

**JUNE 3, 2017  
US**

# The SAT®

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# Test Book

## IMPORTANT REMINDERS

**1**

A No. 2 pencil is required for the test.  
Do not use a mechanical pencil or pen.

**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 Henry James, *The Portrait of a Lady*. Originally published in 1881. Isabel Archer, a young American woman, meets her British aunt for the first time.

Line It was in the “office” still that Isabel was sitting on  
that melancholy afternoon of early spring which I  
have just mentioned. At this time she might have had  
the whole house to choose from, and the room she  
5 had selected was the most joyless chamber it  
contained. She had never opened the bolted door nor  
removed the green paper (renewed by other hands)  
from its side-lights; she had never assured herself  
that the vulgar street lay beyond it. A crude, cold rain  
10 was falling heavily; the springtime presented itself as  
a questionable improvement. Isabel, however, gave as  
little attention as possible to the incongruities of the  
season; she kept her eyes on her book and tried to fix  
her mind. It had lately occurred to her that her mind  
15 was a good deal of a vagabond, and she had spent  
much ingenuity in training it to a military step, and  
teaching it to advance, to halt, to retreat, to perform  
even more complicated manoeuvres, at the word of  
command. Just now she had given it marching  
20 orders, and it had been trudging over the sandy  
plains of a history of German Thought. Suddenly she  
became aware of a step very different from her own  
intellectual pace; she listened a little, and perceived  
that some one was walking about the library, which  
25 communicated with the office. It struck her first as  
the step of a person from whom she had reason to  
expect a visit; then almost immediately announced

itself as the tread of a woman and a stranger—her  
possible visitor being neither. It had an inquisitive,  
30 experimental quality, which suggested that it would  
not stop short of the threshold of the office; and,  
in fact, the doorway of this apartment was presently  
occupied by a lady who paused there and looked very  
hard at our heroine. She was a plain, elderly woman,  
35 dressed in a comprehensive waterproof mantle: she  
had a sharp, but not an unpleasant, face.

“Oh,” she said, “is that where you usually sit?”  
And she looked about at the heterogeneous chairs  
and tables.  
40 “Not when I have visitors,” said Isabel, getting up  
to receive the intruder.

She directed their course back to the library, and  
the visitor continued to look about her. “You seem to  
have plenty of other rooms; they are in rather better  
45 condition. But everything is immensely worn.”

“Have you come to look at the house?” Isabel  
asked. “The servant will show it to you.”

“Send her away; I don’t want to buy it. She has  
probably gone to look for you, and is wandering  
50 about upstairs; she didn’t seem at all intelligent. You  
had better tell her it is no matter.” And then, while  
the girl stood there, hesitating and wondering, this  
unexpected critic said to her abruptly, “I suppose you  
are one of the daughters?”

55 Isabel thought she had very strange manners. “It  
depends upon whose daughters you mean.”

“The late Mr. Archer’s—and my poor sister’s.”

“Ah,” said Isabel, slowly, “you must be our crazy  
Aunt Lydia!”

60 “Is that what your father told you to call me? I am your Aunt Lydia, but I am not crazy. And which of the daughters are you?”

“I am the youngest of the three, and my name is Isabel.”

65 “Yes; the others are Lilian and Edith. And are you the prettiest?”

“I have not the least idea,” said the girl.

“I think you must be.” And in this way the aunt and the niece made friends. The aunt had quarrelled, 70 years before, with her brother-in-law, after the death of her sister, taking him to task for the manner in which he brought up his three girls. Being a high-tempered man, he had requested her to mind her own business; and she had taken him at his word. 75 For many years she held no communication with him, and after his death she addressed not a word to his daughters, who had been bred in that disrespectful view of her which we have just seen Isabel betray. Mrs. Touchett’s behaviour was, as 80 usual, perfectly deliberate. She intended to go to America to look after her investments (with which her husband, in spite of his great financial position, had nothing to do), and would take advantage of this opportunity to inquire into the condition of her 85 nieces. There was no need of writing, for she should attach no importance to any account of them that she should elicit by letter; she believed, always, in seeing for one’s self.

1

The first paragraph suggests that Isabel

- A) must obey strict rules imposed by her father.
- B) is isolated from the outside world.
- C) does not like the company of her sister.
- D) has a pessimistic outlook on life.

2

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

- A) Lines 1-3 (“It was . . . mentioned”)
- B) Lines 6-9 (“She had . . . beyond it”)
- C) Lines 14-19 (“It had . . . command”)
- D) Lines 21-23 (“Suddenly . . . pace”)

3

What main effect do the words “crude,” “cold,” and “heavily” (lines 9-10) have on the tone of the passage?

- A) They reinforce a bleak tone that contrasts with conventional expectations regarding spring.
- B) They create an ominous tone that emphasizes a pervasive sense of danger.
- C) They establish a somber tone that contrasts with Isabel’s high spirits.
- D) They suggest a gloomy tone that foreshadows Isabel’s eventual misfortune.

4

The narrator indicates in lines 25-29 (“It struck . . . neither”) that Isabel is

- A) annoyed at having her reading interrupted.
- B) afraid of the noise because she is home alone.
- C) expecting a male acquaintance.
- D) startled by her aunt’s appearance.

5

As used in line 41, “receive” most nearly means

- A) greet.
- B) acquire.
- C) experience.
- D) suffer.

6

Which event in the passage relieves the tension of Isabel and Mrs. Touchett’s meeting?

- A) When Isabel leads Mrs. Touchett into the library
- B) When Isabel asks if Mrs. Touchett is interested in the house
- C) When Mrs. Touchett reveals who she is
- D) When Mrs. Touchett compliments Isabel

7

The narrator indicates that Mrs. Touchett had quarreled with her brother-in-law over

- A) his high temper.
- B) the way he talked about her in front of his daughters.
- C) the way in which her nieces were being raised.
- D) the details of the inheritance of his property.

8

Which choice provides the best evidence that the narrator judges Isabel’s attitude toward Mrs. Touchett critically?

