their views of the importance of the issue.
- D) People often have strong moral beliefs about issues that their society regards as relatively insignificant.

12

As used in lines 3 and 19, "warm" most nearly means

- A) moderate.
- B) passionate.
- C) cordial.
- D) comfortable.

13

Webster's reference to the warhorse in lines 21-26
 ("As I . . . way") primarily serves to emphasize the

- A) noble aspects of a performance.
- B) resourceful approach to a situation.
- C) headstrong quality of a behavior.
- D) brutal nature of an outcome.

14

As used in line 45, "secures" most nearly means

- A) confines.
- B) guarantees.
- C) adjusts.
- D) fastens.

15

It can reasonably be inferred from Passage 2 that Thoreau equates true citizenship with

- A) subscribing to the values of the Constitution.
- B) being a virtuous and principled person.
- C) obeying federal laws even when they contradict state laws.
- D) functioning independently of all moral ideals.

16

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

- A) Lines 44-46 (“Will . . . expedient”)
- B) Lines 48-50 (“what right . . . light”)
- C) Lines 50-52 (“What is wanted . . . majority”)
- D) Lines 74-76 (“They whom . . . innocent”)

17

In Passage 2, Thoreau suggests that with respect to slavery, the role of the state of Massachusetts should be to

- A) work toward a national solution to the problem.
- B) find justification in the Constitution for ending it.
- C) cease being complicit in supporting it.
- D) put the question of its future to a popular vote.

18

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

- A) Lines 61-62 (“Let . . . slaveholder”)
- B) Lines 62-64 (“She may . . . more”)
- C) Lines 69-71 (“Covered . . . it”)
- D) Lines 71-72 (“And this . . . *justice*”)

19

What is a major theme explored by both passages?

- A) The allegiance of politicians to slaveholding interests
- B) The tendency to allow sympathy to alter one’s moral beliefs
- C) The Constitutional indefensibility of slavery
- D) The role of individual morality in politics

20

Webster would most likely say that the Massachusetts abolitionists discussed by Thoreau in Passage 2

- A) have admirable reasons for wanting to free Anthony Burns despite their questionable methods.
- B) are oblivious to other moral truths in their single-minded focus on opposing slavery.
- C) comprise only a small portion of the citizenry and have views unrepresentative of those of the citizenry as a whole.
- D) have unwittingly turned other people against the very cause for which they are struggling.

Questions 21-30 are based on the following passages.

This passage is from Elizabeth Preston, "Evolution Made Ridiculous Flightless Birds Over and Over." ©2014 by Kalmbach Publishing Co.

Watching an ostrich sprint across the plain like a mean two-legged dust mop, you might think a mistake has been made. Surely this isn't one of evolution's prouder moments? But new genetic evidence says that the group of birds including ostriches, emus, and other ungainly birds all came from flying ancestors. They lost the ability to fly not once, but over and over again. Something must have been working.

The ratites are a group of birds that includes the ostrich and emu, as well as the kiwi, rhea (like a smaller, South American ostrich), and cassowary (with a bright blue face and what looks like a toenail on its head). There were also the moa of New Zealand and the elephant bird of Madagascar—gigantic Big Bird types that went extinct within the past several hundred years, likely due to humans.

The birds themselves are pretty obvious, but the story of ratite evolution "has always been a contentious issue," says Oliver Haddrath, an ornithology research technician and PhD student at the Royal Ontario Museum. Scientists have never been certain how ratites arose, or how they're related to each other and to more normal birds.

In the 1960s and 1970s, Haddrath says, molecular evidence showed that the flightless ratites were closely related to birds called tinamous. Unlike the ratites, these small ground dwellers in Central and South America can fly (though they don't often choose to). At the same time, scientists realized that everyplace ratites live or used to live (Australia, South America, Africa) was a piece of land that once belonged to the supercontinent Gondwanaland. Perhaps the common ancestor of all ratites was a flightless bird on Gondwanaland that had already split off from its flying relative the tinamou. When the supercontinent broke up, the birds left standing on each bit of land could have evolved into different species.

Since then, some evidence has supported this theory, while other studies have contradicted it. Haddrath and his coauthors approached the question using DNA from the extinct moa, as well as updated DNA-sequencing technology that let them gather large amounts of data at once. "We used over

1 million base pairs" of DNA, Haddrath says, "to test whether the tinamou was closer to the moa than the moa was to the emu and ostrich." At last, they would unearth the answers to the ratites' family secrets.

They found that the tinamou isn't a distant cousin after all, but a sibling smack in the middle of the ratite family tree. This suggests that the common ancestor of the ratites and the tinamou could fly, and while the tinamou held onto this skill, the branches leading to other ratites became flightless again and again.

Technically, it's possible that the opposite is true: all the ratites and the tinamou evolved from one flightless ancestor, and the tinamou re-learned how to fly. But Haddrath says it's unlikely. "There are no known examples of a flightless bird species regaining flight," he says. Many kinds of birds other than the ratites have lost the ability to fly—penguins, some ducks, and so on—but none have gotten it back. Generally, it's "considered much easier to lose a trait than regain it," Haddrath says.

The relationship between the tinamou and other ratites, for which Haddrath says there's "overwhelming evidence" in the DNA, was hidden by the shapes of the birds' bodies. "Most studies using skeletal features have concluded that the ratites are each other's closest relatives, and the tinamous are a distant cousin," Haddrath says. But it now seems that the demands of land-bound life made ratites' skeletons evolve in similar ways. This convergent evolution masked the birds' true relationships.

Since so many birds have given up flying, it must be an easy trait to lose when it's beneficial, Haddrath says. For birds that are adapting to life on land, hanging onto the traits that let them fly may (ironically) weigh them down. As they lose flight they're free to evolve into the weird, walking species we know today. It's apparently a winning strategy—as long as humans don't arrive on their island to wipe them out.

21

The main purpose of the passage is to

- A) describe the physical limitations of some bird species.
- B) explain why members of a group of birds lost and then regained the ability to fly.
- C) summarize contradictory theories about birds that require further study.
- D) report on findings that clarify the relationships among species of birds.

22

The author develops the passage primarily using which kind of evidence?

- A) Detailed narratives enhanced by data collected over many years
- B) Summary of technical data supplemented by expert explanation
- C) Reference to trends based on recorded observations
- D) Discussion of a scientific theory contradicting an existing set of data

23

In the first paragraph, the author uses the phrase “mean two-legged dust mop” primarily to

- A) present an amusing depiction of the awkward appearance of ostriches.
- B) present an image that helps explain why ostriches are unable to fly.
- C) suggest that genetic evidence about the ostrich’s ancestor is likely misleading.
- D) imply a link between the appearance of ostriches and their behavior.

24

The main purpose of the second paragraph (lines 10-17) is to

- A) reveal recently discovered findings about a certain group of birds.
- B) identify the members of a certain group of birds in some detail.
- C) compare and contrast the characteristics that define a certain group of birds.
- D) outline the research approaches aimed at understanding a certain group of birds.

25

As used in lines 34 and 52, “common” most nearly means

- A) popular.
- B) shared.
- C) everyday.
- D) well known.

26

The passage suggests that more recent studies have challenged the scientific understanding advanced in the fourth paragraph (lines 25-39) on which point?

- A) Whether ratites and tinamous are related
- B) Whether all tinamous once lived on the same continent
- C) Whether tinamous lost and regained the ability to fly
- D) Whether the common ancestor of ratites was flightless

27

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

- A) Lines 30-33 (“At the . . . Gondwanaland”)
- B) Lines 42-45 (“Haddrath . . . once”)
- C) Lines 45-48 (“We used . . . ostrich”)
- D) Lines 52-56 (“This . . . again”)

28

What potential objection to Haddrath’s argument does the author anticipate in the passage?

- A) That ratites may be more closely related to moas than they are to tinamous
- B) That ratites and tinamous may have evolved from a flightless ancestor
- C) That the skeletal structures of ratites and tinamous are extremely similar
- D) That ratites and tinamous may not have been living on Gondwanaland during the same time period

29

The passage suggests that the connection between the tinamou and ratites would have been recognized sooner if the

- A) anatomy of the tinamou more closely resembled the anatomies of ratites.
- B) habitat of the tinamou were ecologically similar to that of ratites.
- C) tinamou had not migrated such a distance from its original habitat.
- D) tinamou had not been assumed to be flightless.

30

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

- A) Lines 22-24 (“Scientists . . . birds”)
- B) Lines 50-52 (“They . . . tree”)
- C) Lines 57-60 (“Technically . . . to fly”)
- D) Lines 67-70 (“The relationship . . . bodies”)

Questions 31-41 are based on the following passage and supplementary material.

This Passage is adapted from David G. Victor and Danny Cullenward, "Making Carbon Markets Work." ©2007 by Scientific American.

Line Until recently, nearly all policy debate about
building institutions to protect Earth's climate
focused on the global level. Successful climate policy,
thought analysts, activists and politicians, hinged on
5 signing binding international treaties because the
activities that cause climate change are worldwide in
scope. Such an approach was needed because
conventional wisdom assumed that if national
governments merely acted alone, without global
10 coordination, industries would simply relocate to
where regulation was more lax.