- A) Lines 40-41 (“Not . . . intruder”)
- B) Line 55 (“Isabel . . . manners”)
- C) Lines 58-59 (“Ah . . . Lydia”)
- D) Lines 76-79 (“she addressed . . . betray”)

9

One central idea of the last paragraph is that Mrs. Touchett

- A) wishes she had reconciled with her brother-in-law before he died.
- B) intends to reestablish contact with her nieces despite long-standing poor relations with their father.
- C) plans to manipulate her nieces into helping her acquire property from her brother-in-law’s estate.
- D) wants to find out information about her nieces that their father had withheld.

10

The narrator indicates that one reason Mrs. Touchett decides to visit her nieces is that

- A) they are unable to visit her because of their limited income.
- B) she has not seen them for many years and misses them.
- C) she would already be traveling in America on business.
- D) she finally managed to plan a long vacation touring America.

**Questions 11-21 are based on the following passages.**

Passage 1 is from Alexander Hamilton, *A Full Vindication of the Measures of Congress*. Originally published in 1774. Passage 2 is adapted from Samuel Seabury, *A View of the Controversy between Great Britain and Her Colonies*. Originally published in 1774. Seabury was an American who remained loyal to Great Britain during the American Revolution.

**Passage 1**

The only distinction between freedom and slavery consists in this: In the former state a man is governed by the laws to which he has given his consent, either  
 Line in person or by his representative; in the latter, he is  
 5 governed by the will of another. In the one case, his life and property are his own; in the other, they depend upon the pleasure of his master. It is easy to discern which of these two states is preferable. No man in his senses can hesitate in choosing to be free,  
 10 rather than a slave.

That Americans are entitled to freedom is incontestable on every rational principle. All men have one common original: they participate in one common nature, and consequently have one  
 15 common right. No reason can be assigned why one man should exercise any power or preeminence over his fellow-creatures more than another; unless they have voluntarily vested him with it. Since, then, Americans have not, by any act of theirs, empowered  
 20 the British Parliament to make laws for them, it follows they can have no just authority to do it.

Besides the clear voice of natural justice in this respect, the fundamental principles of the English constitution are in our favor. It has been repeatedly  
 25 demonstrated that the idea of legislation or taxation, when the subject is not represented, is inconsistent with *that*. Nor is this all; our charters, the express conditions on which our progenitors relinquished their native countries, and came to settle in this,  
 30 preclude every claim of ruling and taxing us without our assent.

Every subterfuge that sophistry has been able to invent, to evade or obscure this truth, has been refuted by the most conclusive reasonings; so that  
 35 we may pronounce it a matter of undeniable certainty, that the pretensions of Parliament are contradictory to the law of nature, subversive of the British constitution, and destructive of the faith of the most solemn compacts.

40 What, then, is the subject of our controversy with the mother country? It is this: Whether we shall preserve that security to our lives and properties, which the law of nature, the genius of the British constitution, and our charters, afford us; or whether  
 45 we shall resign them into the hands of the British House of Commons, which is no more privileged to dispose of them than the Great Mogul.

**Passage 2**

You have taken some pains to prove what would readily have been granted you—that liberty is a very  
 50 good thing, and slavery a very bad thing. But then I must think that liberty under a King, Lords and Commons is as good as liberty under a republican Congress: And that slavery under a republican Congress is as bad, at least, as slavery under a King,  
 55 Lords and Commons: And upon the whole, that liberty under the supreme authority and protection of Great-Britain, is infinitely preferable to slavery under an American Congress. I will also agree with you, “that Americans are entitled to freedom.” . . .

60 But when you assert that “since Americans have not by any act of theirs empowered the British parliament to make laws for them, it follows they can have no just authority to do it,” you advance a position subversive of that dependence which all  
 65 colonies must, from their very nature, have on the mother country.—By the British parliament, I suppose you mean the supreme legislative authority, the King, Lords and Commons, because no other authority in England has a right to make laws to bind  
 70 the kingdom, and consequently no authority to make laws to bind the colonies. In this sense I shall understand, and use the phrase British parliament.

Now the dependence of the colonies on the mother-country has ever been acknowledged. It is an  
 75 impropriety of speech to talk of an independent colony. The words independency and colony, convey contradictory ideas: much like killing and sparing. As soon as a colony becomes independent of its parent state, it ceases to be any longer a colony; just as when  
 80 you kill a sheep, you cease to spare him. The British colonies make a part of the British Empire. As parts of the body they must be subject to the general laws of the body. . . .

The position that we are bound by no laws to  
85 which we have not consented, either by ourselves, or  
our representatives, is a novel position, unsupported  
by any authoritative record of the British  
constitution, ancient or modern. It is republican in  
its very nature, and tends to the utter subversion of  
90 the English monarchy.

11

In lines 13-15, “common” is used in three different instances to mean

- A) customary.
- B) typical.
- C) widespread.
- D) shared.

12

In Passage 1, Hamilton accuses those who oppose his position regarding freedom for the American colonies of

- A) engaging in deceptive arguments to make their case.
- B) suggesting that laws made by humanity do not take precedence over laws of nature.
- C) failing to consider the British constitution in their reasoning.
- D) underestimating the determination of those who are in favor of independence.

13

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

- A) Lines 18-21 (“Since . . . do it”)
- B) Lines 22-24 (“Besides . . . favor”)
- C) Lines 32-34 (“Every . . . reasonings”)
- D) Lines 35-39 (“we may . . . compacts”)

14

As used in line 44, “afford” most nearly means

- A) sustain.
- B) manage.
- C) entrust.
- D) grant.

15

In Passage 2, one of Seabury’s central claims regarding self-government for the American colonies is that

- A) there is widespread opposition to independence throughout the colonies.
- B) it is only a matter of time before the colonies are granted their independence.
- C) a colony by definition cannot be an independent entity.
- D) colonies generally do not benefit from declaring their independence.