This globalist theory underlay the negotiation of
the 1992 United Nations Framework Convention on
Climate Change, which called for all countries to
15 work in good faith to address the climate problem
and created a new organization to oversee its
implementation. That treaty spawned negotiations to
produce more demanding agreements, leading
to the 1997 Kyoto Protocol. Under Kyoto, the
20 industrialized states—including the United States,
the European Union (E.U.), Japan, and Russia—
agreed in principle to individually tailored
obligations that, if implemented, would have cut
industrial emissions on average about five percent
25 below 1990 levels. But developing countries, which
placed a higher priority on economic growth, refused
to accept caps on their emissions. They argued that
responsibility for greenhouse gas pollution fell
squarely on the industrialized world.

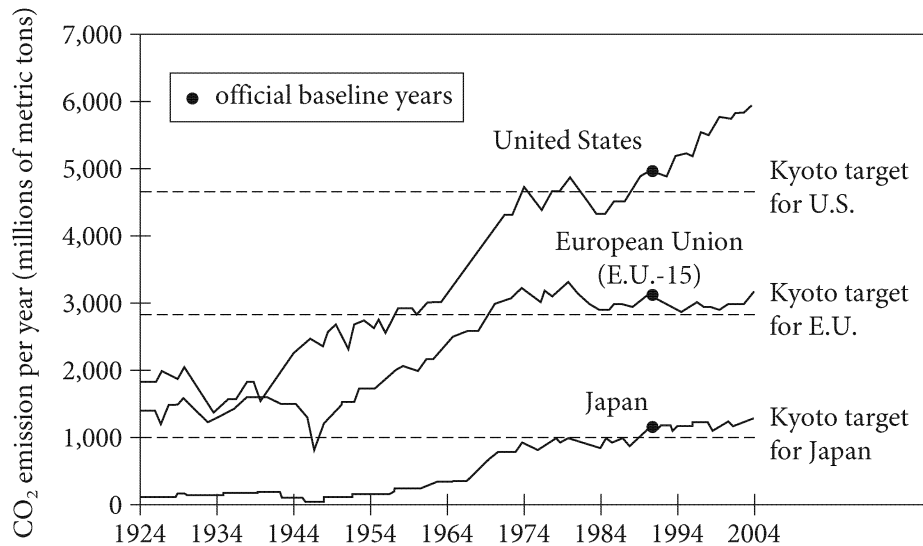
30 Without any practical way to force developing
nations to control their emissions, the Kyoto signers
instead reached a compromise known as the clean
development mechanism. Under this scheme,
investors could earn credits for projects that cut
35 emissions in developing nations even though the
host country faced no binding restriction on its
output of these gases. A British firm that faces strict
(and thus costly) limits on its emissions at home, for
example, might invest to build wind turbines in
40 China. The company would then accrue credits for

the difference between the "baseline" emissions that
would have been released had the Chinese burned
coal to generate electricity and the essentially zero
emissions discharged by the wind farm. China would
45 gain foreign investment and energy infrastructure,
while the British firm could meet its environmental
obligations at lower cost because credits earned
overseas are often less expensive than reducing
emissions at home.

50 The market for clean development mechanism
credits has since exploded in size, accounting for
about a third of a percent of the world's greenhouse
emissions and around \$4.4 billion in annual value.

Although the Kyoto proceedings rapidly
55 yielded an accord on paper, the real-world impact on
global warming is small. Industrialized nations,
where the obligations are most demanding, have
implemented restrictions in an uneven fashion.
Key countries—notably the U.S., but also Australia
60 and Canada—have ignored the Kyoto strictures
because they found them too costly or politically
inconvenient. The U.S. economy, for instance, grew
rapidly in the late 1990s, which raised its emissions
output, making meeting the Kyoto targets even
65 harder.

History shows that broad international treaties
usually fail to find solutions to difficult problems.
That is because these pacts normally reflect the
interests of their least enthusiastic members and are
70 often codified through weak commitments with easy
escape clauses for governments that will not readily
honor their agreements. Pushing tougher constraints
on unwilling governments rarely works because
reluctant nations can just remain aloof, as most
75 developing countries and the U.S. have in the
Kyoto process. (By contrast, the successful efforts to
protect Earth's ozone layer were created with U.S.
leadership. They also hinged on a special financing
scheme to pay recalcitrant developing countries for
80 the cost of instituting deep cuts in emissions, an
option that is an essential part of addressing the
climate change problem, but one that is much harder
to carry out because the price tag is dramatically
larger.)



31

The main purpose of the passage is to

- A) discuss the basis for a course of action and describe the action's shortcomings.
- B) propose a solution to a problem and argue for its implementation.
- C) describe the practices of certain industrialized states and criticize those practices.
- D) reflect on an environmental problem and explain its causes.

32

The authors discuss a "British firm" (line 37) primarily to

- A) acknowledge a significant exception to a trend.
- B) note a prominent instance of a common phenomenon.
- C) substantiate an assumption that is central to an argument.
- D) illustrate a practice with a hypothetical example.

33

The passage states that one consequence of the clean development mechanism is that companies can

- A) calculate baseline emissions in a way that is financially favorable.
- B) require that host countries accept binding restrictions on emissions.
- C) satisfy requirements of the Kyoto Protocol while saving money.
- D) shift responsibility for curbing pollution onto developing countries.

34

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

- A) Lines 33-37 ("Under . . . gases")
- B) Lines 40-44 ("The company . . . farm")
- C) Lines 46-49 ("the British firm . . . home")
- D) Lines 50-53 ("The market . . . value")

35

As used in line 55, “yielded” most nearly means

- A) produced.
- B) surrendered.
- C) slowed.
- D) deferred.

36

The authors make which claim about international climate treaties?

- A) They are difficult to enforce because of the lack of international regulatory bodies.
- B) They tend to be hard to achieve but effective once implemented.
- C) They are generally constrained by the approach preferred by the participants least committed to addressing climate change.
- D) They typically fail because the restrictions that they put on emissions lead to economic contraction rather than to economic growth.

37

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

- A) Lines 3-7 (“Successful . . . scope”)
- B) Lines 25-27 (“But . . . emissions”)
- C) Lines 62-65 (“The U.S. . . . harder”)
- D) Lines 68-72 (“That . . . agreements”)

38

As used in line 70, “weak” most nearly means

- A) illogical.
- B) flimsy.
- C) ambivalent.
- D) unskilled.

39

The authors indicate that the “special financing scheme” (lines 78-79) would be difficult to apply in the case of climate change because of its

- A) great expense.
- B) logistical complexity.
- C) limited popularity.
- D) technological requirements.

40

Which statement accords with data presented in the graph?

- A) Japan, the EU-15 nations, and the United States all saw overall decreases in CO₂ emissions from 1934 to 1944.
- B) The EU-15 nations and Japan saw drastic long-term declines in CO₂ emissions beginning in 1944.
- C) Japan saw an overall increase in its CO₂ emissions from 1954 to 1964, while the EU-15 nations saw an overall decrease during that time.
- D) From 1984 to 2004, the difference in CO₂ emissions between the United States and the EU-15 nations increased significantly.

41

The graph supports which generalization about the United States, the EU-15 nations, and Japan as producers of CO₂ emissions in 2004?

- A) They reduced the amount of CO₂ that they produced relative to the previous year.
- B) They produced more CO₂ than their Kyoto targets called for them to produce.
- C) They generated more CO₂ than each had at any other point represented in the graph.
- D) They emitted more CO₂ each than the Kyoto targets allow any country to emit.

Questions 42-52 are based on the following passage and supplementary material.

This passage is adapted from Emilie Reas, "Your Brain Has Two Clocks." ©2013 by Scientific American.

Scientists have long known that a part of the brain called the hippocampus is critically important for remembering past experiences. They now believe that it might also play a role in remembering the passage of time. Studies recording electrical brain activity in animals have shown that neurons in the hippocampus signal particular moments in time. But the hippocampus isn't *always* necessary for tracking time. Remarkably, people with damage to their hippocampus can accurately remember the passage of short time periods, but are impaired at remembering long time intervals. These findings hint that the hippocampus is important for signaling some—but not all—temporal information. If this is the case, what exactly is this time code used for, and why is it so exclusive?

In a new study, researchers from the University of California, Irvine tried to unravel this mystery by training rats to discriminate between different time intervals. They then rewarded the rats with treats when they indicated, by choosing between different odors, that they could tell how much time had passed. Before some of the trials the scientists injected a chemical that temporarily inactivates the hippocampus. This allowed them to test whether a functional hippocampus is necessary to distinguish between different time intervals.

The rats with inactive hippocampi could tell the difference between vastly different time intervals (e.g., 3 versus 12 minutes) just as well as the control rats, but performed no better than chance at detecting differences between similar periods of time (e.g., 8 versus 12 minutes). This suggests that the hippocampus is important for distinguishing between similar time intervals, but isn't needed when the intervals are very different. But oddly enough, this pattern only held up at long time periods; rats with nonfunctional hippocampi were not just normal at discriminating between similar time periods at short scales (e.g., 1 versus 1.5 minutes), but they in fact performed *better*.

So while the hippocampus does signal elapsed time, it has a very particular role in doing so. It specifically discriminates between similar time periods at long time scales—on the order of several minutes. When you can tell that you've been

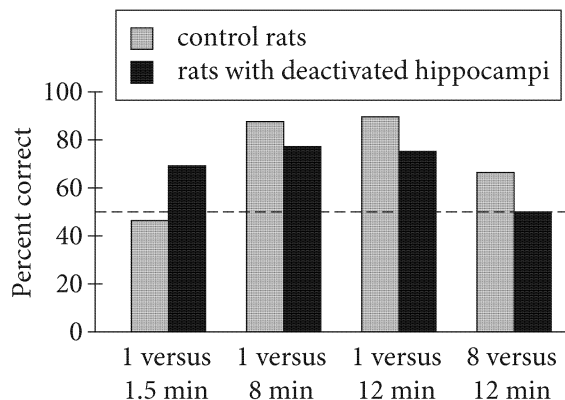
showering for 10 minutes, and not 15, you can thank your hippocampus. But when you sense the difference between 1 and 1.5 minutes, or 20 minutes and an hour, other brain regions have taken over as internal time-keeper.

While it may seem odd for the hippocampus to perform such a highly specialized function, this is perfectly consistent with what we know it does in other domains. The hippocampus is renowned for its ability to discriminate between overlapping objects or experiences—a process known as pattern separation. This study suggests it pattern separates many features of an experience, detecting subtle differences between objects, places and time periods.

The hippocampus might be oblivious to events that happen on a second-by-second scale, but we're certainly able to track the rapid passage of these moments. Considering that the brain region called the striatum is believed to track time on the order of seconds, the authors propose that the hippocampus and striatum might actually compete with one another, such that when the hippocampus is quieted, the striatum is freed to function even more effectively than usual. Although I wouldn't advise intentionally damaging your hippocampus (you'll develop a significantly graver problem), doing so could theoretically boost your ability to track the passage of short time periods.

But it's unclear whether this inhibitory relationship is reciprocal or unidirectional. If the hippocampus and striatum indeed function as separate, antagonistic clocks, does the striatum suppress the hippocampus, just as the hippocampus appears to impair the striatum? Scientists know that damaging the striatum leads to a host of problems processing time. But could it also confer one particular time-telling *superpower*—that of distinguishing between similar long time intervals—by launching the hippocampus into high-gear? Only further research will tell.

Accuracy of Rats' Temporal Distinctions
When Hippocampi Were Deactivated



Dotted line indicates chance accuracy (50 percent correct).

Adapted from Nathan Jacobs et al., "Critical Role of the Hippocampus in Memory for Elapsed Time." ©2013 by Nathan Jacobs et al.

42

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

- A) restricted.
- B) incompatible.
- C) private.
- D) absolute.

43

The passage most strongly suggests that the experimental results described in lines 36-41 ("But oddly . . . *better*") may have resulted from

- A) variations in the sensitivity of the rats' hippocampi to time at different scales.
- B) improvements in the rats' ability to recognize subtle distinctions between odors.
- C) the rats' striata having greater freedom to perform specialized timekeeping functions.
- D) short time periods being too similar for any brain structure to distinguish them.

44

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

- A) Lines 20-23 ("They . . . passed")
- B) Lines 23-25 ("Before . . . hippocampus")
- C) Lines 58-60 ("This study . . . periods")
- D) Lines 64-70 ("Considering . . . usual")

45

The author most likely places the word "better" (line 41) in italics to

- A) emphasize the unexpectedness of an outcome.
- B) stress the firmness of a conviction.
- C) call attention to the importance of an approach.
- D) clarify a potential misunderstanding.

46

The author includes a discussion of the process of pattern separation most likely to

- A) imply that damage to the hippocampus that affects its timekeeping ability does not affect its ability to distinguish other subtle differences.
- B) suggest that the timekeeping activity of the hippocampus is a specific manifestation of a general activity that the hippocampus performs.
- C) draw a comparison between the timekeeping role of the hippocampus and the timekeeping role of the striatum.
- D) illustrate the idea that the hippocampus's timekeeping ability varies depending on the amount of time being tracked.

47

Information in the passage best supports which statement about the relationship between the striatum and the hippocampus?

- A) The striatum ceases to work efficiently if the hippocampus is damaged.
- B) The striatum has not been shown to affect the functioning of the hippocampus.
- C) The striatum separates overlapping experiences so that they can be processed by the hippocampus.
- D) The striatum tracks periods of time too long for the hippocampus to track.

48

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

- A) Lines 55-58 (“The hippocampus is . . . separation”)
- B) Lines 61-64 (“The hippocampus might . . . moments”)
- C) Lines 70-74 (“Although . . . periods”)
- D) Lines 75-76 (“But it’s . . . unidirectional”)

49

The main purpose of the last paragraph is to

- A) discuss potential problems associated with certain parts of the brain.
- B) identify some approaches to brain research that have proven especially promising.
- C) lament the lack of consensus in current research on the brain.
- D) suggest an area of brain research that is worthy of additional investigation.

50

Based on the graph, which statement about the rats with deactivated hippocampi is true?

- A) They had a greater percent correct in the 1- versus 8-minute trial than they did in the 8- versus 12-minute trial.
- B) They performed about the same in the 1- versus 12-minute trial as they did in the 8- versus 12-minute trial.
- C) They had their greatest percent correct in the 1- versus 1.5-minute trial.
- D) They performed considerably better than chance in each of the trials.

51

How do the data in the graph support the author's argument about the hippocampus?

- A) They show that deactivating the hippocampus has a negative effect on distinguishing between similar time intervals at both short and long time periods.
- B) They show that the hippocampus is only somewhat important in distinguishing between similar time intervals at both short and long time periods.
- C) They show that the hippocampus is essential to distinguishing between similar time intervals at relatively short time periods.
- D) They show that the hippocampus is important in distinguishing between similar time intervals at relatively long time periods.

52

Based on the graph and the passage, which statement can be most reasonably inferred about the control rats in the experiment?

- A) Their relatively poor performance in the 1- versus 1.5-minute trial might be explained by the fact that their hippocampi were fully active.
- B) Their strong performance in the 1- versus 12-minute trial demonstrates the importance of the hippocampus in timekeeping.
- C) They showed relatively strong performance in the 1- versus 8-minute trial primarily because their striata were functioning effectively.
- D) They probably would have performed better in the 8- versus 12-minute trial if their hippocampi had been deactivated.

STOP

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

No Test Material On This Page

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.

Restoring Pompeii’s Hidden Treasures

When Mount Vesuvius erupted in 79 CE, the ancient city of Pompeii in southern Italy **1** was just about virtually erased from the map, buried under dozens of feet of volcanic ash. However, in one of history’s great ironies, the event that destroyed the city was simultaneously responsible for its preservation. Under the vast layer of stone and ash, the houses, shops, and inns of Pompeii, and the treasures that were contained therein, lay protected for hundreds of years.

1

- A) NO CHANGE
- B) was, for all intents and purposes, virtually
- C) was virtually
- D) was virtually and not literally

2 Initial excavation of Pompeii happened in the mid-1700s. It revealed many beautiful frescoes, and their colors were still fresh and bright. The fact that they are painted on freshly plastered walls makes the frescoes very durable: their pigments are chemically bonded to the surface on which they are painted. 3 On the other hand, they are not indestructible: overexposure to moisture, for example, will ruin them. Regrettably, from the moment Pompeii's frescoes were uncovered, they began to deteriorate, 4 meaning art historians may never be able to decipher some of the scenes depicted on the walls.

2

Which choice most effectively combines the underlined sentences?

- A) Initial excavation of Pompeii, happening in the mid-1700s, revealed many beautiful frescoes, with the colors still being fresh and bright.
- B) Many beautiful frescoes were revealed in the mid-1700s when initial excavation of Pompeii was done to them and the colors were still fresh and bright.
- C) Initial excavation of Pompeii in the mid-1700s revealed many beautiful frescoes, their colors still fresh and bright.
- D) Initial excavation of Pompeii revealed many beautiful frescoes, their colors (in the mid-1700s) still fresh and bright.

3

- A) NO CHANGE
- B) As a result,
- C) To that end,
- D) Either way,

4

Which choice best sets up the information in the next paragraph?

- A) NO CHANGE
- B) though researchers are replacing some sections of the paintings that were damaged.
- C) endangered by weather and even by misguided attempts at preserving them.
- D) with some of the paintings being in much worse condition than others.

[1] Many of **5** Pompeii's buildings had had their roofs destroyed during the eruption. [2] The wax coating encouraged a buildup of moisture inside the walls, further weakening them. [3] The frescoes in these buildings were especially vulnerable to weather damage once the ash was cleared away. [4] A covering installed by the excavators to shelter some of the buildings leaked, and rainwater began to spoil the paintings. [5] Conservationists tried to protect the frescoes by coating them with a wax solution, but this created its own problems. [6] In addition, the layer of wax over the frescoes changed **6** there colors and made them hard to see. **7**

5

- A) NO CHANGE
- B) Pompeii's building's had had their roofs
- C) Pompeii's building's had had their roofs'
- D) Pompeii's buildings had had their roofs

6

- A) NO CHANGE
- B) their
- C) its
- D) it's

7

To make this paragraph most logical, sentence 2 should be placed

- A) where it is now.
- B) after sentence 3.
- C) after sentence 4.
- D) after sentence 5.

Recognizing these problems, **8** modern technology is being utilized by archaeologists and restoration officials to strengthen Pompeii's buildings and restore the city's frescoes. Ultrasound and thermal imaging processes allow conservationists to evaluate the integrity of walls and **9** determined whether they have absorbed damaging amounts of water. **10** Photographs taken from the air can identify accumulated moisture in the buildings' exterior shells, enabling workers to make targeted repairs. Lastly, lasers are being employed to clean the surface of the frescoes. Since laser cleaning affects only the microscopic top layer of the **11** frescoes, and it can remove the wax and years of grime without causing harm. Through these efforts, archaeologists hope to preserve Pompeii's hidden treasures for centuries to come.