16

In the third paragraph of Passage 2 (lines 73-83), Seabury’s discussion of “killing and sparing” mainly serves to

- A) question the wisdom of a radical course of action.
- B) show the underlying similarity between two historical events.
- C) clarify an abstract concept through the use of analogy.
- D) illustrate the potentially harmful consequences of an idea.



17

In Passage 2, Seabury implies that the view that citizens are bound only by the laws to which they have given explicit approval is

- A) a radical view that undermines the effective functioning of British government.
- B) a typical view that is often held by citizens throughout political history.
- C) a controversial view that challenges the basic laws of nature.
- D) an ill-advised view that undermines the productivity of the American colonies.

18

Which choice best states the relationship between the two passages?

- A) Seabury ultimately rejects the central argument made by Hamilton.
- B) Seabury characterizes as trivial the issues addressed by Hamilton.
- C) Seabury analyzes the argument made by Hamilton and proposes suggestions for improvement.
- D) Seabury disputes certain details provided by Hamilton but agrees with Hamilton's overall goals.

19

The discussion between Hamilton and Seabury regarding Parliament's role most fully addresses which issue?

- A) Whether Parliament has the authority to pass laws regarding taxation and representation
- B) Whether Parliament is too far away from the American colonies to fully understand their situation
- C) Whether Parliament can govern the colonies legitimately without the consent of the governed
- D) Whether the British constitution recognizes Parliament as the supreme legislative authority

20

Which argument put forth by Hamilton does Seabury characterize as self-evident?

- A) Colonies inevitably seek their independence from the mother country.
- B) All humans should prefer freedom to slavery.
- C) Representative government requires the consent of the governed.
- D) Laws governing human society should be based on rational principles.

21

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

- A) Lines 48-50 ("You have . . . bad thing")
- B) Lines 50-53 ("But then . . . Congress")
- C) Lines 53-55 ("And that . . . Commons")
- D) Lines 66-71 ("By the . . . colonies")

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

This passage is adapted from Michael Balter, “Dinosaur Metabolism neither Hot nor Cold, but Just Right.” ©2014 by American Association for the Advancement of Science.

For the first 150 years after their discovery, dinosaurs were considered ectotherms [animals with limited ability to internally regulate their body temperatures] like today’s reptiles. Ectothermy makes some sense: “It requires much less energy from the environment,” explains Roger Seymour, a zoologist at the University of Adelaide in Australia. But it has drawbacks, too: “The animal cannot feed in cold conditions and has a much more limited capacity for sustained, powerful activity, even if warmed by the sun,” he says.

Beginning in the late 1960s, researchers put forward the then-heretical idea of dinosaurs as endotherms [animals able to internally regulate their body temperatures], and evidence for this has accumulated. Annual growth rings in dinosaur bones suggest fast, energy-hungry developmental rates. Birdlike air sacs may have boosted their respiratory efficiency, suggesting rapid movements. And isotopic data from fossils suggest higher body temperatures.

Giant endotherms pose their own puzzles, however, such as the huge quantities of food needed to sustain them. An endothermic *Tyrannosaurus rex* “would probably have starved to death,” says John Grady, an evolutionary biologist at the University of New Mexico, Albuquerque.

Grady and his colleagues tackled the problem by examining the relationship between an animal’s growth rate—how fast it becomes a full-sized adult—and its resting metabolic rate (RMR), a measure of energy expenditure. Earlier studies, based on limited data, had suggested that growth rates scale with metabolic rates. That is, the more energy an animal can expend, the faster it can grow and the bigger it can get. The team pulled together updated data on 381 living and extinct vertebrates, including 21 species of dinosaurs, and developed mathematical equations that predict the relationship between metabolic rate, growth rate, and body size in living animals.

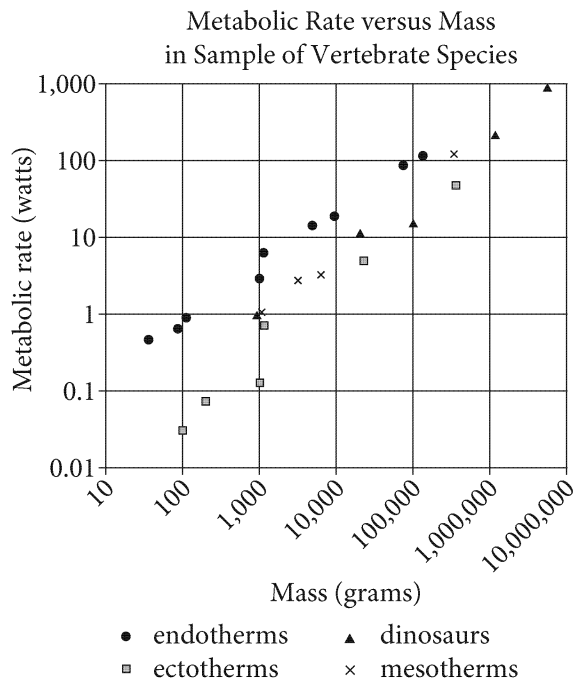
These equations show that ectotherms and endotherms fall into distinct clusters when growth rate is plotted against metabolic rate. High-energy endotherms grow fast and have high metabolic rates, whereas ectotherms have low values of both. Those

two categories include most living species, but the team found that a handful, such as fast-swimming sharks, tuna, reptiles such as large sea turtles, and a few odd mammals like the echidna, fall into an in-between state: mesothermy. These animals use their metabolism to raise their body temperatures, but do not “defend” a set temperature.

Using their equations, the team calculated dinosaur RMRs, plugging in reliable published data on these extinct animals. Dino growth rates can be estimated because rings of bone, which give a measure of age, were laid down annually, and body size can be estimated from bone size. The results placed dinosaurs squarely among the mesotherms. The earliest birds—direct descendants of dinosaurs—plotted as mesotherms, too.