8

- A) NO CHANGE
- B) utilization of modern technology is allowing archaeologists and restoration officials
- C) archaeologists and restoration officials are utilizing modern technology
- D) utilizing modern technology is what archaeologists and restoration officials do

9

- A) NO CHANGE
- B) determine
- C) has determined
- D) is determining

10

The writer is considering deleting the underlined sentence. Should the sentence be kept or deleted?

- A) Kept, because it offers a relevant example in support of the paragraph's main point.
- B) Kept, because it follows logically from a discussion of painting earlier in the passage.
- C) Deleted, because it distracts from the passage's focus on how the frescoes are being protected.
- D) Deleted, because it fails to explain how workers will make the repairs to the frescoes.

11

- A) NO CHANGE
- B) frescoes; therefore,
- C) frescoes;
- D) frescoes,

Questions 12-22 are based on the following passage and supplementary material.

The Politics of Space Debris

[1] In the 2013 film *Gravity*, astronauts are stranded when pieces of a defunct satellite strike their space shuttle. [2] This event, though fictional, points to a mounting problem in space travel. [3] As leftover objects such as defunct satellites and spent **12** rockets travel at high speeds in heavily populated orbits around Earth, spacecraft and astronauts are at risk. [4] Even a piece of debris the size of a marble has the potential to destroy a satellite. [5] The problem has intensified in recent years: the amount of debris tracked by the US Space Surveillance Network leaped from 9,949 objects equal to or over 10 cm in size in December 2006 to more than 16,000 in July 2011. **13**

Recent events have called attention to the urgency of this issue. In 2007, China's **14** deliberate destruction of a defunct satellite in an antisatellite missile test, adding nearly 3,000 pieces of debris. Two years later, a collision between an active US communications satellite and a discarded Russian satellite created more than 2,000 pieces of debris. From these incidents alone, the likelihood of catastrophic collisions **15** have more than doubled. According to a 2013 United Nations report, a NASA

12

- A) NO CHANGE
- B) rockets;
- C) rocket—
- D) rockets,

13

The writer wants to add the following sentence.

Without international cooperation in cleanup efforts, the problem will only continue to grow in the future.

To make the paragraph most logical, the sentence should be placed

- A) after sentence 2.
- B) after sentence 3.
- C) after sentence 4.
- D) after sentence 5.

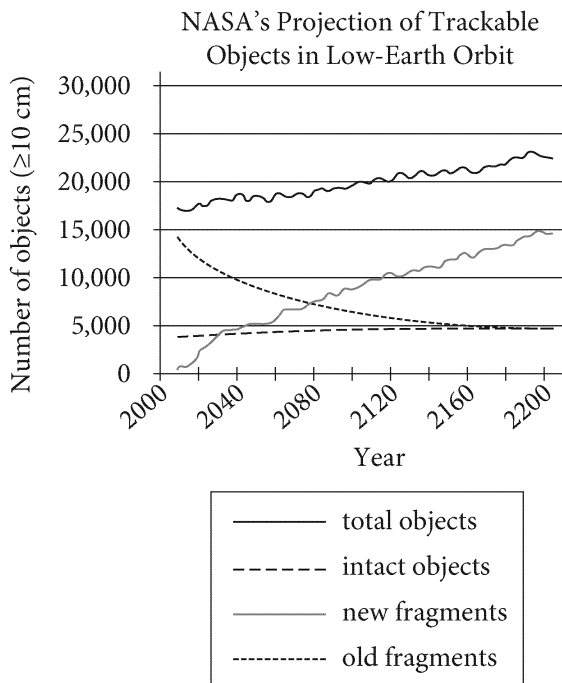
14

- A) NO CHANGE
- B) deliberate destruction of a defunct satellite in an antisatellite missile test added
- C) deliberately destroying a defunct satellite in an antisatellite missile test and adding
- D) deliberate destruction of a defunct satellite in an antisatellite missile test, which added

15

- A) NO CHANGE
- B) will be
- C) are
- D) has

model of the number of pieces of debris equal to or over 10 cm in size projects that **16** the number of intact objects will remain at approximately 4,000 through 2200, increasing the danger considerably. **17**



NASA's model assumes the number of future space launches will follow the 2001–2009 historical trend and that 90 percent of defunct satellites and spent rocket boosters will reenter Earth's atmosphere in less than twenty-five years.

Adapted from Jer Chyi Liou et al., "Stability of the Future LEO Environment." ©2013 by Inter-Agency Space Debris Coordination Committee.

16

Which piece of information from the graph best supports the paragraph's claim about the considerably increased risk from space debris?

- A) NO CHANGE
- B) the number of old fragments will actually decrease to under 5,000 by 2200,
- C) the number of new fragments will equal the number of old fragments around 2080,
- D) approximately 15,000 new fragments will be created by 2200,

17

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

Fortunately, as the projection demonstrates, the number of future space launches will not exceed the 2001–2009 historical trend in the coming decades.

Should the writer make this addition here?

- A) Yes, because it confirms the importance of reducing the number of collisions.
- B) Yes, because it helps to prevent an exaggerated response to the projection.
- C) No, because it treats as an established fact what is given as an assumption.
- D) No, because it contradicts the information about intact objects provided in the graph.

18 Recording the need for action, individual countries have started to invest in tracking systems that can alert operators to the presence of **19** hazards, they have also begun to develop technologies that might one day remove debris. Political obstacles, however, stand in the way of these advances. Although object-tracking technologies have the potential to prevent disastrous collisions, for reasons of competition and national security, countries **20** drag their feet when it comes to sharing necessary data. Currently, there are no legal imperatives for them to do so. **21** Despite the inherent risks of spaceflight, all devices in space are the private property of the nations by which they were launched. Marco Castronuovo of the Italian Space Agency explains that many nations “do not allow access to their objects even if they are at the end of their operative life,” blocking any comprehensive effort toward the removal of debris.

In 2007, the United Nations adopted voluntary guidelines for the management of space debris, but according to the nonprofit Space Generation Advisory Council, these guidelines do not address the legal and **22** practical hurdles of international cooperation. Ultimately, space debris is a global problem, and cleaning it up will require greater collaboration and consensus within the international community.

18

- A) NO CHANGE
- B) Assimilating
- C) Recognizing
- D) Beholding

19

- A) NO CHANGE
- B) hazards;
- C) hazards—
- D) hazards:

20

Which choice best maintains the tone of the passage?

- A) NO CHANGE
- B) are not always willing to share
- C) try to dodge the topic of sharing
- D) are lousy sharers when it comes to

21

Which choice provides the most effective transition from the previous sentence to this one?

- A) NO CHANGE
- B) According to international law,
- C) Regardless of each nation’s political issues,
- D) Regardless of where the objects were assembled,

22

- A) NO CHANGE
- B) practicable hurdles
- C) practicable hurtles
- D) practiced hurtles

Questions 23-33 are based on the following passage.

Third Floor: Ladies' Apparel

[1] When Harry Gordon Selfridge, a junior partner at the flourishing Chicago department store Marshall Field's, traveled to London in 1906, he noted a significant gap in the city's retail market. [2] Selfridge moved to England shortly thereafter and opened a store that would modernize British shopping. [3] There were no department stores. [4] In bold illustrated newspaper ads that publicized **23** his new venture, which would have a floor area of 42,000 square feet and include 130 different departments, Selfridge **24** promised, "the pleasures of shopping as well as those of sightseeing." [5] No longer a series of somewhat tedious errands, shopping would become a memorable outing, a spectacular occasion. **25**

To this end, Selfridge planned a large-scale event, hoping to draw customers to the store. In July 1909, several months after the store's grand opening, famed French **26** aviator Louis Blériot, piloted the first flight over the English Channel. Selfridge was among **27** that to greet the pilot upon his arrival on British soil.

23

- A) NO CHANGE
- B) its
- C) their
- D) it's

24

- A) NO CHANGE
- B) promised:
- C) promised
- D) promised;

25

To make this paragraph most logical, sentence 3 should be placed

- A) where it is now.
- B) before sentence 1.
- C) after sentence 1.
- D) after sentence 4.

26

- A) NO CHANGE
- B) aviator, Louis Blériot
- C) aviator—Louis Blériot,
- D) aviator Louis Blériot

27

- A) NO CHANGE
- B) those
- C) whom
- D) them

28 Selfridge, first, convinced Blériot to loan the plane to him. Second, Selfridge had Blériot's plane transported to London; the plane was displayed in the center of the store for four days, an event that drew crowds of over 150,000 people.

In addition to holding widely publicized events, Selfridge **29** became a celebrity, thanks, in part, to his vibrant personality. He provided the store's creative director, Edward Goldsman, with an **30** ample, generously sized blank canvas: the store featured

28

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

- A) The first thing Selfridge did was convince Blériot to loan the plane to him; then, it was Blériot's plane that was
- B) Selfridge did two things: first, Blériot loaned the plane to him; second, he had it
- C) Selfridge convinced Blériot to loan the plane to him; subsequently, Selfridge had the plane
- D) Selfridge, having convinced Blériot to loan the plane to him, had it

29

Which choice most effectively sets up the information in the next two sentences of the paragraph?

- A) NO CHANGE
- B) outspent rival retailers on advertisements for his store and merchandise.
- C) created a sense of theatricality through lavish window displays.
- D) took daily morning walking tours of his store to ensure that his employees were ready to greet the public.

30

At this point, the writer wants to provide a concise description of the blank canvas. Which choice best accomplishes this goal?