Grady and colleagues think mesothermy may have allowed dinosaurs to grow large and active with lower energy costs. Geochemist Robert Eagle of the California Institute of Technology in Pasadena agrees: “In a world that was generally hotter than today, it wasn’t really necessary to be a full endotherm.” Previous studies have suggested that during the Mesozoic period, even mammalian endotherms kept their bodies at a lower set point than they do today.

Grady suggests that mesothermy might even help explain why dinosaurs ruled the Earth: They could easily outcompete other reptiles, which were lethargic ectotherms. And by getting big quickly, they occupied the large-animal niches, and prevented the small, energy-hungry endothermic mammals from getting bigger themselves.



Adapted from John M. Grady et al., "Evidence for Mesothermy in Dinosaurs." ©2014 by American Association for the Advancement of Science.

22

The primary purpose of the passage is to

- A) discuss a study that supports a new understanding of dinosaurs' control over their body temperatures.
- B) present data that underlie a theory about how dinosaurs evolved from ectotherms to mesotherms.
- C) describe research that revives a previously discarded model about dinosaurs' body temperatures.
- D) explain the history of the debate about whether dinosaurs were ectotherms or endotherms.

23

The passage implies that scientists' initial assessment of dinosaurs as ectotherms was understandable because

- A) dinosaurs were then believed to have evolved from lizards, which are ectotherms.
- B) dinosaurs' metabolic rates were closer to those of ectotherms than to those of endotherms.
- C) ectothermy could explain how dinosaurs could survive on a reasonably attainable amount of energy.
- D) fossil evidence suggested that dinosaurs were incapable of rapid movements or intense activity.

24

As presented in the passage, which evidence most directly led scientists to conclude that dinosaurs increased in size more quickly than would likely have been the case if they had been ectotherms?

- A) The average body size of dinosaurs when they reached maturity
- B) The temperature-related isotopes that were extracted from dinosaur fossils
- C) The quantity of food that very large dinosaurs appear to have consumed
- D) The growth rings found in dinosaur fossils

25

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

- A) Lines 16-17 ("Annual . . . rates")
- B) Lines 19-20 ("And isotopic . . . temperatures")
- C) Lines 21-23 ("Giant . . . them")
- D) Lines 27-31 ("Grady . . . expenditure")

26

In the third paragraph (lines 21-26), the comment about *Tyrannosaurus rex* primarily serves to

- A) outline the differences between ectothermy and endothermy.
- B) point out an exception to the tendency of large dinosaurs to be endothermic.
- C) explain why endotherms require more food relative to body size than do ectotherms.
- D) illustrate a problem with the notion that dinosaurs were endothermic.

27

According to the passage, high metabolic rates in animals correlate with

- A) fluctuations in body temperature.
- B) rapid growth rates.
- C) difficulty in sustaining physical activity.
- D) susceptibility to cold conditions.

28

As used in line 52, “defend” most nearly means

- A) maintain.
- B) prevent.
- C) represent.
- D) rectify.

29

Which choice provides the best evidence that mesothermy was one of the traits that was retained as some dinosaurs evolved into new species?

- A) Lines 41-43 (“These equations . . . rate”)
- B) Lines 50-52 (“These animals . . . temperature”)
- C) Lines 58-59 (“The results . . . mesotherms”)
- D) Lines 60-61 (“The earliest . . . too”)

30

As used in line 76, “occupied” most nearly means

- A) employed.
- B) filled.
- C) annexed.
- D) settled.

31

According to the graph, the metabolic rate of the dinosaur that had a mass of approximately 1,000 grams was approximately

- A) 0.1 watt.
- B) 1 watt.
- C) 10 watts.
- D) 1,000 watts.

32

As depicted by the graph, mesotherms with metabolic rates between 1 watt and 10 watts have masses between

- A) 10 grams and 100 grams.
- B) 100 grams and 1,000 grams.
- C) 1,000 grams and 10,000 grams.
- D) 10,000 grams and 100,000 grams.

**Questions 33-41 are based on the following passage and supplementary material.**

This passage is adapted from Bruce Bower, "Online Causes May Attract More Clicks than Commitments." ©2014 by Society for Science and the Public.

Sociologist Kirk Kristofferson and his colleagues at the University of British Columbia noticed that previous studies of social and political causes made  
 Line opposing predictions about how people should  
 5 behave after providing token support to a cause. One line of research suggested that helping others in small ways gives people "moral license" to forgo future support. Yet other studies indicated that volunteers more often comply with large requests for assistance  
 10 after agreeing to small requests.

Kristofferson's group recently tried to bridge these perspectives. Results of several experiments begin to explain why joining an online activist site might or might not discourage serious involvement  
 15 in that movement.

People are much less willing to go out of their way for a cause after engaging in public token support, versus private token support, the researchers find. An act of trivial backing for a cause that friends and  
 20 strangers can see (say, clicking "like" on Facebook or donning a colorful wristband) satisfies a need to present oneself to others in a positive light, they propose.

"Token support that's observable by others  
 25 may not lead to increased support for a cause," Kristofferson says. That's when real-world behavior mirrors results of the moral license studies.

His group ran its first study shortly before a date when Canadians annually show support for veterans  
 30 by wearing poppy flower pins. Participants consisted of 92 people who walked across a concourse on the University of British Columbia campus that leads to a cafeteria and shops. At the concourse entry, a researcher gave some participants a free poppy and  
 35 asked them to pin it on their clothing. Others received an envelope containing a poppy inside. A third group got no poppies. At the end of the concourse, another researcher asked all volunteers if they wanted to put donations in a bin on behalf of  
 40 Canada's war veterans.

On average, those who received their poppies in envelopes donated more than twice as much as those who were given poppies to display immediately on their coats. Those who got no poppies gave the least.  
 45 Hidden token support, the exercise suggested, was the best foot in the door to making a substantial contribution.

Comparable findings emerged in a lab investigation. Participants read pamphlets the  
 50 researchers created for two phony charities, one to combat poverty in developing countries and another to provide international disaster relief. Volunteers who privately signed petitions for either cause later made a verbal commitment to spend an  
 55 average of 57 minutes stuffing envelopes for their chosen organization, versus an average commitment of 32 minutes by those who signed petitions in front of the other participants. Individuals who weren't asked to sign petitions said they would stuff  
 60 envelopes for about the same amount of time as those who had publicly inked petitions.

The team's third study suggested that engaging in public token support resolves a popular desire to impress others. In line with that idea, volunteers felt  
 65 less concerned about how others perceived them after signing petitions in front of peers, relative to just before public signings. In contrast, participants who privately signed petitions reported a greater desire to act consistently with their beliefs and values.  
 70 People who provide token support without being observed don't worry so much about social status as about contemplating how their personal values align with those of the cause, the researchers suspect.

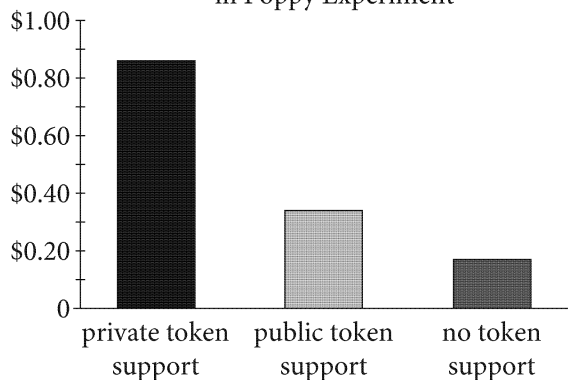
Charities generate a lot of publicity through  
 75 online campaigns, "but seeking public expressions of token support may not attract new donors," Kristofferson says.

His warning applies not only to online outfits obsessed with collecting "likes" from admirers but to  
 80 organizations that exhort people, say, to wear ribbons in support of medical research.

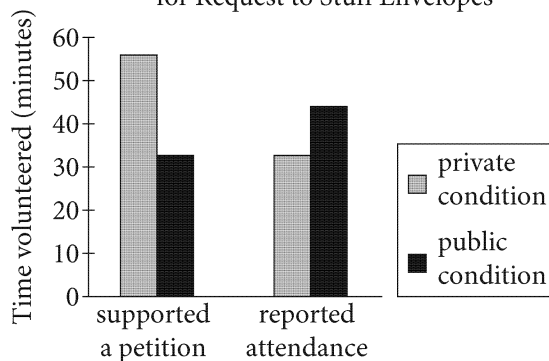
"[This phenomenon] is more common than scholars of online activism have believed," says sociologist Brayden King of Northwestern University  
 85 in Evanston, Ill. However, he adds, Kristofferson's experiments suggest that getting people to join private online groups may be a way to turn "likes" into meaningful participation.

**Figure 1**

Average Amount Donated  
in Poppy Experiment

**Figure 2**

Average Number of Minutes Volunteered  
for Request to Stuff Envelopes



Figures adapted from Kirk Kristofferson et al., "The Nature of Slacktivism: How the Social Observability of an Initial Act of Token Support Affects Subsequent Prosocial Action." ©2013 by Journal of Consumer Research, Inc.

In the public condition referred to in figure 2, participants walked to the front of the room and signed a petition or an attendance sheet. In the private condition, participants were instructed to place signed ballots in a box at the back of the room to either indicate their support for a petition or to report their own attendance.

33

Early in the passage, the main focus shifts from a discussion of

- A) a hypothesis that guided past research to a discussion of recent experimental results that undermine that hypothesis.
- B) reasons that people might show a reluctance to donate to a discussion of how that reluctance can be overcome.
- C) common criticisms of online activist behavior to a discussion of the possible merits of such behavior.
- D) contradictory conclusions drawn by researchers to a discussion of experiments intended to determine the source of the contradiction.

34

As used in the passage, "token support" that is observable describes support that is

- A) mainly symbolic.
- B) intentionally deceptive.
- C) somewhat biased.
- D) highly profitable.

35

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

- A) usage.
- B) program.
- C) activity.
- D) exertion.

36

Based on the passage, asking people to publicly sign a petition before asking them to volunteer provides

- A) no clear advantage over simply asking them to volunteer.
- B) less incentive for them to volunteer than does asking them to wear a ribbon in support of a cause.
- C) a guarantee that they will volunteer for a certain number of hours.
- D) strong motivation for them to excel at their duties as volunteers.

37

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

- A) Lines 49-52 (“Participants . . . relief”)
- B) Lines 53-58 (“Volunteers . . . participants”)
- C) Lines 58-61 (“Individuals . . . petitions”)
- D) Lines 67-69 (“In contrast . . . values”)

38

It can reasonable be inferred from the passage that publicly expressing support for a cause reduces people’s

- A) readiness to provide support for related causes.
- B) loyalty to specific charitable organizations.
- C) sense of obligation to inspire advocacy in others.
- D) need to secure the approval of others.

39

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

- A) Lines 64-67 (“In line . . . singings”)
- B) Lines 70-73 (“People . . . suspect”)
- C) Lines 78-81 (“His . . . research”)
- D) Lines 85-88 (“However . . . participation”)

40

In the last paragraph of the passage, King characterizes the phenomenon at the center of Kristofferson’s findings as

- A) controversial within a particular scholarly community.
- B) applicable only in a specific form of activism.
- C) underestimated by experts in a certain field.
- D) difficult to observe in a controlled environment.

41

According to figure 1, which choice best approximates the average amount donated by participants in the poppy experiment who, in the passage, are identified as having been given poppies in envelopes?

- A) \$0.95
- B) \$0.85
- C) \$0.35
- D) \$0.15

42

According to figure 2, participants who publicly reported their attendance committed to volunteering for how many minutes, on average?

- A) Between 50 and 60 minutes
- B) Between 40 and 50 minutes
- C) Between 30 and 40 minutes
- D) Between 20 and 30 minutes

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

This passage is adapted from Elizabeth Pennisi, “Water’s Tough Skin.” ©2014 by American Association for the Advancement of Science.