- A) NO CHANGE
- B) ample, capacious
- C) amply sized and large
- D) ample

twenty-one windows, **31** twelve of which had the largest sheets of plate glass in the world. While British window displays at the time typically featured a simple arrangement of various goods for sale, Goldsman used his windows to tell stories that included elaborate backdrops and props as well as merchandise. When peace negotiations to formally end the First World War were under way in June 1919, Goldsman was sent to France to sketch and photograph the Palace of Versailles. **32** The Treaty of Versailles was signed by the Allied forces and by Germany in the palace's famous Hall of Mirrors on June 28, 1919. Upon his return, he constructed palatial displays that featured plaster columns and draped figures holding shields and flags; even the lampposts outside the store were festooned with regalia. Each new window display stirred a sense of anticipation as people lined up to catch the first glimpse.

Selfridge once remarked that his department store was the third-biggest attraction in London, surpassed only by the Tower of London and Westminster Abbey. Whether or not this boast was true, his store did ultimately change the culture of shopping in England, **33** proving that Selfridge had made a wise decision in leaving Marshall Field's.

31

- A) NO CHANGE
- B) of these, twelve
- C) twelve of theirs
- D) twelve of them

32

The writer is considering deleting the underlined sentence. Should the sentence be kept or deleted?

- A) Kept, because it enriches the passage with information about key global events.
- B) Kept, because it provides an exact date that is critical to the chronology of the passage.
- C) Deleted, because it does not provide specific information about the impact of the treaty.
- D) Deleted, because it interrupts the discussion of Goldsman's innovative designs with distracting information.

33

The writer wants a conclusion that reflects the details emphasized in the passage. Which choice most effectively accomplishes this goal?

- A) NO CHANGE
- B) transforming it from a dull necessity into a recreational activity undertaken for pleasure and escape.
- C) as did an abundance of newly wealthy consumers, beneficiaries of England's ongoing Industrial Revolution.
- D) just as Louis Blériot had an enduring impact on the aviation industry.

Questions 34-44 are based on the following passage.

How Much Is That Wordsworth in the Window?

In many cities, around the **34** corner from a colossal media megastore sits a quaint bookshop filled with the rich aroma of aging paper and leather bindings. Such is the haunt of antiquarian **35** booksellers, who, in an age of rapid technology, know the value of a good book.

Antiquarian booksellers, often avid readers themselves, are experts on the history of books and their resale value. Some focus on modern first editions, others on classic literature, and still others on ancient manuscripts. These professional dealers have specialized knowledge of what gives a book value, seeking out any high-value features that may have been **36** overseen among other sellers.

34

- A) NO CHANGE
- B) corner, from a colossal media
- C) corner from a colossal, media,
- D) corner, from a colossal, media

35

The writer is considering revising the underlined portion to the following.

booksellers—dealers of rare, old, and out-of-print books—

Should the writer make this revision here?

- A) Yes, because it provides a definition of a key term in the passage.
- B) Yes, because it conveys the main idea that is developed in the passage.
- C) No, because it does not contribute to the claim presented in the following sentence.
- D) No, because it introduces irrelevant information into the paragraph.

36

- A) NO CHANGE
- B) overseen by
- C) overlooked among
- D) overlooked by

Antiquarian booksellers typically enter the industry through an apprenticeship with an established dealer, librarian, or auctioneer. **37** Because maintaining a reputation for excellence among clients is so important, they learn the trade firsthand in preparation for a solo career. Apprentices might assist with managing inventory, finding rare books to purchase for resale, or **38** to evaluate books to determine the appropriate selling price. Some even pursue academic or professional training in the history of books and bookselling. Once the prospective booksellers possess expert **39** knowledge and know bookselling well, they can open their own bookselling business or enter the **40** sphere of online trading.

37

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

- A) NO CHANGE
- B) Even though they may grow resentful of their relative lack of authority and power,
- C) By working with a more experienced employer,
- D) While some aspiring entrepreneurs may find this form of training old-fashioned,

38

- A) NO CHANGE
- B) evaluating
- C) the evaluation of
- D) they evaluate

39

- A) NO CHANGE
- B) knowledge and understand bookselling adequately,
- C) comprehension and knowledge of bookselling,
- D) knowledge,

40

- A) NO CHANGE
- B) globe
- C) planet
- D) space

[1] Recent decades have seen the network of roughly 1,300 dealers specializing in face-to-face sales extended by an estimated 20,000 websites. [2] Thanks to the Internet, booksellers can reach many more potential customers, and in turn customers can find interesting books without having to leave their homes. [3] In a world of e-texts, antiquarian bookselling may seem like a dying industry, but actually business has never been better. [4] The Internet also allows dealers to more easily research and compare prices and to stock their inventory, helping to keep prices competitive. [5] In 2013 an 1855 edition of Walt Whitman's *Leaves of Grass* sold for \$149,000, **41** which that high price is not unusual. [6] While book digitization has caused other areas of the bookselling industry to shrink, it has not produced a comparable decline in antiquarian bookselling. **42**

41

- A) NO CHANGE
- B) and
- C) thus
- D) DELETE the underlined portion.

42

To make this paragraph most logical, sentence 3 should be placed

- A) where it is now.
- B) before sentence 1.
- C) after sentence 1.
- D) after sentence 4.

As in any business, the goal of antiquarian bookselling lies in making a profit, so continually finding rare or old books to add to the inventory **43** keep revenues constant. At best, the bookseller will resell a book for a large sum. **44** But occasionally a dealer purchases a “mistake”—a book that is not as valuable as he or she initially thought. And therein lies the beauty of the trade: at worst, the bookseller ends up with a great read, a book that is at once valueless and priceless.

43

- A) NO CHANGE
- B) are keeping
- C) keeps
- D) have kept

44

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

As noted antiquarian bookseller Kenneth Karmiole acknowledges, “I became involved in the rare book trade because I enjoyed working with old books [and] getting my hands dirty.”

Should the writer make this addition here?

- A) Yes, because it provides additional support for the passage’s discussion of how booksellers make money.
- B) Yes, because it records the firsthand observations of an expert in the field.
- C) No, because it does not follow logically from the claim about bookselling in the previous sentence.
- D) No, because it contradicts a point about booksellers’ motivations discussed earlier in the passage.

STOP

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



Math Test – No Calculator

25 MINUTES, 20 QUESTIONS

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

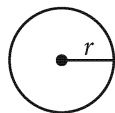
DIRECTIONS

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

NOTES

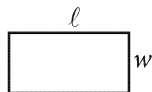
1. The use of a calculator **is not permitted**.
2. All variables and expressions used represent real numbers unless otherwise indicated.
3. Figures provided in this test are drawn to scale unless otherwise indicated.
4. All figures lie in a plane unless otherwise indicated.
5. Unless otherwise indicated,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

REFERENCE

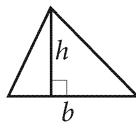


$$A = \pi r^2$$

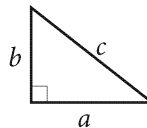
$$C = 2\pi r$$



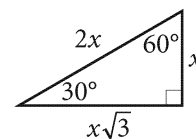
$$A = \ell w$$



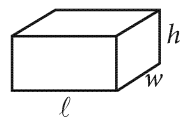
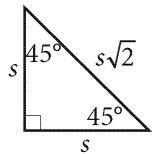
$$A = \frac{1}{2}bh$$



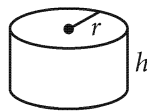
$$c^2 = a^2 + b^2$$



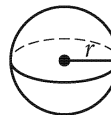
Special Right Triangles



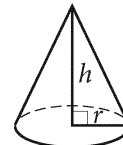
$$V = \ell wh$$



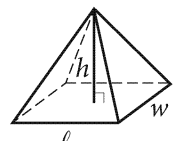
$$V = \pi r^2 h$$



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



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



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

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

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

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



1

$$(x - 2)^2 = 9$$

What is the greatest of the two solutions to the quadratic equation above?

- A) 2
- B) 3
- C) 5
- D) 9

2

A taxi company charges a \$2.00 base fare plus an additional fare based on a per-mile rate and a per-minute rate. Ryan's first taxi ride was 3.0 miles, took 7 minutes, and cost \$8.50. His second taxi ride was 7.0 miles, took 14 minutes, and cost \$16.00. If his third taxi ride took 10 minutes and cost \$13.50, approximately how many miles was the third taxi ride?

- A) 3.0
- B) 6.5
- C) 7.0
- D) 8.5

3

A market sells apples for \$4.50 per bag and grapefruit for \$4.00 per bag. At the market, Patrick purchased x bags of apples and y bags of grapefruit. If he spent less than \$20.00, which of the following describes Patrick's purchase?

- A) $4.00x + 4.50y > 20.00$
- B) $4.50x + 4.00y > 20.00$
- C) $4.00x + 4.50y < 20.00$
- D) $4.50x + 4.00y < 20.00$

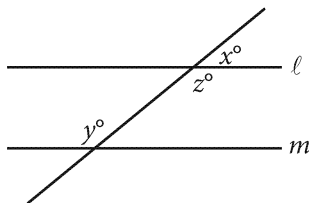
4

An adult elephant drinks by filling its trunk with water and then emptying the water into its mouth. If an adult elephant's trunk can hold between 4 and 8 liters of water, which of the following can be the number of times an elephant must fill its trunk to drink 225 liters of water?

- A) 26
- B) 27
- C) 55
- D) 60



5



Note: Figure not drawn to scale.

In the figure above, $\ell \parallel m$ and $z = 138$. What is the value of $x + y$?