Plants lack muscles, but for some, surface tension can substitute. “When there’s a change in surface tension, you get motion,” explains Rachel Levy, a mathematician at Harvey Mudd College in Claremont, California. “It creates motion in ways you don’t expect.”

Consider *Erodium*, a group of flowers whose fruit resemble a bird beak. Inside that beak, each seed develops a centimeter-long awn—a rodlike “tail” that serves two purposes. Initially, inside the fruit, the awn is stretched out. When the fruit dries and cracks open, the freed awn spontaneously coils, releasing its stored energy and sending the seed a half-meter from the parent plant. After the seed lands, the awn winds up during the day and unwinds at night, screwing the seed into the ground bit by bit—a millimeter or so a day.

Mechanical engineer Ho-Young Kim has found that surface tension drives the process. Normally, surface tension causes water droplets to ball up to minimize the air-water interface, he explains. But when those droplets meet a surface that has a greater attraction for the molecules of water than water itself, they will spread out and wet it. He found that the awns of *Erodium* and of *Pelargonium*, another group of plants with self-burying seeds, consist mostly of fibers of lignin and pectin, both water-loving molecules. At times of day when humidity is high, the fibers quickly absorb moisture. “The wet tissues swell and become straight from [an] initially dry, coiled configuration,” Kim explains. When humidity drops, the fibers dry out, the tissues shrink, and the awn coils up again.

Kim mounted seeds from both groups of plants onto a force sensor and increased the humidity to measure the force they generated as they tried to uncoil. He also tested the burying potential of the force by watching awns drive their seeds into “soils” of glass beads of different sizes. The force “is just enough to dig into the soil,” Kim reported.

It might also be enough to propel a microrobot. Today’s microrobots all require electrical tethers, because no battery is both sufficiently

powerful and small enough to be carried on board. Eventually Kim wants to equip robots with humidity-driven “muscles” that won’t require external power. “But first we need to know how the biology works,” he says.

\*\*\*

A floating fern, *Salvinia molesta*, forms meter-thick beds at the surface of ponds and slow-moving rivers. Native to South America, it’s become invasive around the world, clogging waterways and disrupting aquatic ecosystems. But what attracted Wilhelm Barthlott to this prolific plant was its ability to keep submerged leaves coated with a thin layer of air. The film of air gives the leaves a silvery sheen and enables the plant to carry out photosynthesis and gas exchange underwater. It also makes the fern buoyant, so it will quickly bob to the surface if an opening appears, filling in any gaps before other species can get established.

Engineers want to create similar air layers on the hulls of ships to reduce drag and fuel consumption. But to date, they have not been able to generate a layer that lasts. So Barthlott, a biologist emeritus at the University of Bonn in Germany, and his colleagues decided to see how *Salvinia* does it. Studying the microscopic structure of the leaf surface, they discovered hundreds of regularly spaced clumps of 2-millimeter-long hairs, four per clump. The clumps resemble eggbeaters: The hairs in each clump flare out midway up but reconnect at their tips. Along most of their length, the hairs are coated with hydrophobic, or water-repellent, wax, while the tips are waxless and hydrophilic—they attract water. Surface tension pins the air-water interface to the tips so that the air layer resists disruption by turbulence in water. The interface is “a bit like a tent where the hairs are the poles,” said Matthias Mayser, a biologist who worked with Barthlott. “The water stays on top of the air.”

The plant also repels rain, Mayser explained. “It would be impossible to establish an air layer upon submergence if the room in between the hairs was already filled by water from rain.” By filming drops falling on the *Salvinia* leaf surface, he observed that “the [drop’s] surface tension keeps the drop in a spherical form and prevents water from penetrating” between the hairs. That keeps the leaf’s silvery sheath of air intact.



43

Based on the passage, what can reasonably be inferred about *Erodium*?

- A) It is one of the few plant species that has muscles.
- B) It grows in various environments and thrives in granular soils.
- C) Its seed drops from the parent plant and inches to a new location.
- D) It grows where humidity is high at night and low during the day.

44

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

- A) Lines 1-2 (“Plants . . . substitute”)
- B) Lines 8-10 (“Inside . . . purposes”)
- C) Lines 29-31 (“The wet . . . explains”)
- D) Lines 37-39 (“He also . . . sizes”)

45

Which choice best summarizes the third paragraph (lines 18-33)?

- A) As low humidity dries plant fibers, awns coil and seeds are buried.
- B) Awns that straighten and coil can dig their seeds into the ground.
- C) *Erodium* and *Pelargonium* have self-burying seeds.
- D) Surface tension causes awns to straighten and coil in response to humidity.

46

The author uses the word “tethers” (line 43) most likely to

- A) allude to the need for muscle power to free the microrobots.
- B) focus on alternate power sources for microrobots.
- C) imply that the microrobots’ range of motion is restricted.
- D) stress the expense of attaching batteries to microrobots.

47

The author presents microrobots and ships as particular examples of

- A) devices that currently require surface tension to function.
- B) experimental apparatuses needed to investigate surface tension.
- C) opportunities for the commercial application of surface tension.
- D) systems that scientists use for experiments on surface tension.

48

Based on the passage, which statement best describes the relationship between surface tension and technology?

- A) Surface tension is exploited in a small fraction of technological devices.
- B) Surface tension may be employed in new technologies once it is better understood in nature.
- C) The study of surface tension in nature will soon be eased by technological advances.
- D) The most up-to-date experimental technologies are used to study surface tension.

49

The main purpose of the sixth paragraph (lines 49-61) is to

- A) introduce a characteristic of *Salvinia* that will be explored in the paragraphs that follow.
- B) detail the qualifications of the researchers whose *Salvinia* investigations will be discussed further in the passage.
- C) highlight *Salvinia* as a model system that will be discussed throughout the passage.
- D) relate *Salvinia*'s use of surface tension to that of the plants described earlier in the passage.

50

As used in line 72, "flare" most nearly means

- A) vent.
- B) spread.
- C) signal.
- D) shine.

51

Which piece of evidence does the author use to support the relevance of research on *Salvinia* to ship design?

- A) *Salvinia*'s leaves repel rain.
- B) *Salvinia* clogs waterways around the world.
- C) *Salvinia*'s air layer resists disruption by turbulence.
- D) Hairs on *Salvinia*'s leaves have both hydrophilic and hydrophobic portions.

52

Which choice best supports the idea that it is easier to maintain an existing air layer on a plant than to create a new air layer?

- A) Lines 19-21 ("Normally . . . explains")
- B) Lines 54-56 ("But what . . . layer of air")
- C) Lines 64-65 ("But to . . . lasts")
- D) Lines 83-85 ("It would . . . rain")

**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 and supplementary material.

### The Human Impact on Antarctica

Antarctica, once a pristine wilderness virtually untouched by humans, no longer bears out that reality. The number of tourists to the area rose from less than 5,000 in 1990 to almost 40,000 in 2013. The continent is also home to over one hundred research facilities. This increase in traffic **1** has also brought more tourists to Argentina, the southern tip of which is near Antarctica. Measures regulating visitation should be strengthened by classifying more of Antarctica’s land as protected areas.

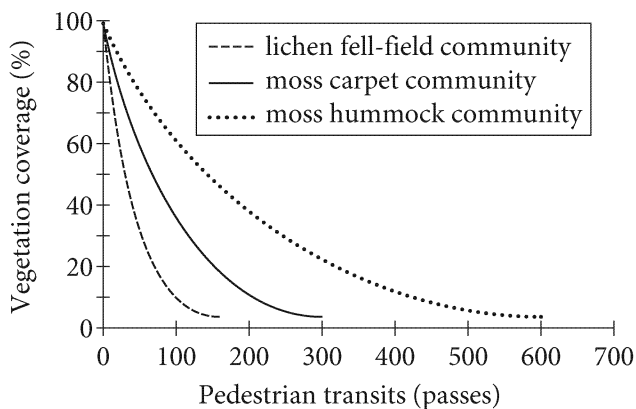
1

The writer wants to set up the main claim of the passage. Which choice best accomplishes this goal?

- A) NO CHANGE
- B) undermines the pristine quality of the landscape and may corrode the continent’s stunning beauty.
- C) exacerbates the threat of climate change and endangers the continent’s fragile ecosystem.
- D) has not changed the fact that Antarctica is one of the least visited places in the world.

The surge in **2** visitors already imperils the ecology of Antarctica's ice-free areas, which constitute a small portion of the continent but host the greatest amount of biodiversity. Especially at risk are patches of moss and lichen, organisms that play an important role in mitigating the effects of climate change by absorbing carbon dioxide. A 2013 study on the impact of human trampling at Byers **3** Peninsula, it revealed that these patches are sensitive to disturbance. By **4** 100 pedestrian passes, the three areas in the study had lost over 50 percent of their initial coverage, a loss that altered the nutrient content of the soil. Thus, more foot traffic results in a damaged ecosystem and additional carbon dioxide for the planet.

Effect of Pedestrian Traffic on Moss and Lichen Communities



Adapted from L. R. Perterra et al., "Rapid Denudation Processes in Cryptogamic Communities from Maritime Antarctica Subjected to Human Trampling." ©2013 by Antarctic Science Ltd.

2

- A) NO CHANGE
- B) visitor's already imperils
- C) visitors' already imperils'
- D) visitors already imperil's

3

- A) NO CHANGE
- B) Peninsula, revealing
- C) Peninsula revealed
- D) Peninsula, which revealed

4

The writer wants to support the claim in the previous sentence with accurate information from the graph. Which choice best accomplishes this goal?

- A) NO CHANGE
- B) 200 pedestrian passes, each of the three areas in the study had lost over 50 percent of its
- C) 50 pedestrian passes, the lichen fell-field community had lost almost all of its
- D) 600 pedestrian passes, the moss hummock community had lost about 10 percent of its

[1] Pollution from ships and factories also threatens the region. [2] Icebergs off Antarctica's shores make shipping dangerous, yet cruise ships and fishing boats flock to the area. [3] A single oil spill would be devastating. [4] Research facilities create waste that is barely regulated, contaminating water and land used by animals. [5] The penguins at the tourist site showed higher levels of contaminants in their **5** blood, indicating the presence of pollution as well as decreased immune functioning. [6] A study examined differences between gentoo penguins at a tourist site and **6** that at a rarely visited area. [7] Two final risks posed by the increase in human tourists and tenants are **7** the dangers created by the introduction of invasive species and the introduction of diseases, both of which threaten native flora and fauna. **8**

5

- A) NO CHANGE
- B) blood, this indicates
- C) blood: indicating
- D) blood, thus is indicated

6

- A) NO CHANGE
- B) those at
- C) comparing it with
- D) DELETE the underlined portion.

7

- A) NO CHANGE
- B) the perils presented by
- C) the hazards attendant on
- D) DELETE the underlined portion.

8

To make this paragraph most logical, sentence 6 should be placed

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

The Antarctic **9** Treaty was established in 1961.

This treaty makes little provision for the continent’s most vulnerable areas. Only 1.5 percent of the ice-free terrain is classified among the Antarctic Specially Protected Areas, a designation that limits human activity. With scientists predicting between 120,000 and 160,000 annual visitors by 2060, the need to protect Antarctica will only become more urgent. People will always be drawn to Antarctica for **10** their recreational and scientific potential; however, tougher protection standards will be necessary to **11** prove the importance of “the substantial contributions to scientific knowledge resulting from international cooperation” cited in the Antarctic Treaty.

9

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

- A) Treaty, established in 1961, makes
- B) Treaty was established in 1961, and it makes
- C) Treaty was established in 1961 to make
- D) Treaty was established in 1961; furthermore, it makes

10

- A) NO CHANGE
- B) one’s
- C) its
- D) DELETE the underlined portion.