- A) 42
- B) 90
- C) 138
- D) 180

6

A road construction crew is hired to fill a certain number of potholes in a section of a road. After filling 12 of those potholes, the crew accepts an additional job to fill 7 more potholes in the next section of the road, so they now have 15 potholes left to fill. How many potholes were they hired to fill in the first section of the road?

- A) 13
- B) 19
- C) 20
- D) 27

7

The zeros of the polynomial function f are -3 , 1 , and 2 . Which of the following is a factor of $f(x)$?

- A) $x + 1$
- B) $x + 2$
- C) $x - 1$
- D) $x - 3$

8

The gas tank of Janessa's car contains 12 gallons of gas at the start of a road trip. Her car uses 1 gallon of gas for every 40 miles it is driven. Which of the following equations gives the number of gallons, g , of gas remaining in the car's gas tank after it has been driven m miles on the road trip?

- A) $g = 12 - \frac{m}{40}$
- B) $g = 12 - 40m$
- C) $g = 40 - \frac{m}{12}$
- D) $g = 40 - 12m$



9

$$\left(x^{\frac{2}{3}}y^{\frac{4}{3}}\right)^{\frac{1}{2}}$$

Which of the following is equivalent to the expression above, for $x > 0$ and $y > 0$?

- A) $\sqrt[3]{xy^2}$
- B) $\sqrt[3]{x^2y}$
- C) $\sqrt[3]{x^2y^2}$
- D) $\sqrt[3]{xy^4}$

10

$$\frac{2b + 2c}{ab + ac} = 1$$

In the equation above, a , b , and c are constants, $b \neq -c$, and $a \neq 0$. Which of the following must be true?

- A) $a = \frac{1}{2}$
- B) $a = 2$
- C) $a + b = 1$
- D) $b = c$



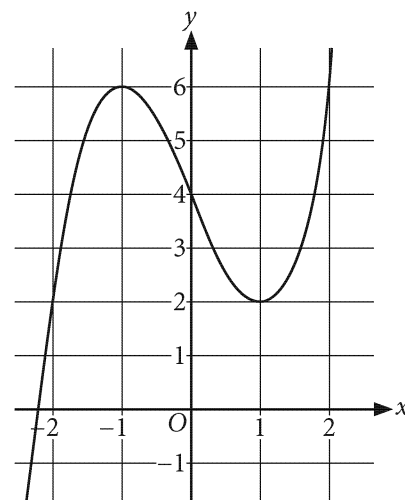
11

$$9x - 3y = 31$$

One equation in a system of two linear equations is shown above. The graph of the second equation in the xy -plane has a slope of 4. How many ordered pairs (x, y) satisfy both equations?

- A) None
- B) One
- C) Two
- D) More than two

12



The function defined by $f(x) = x^3 - 3x + 4$ is graphed above. Which of the following defines a function with exactly 3 real zeros?

- A) $p(x) = f(x) + 3$
- B) $q(x) = f(x) + 1$
- C) $r(x) = f(x) - 1$
- D) $r(x) = f(x) - 3$



13

In the xy -plane, the line with equation $y = 2x$ intersects the parabola with equation $y = x^2 - 8$ at two points. What is the sum of the x -coordinates of the two points of intersection?

- A) -8
- B) -2
- C) 2
- D) 4

14

$$\frac{1}{0.75} = \frac{5}{x}$$

Sean ran from his home to his school in 45 minutes at an average rate of 5 miles per hour. If the equation above represents this situation, what does x represent in terms of this situation?

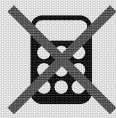
- A) The distance, in miles, that Sean ran
- B) The time, in hours, that Sean spent running
- C) Sean's average speed, in miles per minute
- D) Sean's average speed, in miles per hour

15

$$f(x) = x^5 + ax^4 + bx^3$$
$$g(x) = x^5 + sx^4 + tx^3$$

In the polynomial functions f and g above, a , b , s , and t are constants. If the polynomial $h(x) = f(x) + g(x)$ is divisible by x^4 , which of the following must be true?

- A) $a = s = 0$
- B) $a + s = 0$
- C) $b = t = 0$
- D) $b + t = 0$



16

$$(x - p)^2 = x^2 - 2px + 49$$

In the equation above, p is a constant greater than 0.
What is the value of p ?

17

In the xy -plane, the lines with equations $4x - y = 8$
and $y = 5x - 10$ each pass through point (c, d) .
What is the value of c ?

18

$$\frac{2}{5}y = \frac{1}{2}(y - 700)$$

What is the solution y of the equation above?

19

The measure of an angle is 1.75π radians. If the
measure of the same angle is r degrees and
 $0 < r < 360$, what is the value of r ?

20

The graph in the xy -plane of the equation
 $(x + 1)^2 + (y - 4)^2 = 25$ is a circle. What is the
diameter of the circle?

STOP

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



Math Test – Calculator

55 MINUTES, 38 QUESTIONS

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

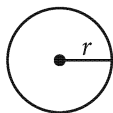
DIRECTIONS

For questions 1-30, solve each problem, choose the best answer from the choices provided, and fill in the corresponding bubble on your answer sheet. For questions 31-38, solve the problem and enter your answer in the grid on the answer sheet. Please refer to the directions before question 16 on how to enter your answers in the grid. You may use any available space in your test booklet for scratch work.

NOTES

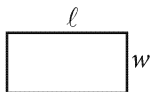
1. The use of a calculator **is not permitted**.
2. All variables and expressions used represent real numbers unless otherwise indicated.
3. Figures provided in this test are drawn to scale unless otherwise indicated.
4. All figures lie in a plane unless otherwise indicated.
5. Unless otherwise indicated,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

REFERENCE

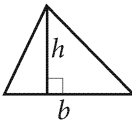


$$A = \pi r^2$$

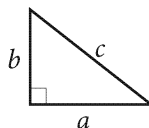
$$C = 2\pi r$$



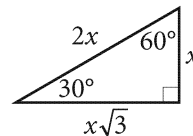
$$A = \ell w$$



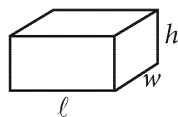
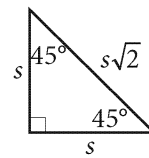
$$A = \frac{1}{2}bh$$



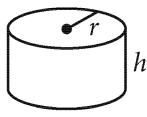
$$c^2 = a^2 + b^2$$



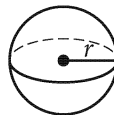
Special Right Triangles



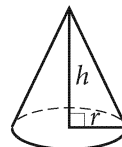
$$V = \ell wh$$



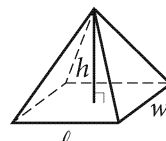
$$V = \pi r^2 h$$



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



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



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

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

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

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



1

It takes 2 hours to unload 4 trucks. At this rate, how many hours does it take to unload 10 such trucks?

- A) 3
- B) 4
- C) 5
- D) 8

2

Cindy and Elsa are doing volunteer service in their community. Cindy has volunteered h hours and Elsa has volunteered 4 more than twice Cindy's hours. Which of the following represents the number of hours that Elsa has volunteered?

- A) $h + 4$
- B) $2h + 2$
- C) $2h + 4$
- D) $2h - 4$

3

$$3x + 12 = 2(8 + 4x)$$

Which of the following is equivalent to the equation above?

- A) $5x = -4$
- B) $5x = 4$
- C) $x = 4$
- D) $x = -2$

4

A baker needs 4 eggs to make a cake and 6 eggs to make a flan. The baker purchases eggs in cartons of 12. If the baker wants to make 8 cakes and 6 flans, what is the minimum number of cartons the baker must purchase?

- A) 4
- B) 5
- C) 6
- D) 7



5

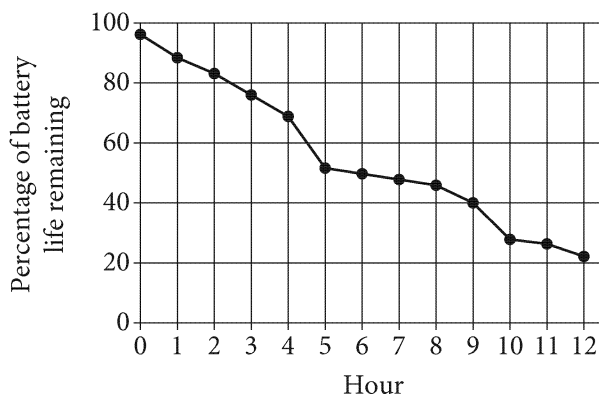
$$x^2 - x(1 - x) + 1$$

Which of the following is equivalent to the expression above?

- A) 0
- B) $x + 1$
- C) $2x^2$
- D) $2x^2 - x + 1$

6

Julia checked the percentage of battery life remaining on her cell phone every hour over a 12-hour period. Her results are shown in the line graph below.



During which of the following intervals did the largest decrease in battery life occur?

- A) Hour 1 to hour 3
- B) Hour 2 to hour 4
- C) Hour 3 to hour 5
- D) Hour 9 to hour 11

7

Karolina observed bacteria in a liquid culture and recorded the number of bacteria, N , every two hours. Her data are shown in the table below.

Time (hours)	N
0	7,740
2	10,290
4	13,690
6	18,200
8	24,200
10	32,180

According to Karolina's data, which of the following best describes the relationship between the number of bacteria and time during this 10-hour period?

- A) The number of bacteria is decreasing exponentially with time.
- B) The number of bacteria is increasing exponentially with time.
- C) The number of bacteria is decreasing linearly with time.
- D) The number of bacteria is increasing linearly with time.



Questions 8-10 refer to the following information.

Voting Preference by Region

	Candidate A	Candidate B	Candidate C	Total
Region 1	37	124	85	246
Region 2	68	74	43	185
Region 3	103	94	62	259
Total	208	292	190	690

A political analyst wanted to determine voter preference for an upcoming election for the registered voters in a county with three regions. The analyst surveyed a random sample of registered voters in the county to obtain information on region and candidate preference. The table above shows the results of the survey.

8

Which of the following types of graphs would be most appropriate to display the data presented in the table?

- A) Bar graph
- B) Box plot
- C) Line graph
- D) Scatterplot

9

What fraction of the survey respondents from Region 2 indicated that they prefer Candidate B in the upcoming election?

- A) $\frac{74}{185}$
- B) $\frac{74}{292}$
- C) $\frac{74}{690}$
- D) $\frac{185}{690}$

10

If the same survey is conducted with another random sample of 690 registered voters in the county, which of the following statements is true about the number of respondents from that sample who would indicate preference for Candidate A in the upcoming election?

- A) The number of respondents who will indicate preference for Candidate A must be 208.
- B) The number of respondents who will indicate preference for Candidate A must be greater than 208.
- C) The number of respondents who will indicate preference for Candidate A must be less than 208.
- D) Because of sample variability, the number of respondents who will indicate preference for Candidate A may be equal to 208, less than 208, or greater than 208.



11

If $\sin x^\circ = \cos y^\circ$, where $0 < x < 90$ and $0 < y < 90$, which of the following must be equal to y ?

- A) x
- B) $90 - x$
- C) $180 - x$
- D) $x + 90$

12

If $2a + 2b + 6 = 30$, what is the sum of a , b , and 6?

- A) 6
- B) 12
- C) 18
- D) 30

13

The Oort cloud is a spherical shell encircling the solar system that is thought to contain many billions of cometary objects. Its inner boundary is 7.5×10^{11} kilometers from Earth. If a satellite were sent to the Oort cloud on a straight line at an average speed of 52,900 kilometers per hour, approximately how many years would it take the satellite to reach the inner boundary of the cloud?

- A) 647
- B) 1,620
- C) 9,850
- D) 38,800



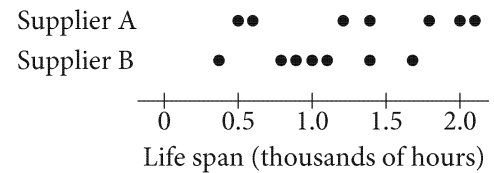
14

In the xy -plane, line ℓ has slope 3. Line k is perpendicular to line ℓ . Which of the following could be an equation of line k ?

- A) $y = -3x - 9$
- B) $y = -\frac{1}{3}x - 1$
- C) $y = \frac{1}{3}x + 1$
- D) $y = 3x + 6$

15

Samples of lightbulbs were taken from two different suppliers. The graph below displays the life spans of the lightbulbs, in thousands of hours, in the samples from each supplier.



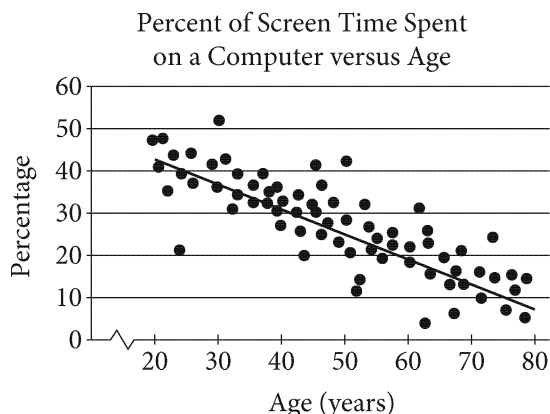
Which of the following statements best compares the range and standard deviation of the life spans of the lightbulbs in the samples from the two suppliers?

- A) The life spans from both suppliers have approximately the same range and approximately the same standard deviation.
- B) The life spans from Supplier A have a greater range than the life spans from Supplier B, but they have approximately the same standard deviation.
- C) The life spans from Supplier A have both a greater range and a greater standard deviation than the life spans from Supplier B.
- D) Not enough information is given to compare the range and standard deviation of the life spans from the two suppliers.



16

The scatterplot below shows the data reported in a study on age and the percentage of screen time spent on a computer. A line of best fit for the data is also shown. Screen time is defined as the time spent using a device such as a computer, television, smartphone, or game console.



One 52-year-old participant in the study spent 11% of her screen time on the computer. Which of the following is closest to how much, in percent, the line of best fit prediction exceeds the actual percentage of screen time she spent on the computer?

- A) 13%
- B) 18%
- C) 24%
- D) 41%

17

$$\sqrt[3]{x-6} = 8$$

What is the solution to the equation above?

- A) 518
- B) 506
- C) 30
- D) 8

18

When Olivia purchased a minivan, its value was \$21,000. For each year that Olivia owned the minivan, the minivan's value decreased by 12% of its value from the previous year. Which of the following equations could be used to determine how many years, x , it took for the value of Olivia's minivan to be one-half of its value at the time she purchased it?

- A) $21,000(1 + 0.12)^x = \frac{1}{2}(21,000)$
- B) $21,000(1 - 0.12)^x = \frac{1}{2}(21,000)$
- C) $21,000\left(\frac{1}{2}\right)^x = 0.12(21,000)$
- D) $21,000\left(\frac{1}{2}\right)^x = (1 - 0.12)(21,000)$



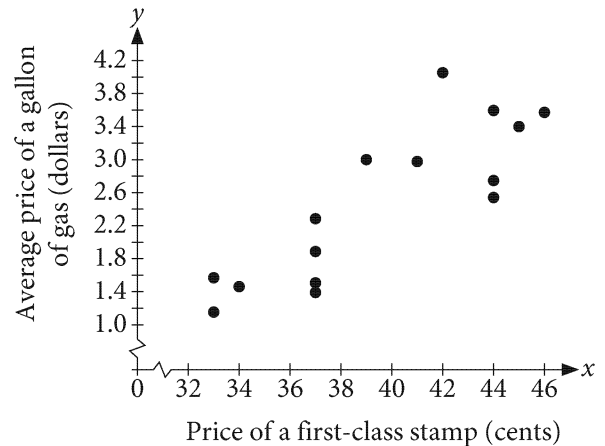
19

Morgan purchased puzzle books and activity books to donate to a children's charity. The cost of each puzzle book was \$2, and the cost of each activity book was \$3. If Morgan purchased at least 10 of the books and spent less than \$25, which of the following could be the number of puzzle books Morgan purchased?

- A) 2
- B) 4
- C) 5
- D) 6

20

For the period from 1999 through 2013 in the United States, the price of a first-class postage stamp never decreased, while the average price of a gallon of unleaded regular gasoline both decreased and increased. The scatterplot below shows the relationship between the price of a first-class postage stamp, in cents, and the average price of a gallon of unleaded regular gasoline, in dollars, in July of each year from 1999 through 2013.



Which of the following could be the equation of the line of best fit?

- A) $y = -0.18x + 1.1$
- B) $y = 0.18$
- C) $y = 0.18x + 1.1$
- D) $y = 0.18x - 4.7$



Questions 21-23 refer to the following information.

$$p = 100\left(\frac{s-1}{s}\right)$$

The percent p of ultraviolet B (UVB) rays that are blocked by sunscreen lotion with a sun protection factor (SPF) of s can be modeled by the equation above for $2 \leq s \leq 100$.

21

What is the ratio of the percent of UVB rays blocked by a sunscreen with an SPF of 2 to the percent of UVB rays blocked by a sunscreen that has an SPF of 4?

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

22

A consumer is looking for sunscreen that will block between 90 and 98 percent of UVB rays. Which of the following represents the range of SPFs for sunscreens that meet the consumer's requirement?

- A) $5 \leq s \leq 10$
- B) $10 \leq s \leq 50$
- C) $50 \leq s \leq 70$
- D) $70 \leq s \leq 100$

23

Which of the following equations represents the SPF of a sunscreen, in terms of the percent of UVB rays that are blocked by the sunscreen?

- A) $s = 1 - \frac{p}{100}$
- B) $s = \frac{1}{100} - p$
- C) $s = \frac{1}{100 - p}$
- D) $s = \frac{100}{100 - p}$



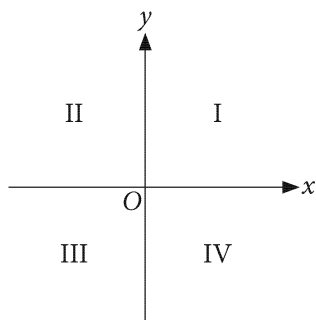
24

$$\frac{5}{x-3} - \frac{3}{3-x}$$

Which of the following expressions is equivalent to the one above, for $x \neq 3$?

- A) $\frac{2}{x-3}$
- B) $\frac{2}{3-x}$
- C) $\frac{8}{x-3}$
- D) $\frac{8}{3-x}$

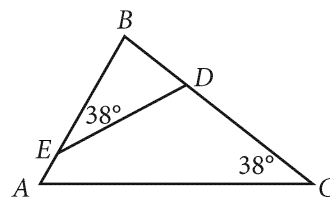
25



In the xy -plane above, points A and B (not shown) lie in quadrants II and IV, respectively. Line ℓ contains both points A and B . If the x -intercept of line ℓ is positive, which of the following must be true about the slope m and y -intercept b of ℓ ?

- A) $m < 0$ and $b > 0$
- B) $m < 0$ and $b < 0$
- C) $m > 0$ and $b < 0$
- D) $m > 0$ and $b > 0$

26



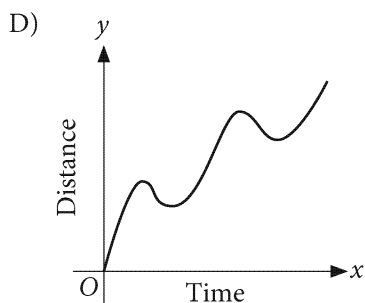
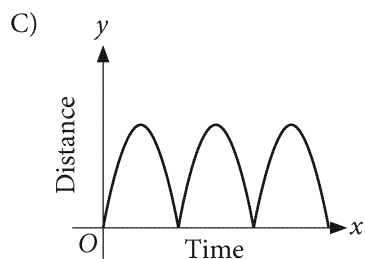
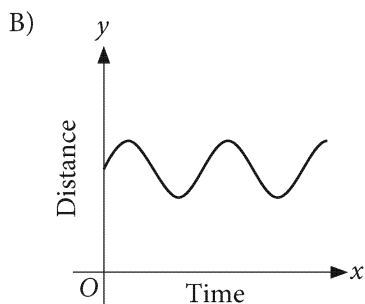
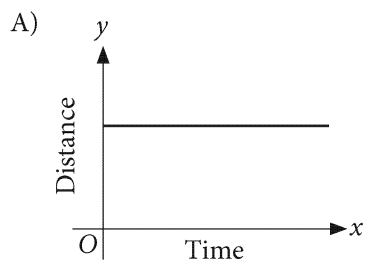
Based on the figure above, which of the following must be true?

- A) $\frac{BD}{AB} = \frac{BE}{BC}$
- B) $\frac{BD}{BC} = \frac{BE}{AB}$
- C) $\frac{BD}{BE} = \frac{AE}{CD}$
- D) $\frac{BD}{CD} = \frac{AE}{BE}$



27

The Langhorne Speedway in Pennsylvania was an automobile racetrack that was approximately circular in shape. If a car had traveled around the track three times at a constant speed, which of the following graphs best represents the distance y of the car from the starting line as a function of time x ?





28

$$H = 1.880L + 32.010$$

The formula above has been used to estimate the height of a person, H , in inches, using the length of the person's femur (thighbone), L , in inches. Which of the following is the best interpretation of the meaning of the number 1.880 in the context of this problem?

- A) The estimated increase, in inches, of femur length corresponding to an increase of 1 inch in height
- B) The estimated increase, in inches, of femur length for each increase of 32.010 inches in height
- C) The estimated increase, in inches, of height corresponding to an increase of 1 inch in femur length
- D) The estimated height, in inches, of a person whose femur has a length of L inches

29

The function f is defined by the equation

$f(x) = (x - b)^2$, where b is a constant. If $f(5) = f(9)$, what is the value of $f(1)$?

- A) 25
- B) 36
- C) 45
- D) 49

30


The cost of renting a bicycle is \$10 for the first hour, plus \$5 for each additional hour. If h represents the number of hours the bicycle is rented, which of the following functions gives the cost $C(h)$, in dollars, of renting the bicycle for h hours?

- A) $C(h) = 10h - 5$
- B) $C(h) = 10h + 5$
- C) $C(h) = 5h + 10$
- D) $C(h) = 5h + 5$


DIRECTIONS

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

- Although not required, it is suggested that you write your answer in the boxes at the top of the columns to help you fill in the bubbles accurately. You will receive credit only if the bubbles are filled in correctly.
- Mark no more than one bubble in any column.
- No question has a negative answer.
- Some problems may have more than one correct answer. In such cases, grid only one answer.

- Mixed numbers** such as $3\frac{1}{2}$ must be gridded as 3.5 or $7/2$. (If  is entered into the

grid, it will be interpreted as $\frac{31}{2}$, not $3\frac{1}{2}$.)

- Decimal answers:** If you obtain a decimal answer with more digits than the grid can accommodate, it may be either rounded or truncated, but it must fill the entire grid.

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

Write answer in boxes. →

7	/	1	2
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

Grid in result. ←

Fraction line ←

Answer: 2.5

	2	.	5
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

Decimal point ←

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

	2	/	3
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

.	6	6	6
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

.	6	6	7
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

Answer: 201 – either position is correct

	2	0	1
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3

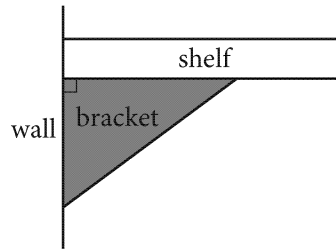
2	0	1	
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3

NOTE:

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



31



Note: Figure not drawn to scale.

A shelf bracket in the shape of a right triangle is shown above. The portion of the bracket upon which the shelf rests is 12 inches long, and the portion of the bracket that attaches to the wall is 9 inches long. How long, in inches, is the hypotenuse of the bracket?

32

Some North American Butterfly Species

Where species is seen regularly	Number of species
Only in the 48 contiguous states of the United States	450
Only in Canada	150

Michael has one photograph of each of the 600 species of butterflies categorized in the table above. He places all the photographs in albums with exactly 40 photographs in each album. Each album will have at least 2 times and no more than 4 times as many photographs of butterflies from the United States as photographs of butterflies from Canada. What is one possible number of photographs of Canadian species that he can place in an album?



33

If $10(a + b) = 360 - 9a$ and $a + b = 18$, what is the value of $\left|\frac{a}{b}\right|$?

34

The population of North Carolina is the sum of its urban population and its rural population. Its urban population in 2000 was approximately 4.8 million, which was 60% of its total population. Based on this approximation, what was the rural population of North Carolina, in millions, in 2000?

35

Mode of Commuter Transportation
in Three Canadian Cities

City	Car, van, or truck	Public transportation	Walk	Bike	Total
Victoria, British Columbia	77	11	11	6	105
Toronto, Ontario	133	42	9	2	186
Regina, Saskatchewan	107	5	7	2	121
Total	317	58	27	10	412

The table above summarizes the responses of commuters in three Canadian cities to a survey on the mode of transportation they use to travel to work. What fraction of commuters who walked or took public transportation were from Toronto, Ontario?

36

In 2012, there were 13.8 million visitors who went to Florida from overseas or Canada. There were 6.6 million more visitors to Florida from overseas than from Canada. How many visitors to Florida, in millions, were there from Canada in 2012?



Questions 37 and 38 refer to the following information.

A company sells crushed granite and lava rock. The table below shows the price per ton, in dollars, and the area covered per ton, in square meters, for each type of material.

	Price per ton	Area covered per ton (square meters)
Crushed granite	\$32	8
Lava rock	\$95	22

Customers can purchase any quantity of material, including fractions of tons.

37

The company offers a 20% discount off the purchase price when a customer purchases 25 or more tons of lava rock. How many more dollars would a customer pay for 22 tons of lava rock than for 25 tons of lava rock? (Disregard the \$ sign when gridding your answer.)

38

A rectangular parking lot has a length of 45 meters and a width of 30 meters. How much will it cost, in dollars, to cover the parking lot with crushed granite purchased from the company? (Disregard the \$ sign when gridding your answer.)

STOP

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

ANSWER KEY

Reading Test Answers

1 A	12 B	23 A	34 C	45 A
2 D	13 C	24 B	35 A	46 B
3 A	14 B	25 B	36 C	47 B
4 C	15 B	26 D	37 D	48 D
5 D	16 C	27 D	38 B	49 D
6 C	17 C	28 B	39 A	50 A
7 B	18 A	29 A	40 D	51 D
8 C	19 D	30 D	41 B	52 A
9 A	20 B	31 A	42 A	
10 D	21 D	32 D	43 C	
11 C	22 B	33 C	44 D	

READING TEST
RAW SCORE
(NUMBER OF
CORRECT ANSWERS)

Writing and Language Test Answers

1 C	12 A	23 A	34 A
2 C	13 D	24 C	35 A
3 A	14 B	25 C	36 D
4 C	15 D	26 D	37 C
5 D	16 D	27 B	38 B
6 B	17 C	28 D	39 D
7 D	18 C	29 C	40 A
8 C	19 B	30 D	41 B
9 B	20 B	31 A	42 B
10 A	21 B	32 D	43 C
11 D	22 A	33 B	44 C

WRITING AND
LANGUAGE TEST
RAW SCORE
(NUMBER OF
CORRECT ANSWERS)

Math Test – No Calculator Answers

1 C	11 B
2 B	12 D
3 D	13 C
4 C	14 A
5 D	15 D
6 C	16 7
7 C	17 2
8 A	18 3500
9 A	19 315
10 B	20 10

MATH TEST –
NO CALCULATOR
RAW SCORE
(NUMBER OF
CORRECT ANSWERS)

Math Test – Calculator Answers

1 C	11 B	21 B	31 15
2 C	12 C	22 B	32 8, 9, 10, 11, 12, 13
3 A	13 B	23 D	33 10
4 C	14 B	24 C	34 3.2
5 D	15 C	25 A	35 $\frac{3}{5}$
6 C	16 A	26 A	36 3.6
7 B	17 A	27 C	37 190
8 A	18 B	28 C	38 5400
9 A	19 D	29 B	
10 D	20 D	30 D	

MATH TEST –
CALCULATOR
RAW SCORE
(NUMBER OF
CORRECT ANSWERS)