11

The writer wants to use a quotation from the Antarctic Treaty to effectively state the main goal of the actions proposed in the passage. Which choice best accomplishes this goal?

- A) NO CHANGE
- B) ensure that “there shall be prohibited . . . any measures of a military nature,” as mandated by the Antarctic Treaty.
- C) uphold the Antarctic Treaty’s mission to maintain “a natural reserve, devoted to peace and science” for future generations.
- D) maintain the Antarctic Treaty’s ban on nations asserting a “new claim, or enlargement of an existing claim, to territorial sovereignty.”

Questions 12-22 are based on the following passage.

**And the Winner Is . . . No, Wait . . .**

In 1904 the Olympic Marathon competition, held during the Saint Louis World's Fair, had an astonishing outcome **12** with an unexpected ending. The 26.2-mile race had not one but three winners: the first winner, the true winner, and the man who should have won.

Held on an August afternoon with temperatures well into the 90s, **13** the course was beyond strange. It had seven hills (some as high as 300 feet), roads were inches deep in dust and covered with cracked stones, and the runners had to dodge delivery wagons, trains, trolley cars, and pedestrians as well as Olympic officials in the newest invention: automobiles. Cars traveling alongside the runners **14** tossed up so much dust that runners suffered from coughing spells and illness. **15** Drivers were coughing, too, as car windows were rolled down to alleviate the heat.

12

- A) NO CHANGE
- B) via a shocking conclusion.
- C) because of an outrageous finish.
- D) DELETE the underlined portion and end the sentence with a period.

13

- A) NO CHANGE
- B) the racers ran on a course that was beyond strange.
- C) the race took place on a course that was beyond strange.
- D) it was a course that was strange beyond belief.

14

- A) NO CHANGE
- B) tossing
- C) will toss
- D) toss

15

Which choice emphasizes how dangerous the course itself was?

- A) NO CHANGE
- B) One runner was hospitalized because dust from the road coated his esophagus.
- C) The race began in the smoldering heat of the afternoon.
- D) Several runners took a wrong turn and ran for almost a mile before realizing it.



The race's first winner was Fred Lorz, who suffered from cramps at mile 9. After watching other runners pass him, he hopped into one of the automobiles traveling by. At the 20-mile mark, the car broke down, and **15** a refreshed Lorz jogged to the end of the race. As he crossed the finish line, the crowd erupted into cheers, and Lorz, overcome by **17** it's adoring ovations, **18** accepting the winner's crown and posed with President Roosevelt's daughter. His "victory" was short-lived, however, as officials realized what had happened within minutes and immediately revoked his prize.

The true winner, Thomas Hicks, was still struggling on the course. Hicks had wanted to quit at the 10-mile mark. Unwilling to let him, his trainers fed him two **19** quantities of a medicine of strychnine and egg whites as well as brandy. (A lethal poison, strychnine was believed to be a stimulant.) By the time he reached the finish line, he was hallucinating and had to be carried over.

16

Which choice most effectively conveys that Lorz had an easygoing, fun-loving personality?

- A) NO CHANGE
- B) an unthinking Lorz dashed to the finish line.
- C) an energized Lorz sprinted for the win.
- D) a grinning Lorz zigzagged toward the finish line.

17

- A) NO CHANGE
- B) there
- C) its
- D) its'

18

- A) NO CHANGE
- B) accepts
- C) accepted
- D) excepted

19

- A) NO CHANGE
- B) doses of a concoction
- C) amounts of a mixture
- D) servings of an invention

[1] Finally, there was the man who should have

**20** won; named Felix Carvajal de Soto of Cuba. [2] He arrived, wearing street clothes and a beret, just in time for the starting gun. [3] A sympathetic athlete found scissors and helped Carvajal cut his pants into shorts. [4] Sometimes he even ran backward so that he could talk to spectators and other runners. [5] Finally, overcome with hunger, he stopped in an orchard, devoured several apples, got a stomachache, and took an hour-long nap. [6] **21** In addition, he still managed to finish in fourth place. [7] By all accounts, Carvajal should have won easily, but he ran casually. **22**

Only 14 of the race's 32 runners even completed the race, and Hicks won despite his feet not touching the ground as he was carried across the finish line. However, Hicks's winning time still holds a record: it was the slowest winning time in Olympic history at 3 hours, 28 minutes, 53 seconds.

20

- A) NO CHANGE
- B) won:
- C) won
- D) won: by the name of

21

- A) NO CHANGE
- B) As such,
- C) However,
- D) Therefore,

22

To make this paragraph most logical, sentence 7 should be placed

- A) where it is now.
- B) after sentence 2.
- C) after sentence 3.
- D) after sentence 4.

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

### The (Liberal) Art of Finding a Job

In a 2012 column for *Forbes* magazine, Peter Cohan suggested that US colleges should eliminate departments in the liberal arts such as literature and anthropology, arguing that majoring in these fields makes students “unemployable.” Although Cohan’s proposed solution is **23** extreme, however, the belief that education in the liberal arts may create employment problems for students is common—and misguided. Based on employment data and the **24** satisfaction levels reported by recent college graduates, it is clear that the knowledge and skills gained from a liberal arts education are valuable resources for **25** graduates, seeking almost any kind of job.

23

- A) NO CHANGE
- B) extreme,
- C) extreme; however,
- D) extreme, but

24

Which choice best anticipates a major idea developed later in the passage?

- A) NO CHANGE
- B) opinions of employers,
- C) hiring practices of major corporations,
- D) surveys of tenured professors at US universities,

25

- A) NO CHANGE
- B) graduates seeking—
- C) graduates: seeking
- D) graduates seeking

Commentators who recommend cutting liberal arts departments often justify their proposals by citing high rates of unemployment for recent graduates in these departments. The figures they refer to are sobering, but they do not tell the full story. In 2010–2011, the unemployment rate for recent graduates in the liberal arts and humanities **26** were 9 percent—certainly an unappealing figure. But during the same period, the unemployment rate for graduates in fields related to computers and mathematics, which are often proposed as practical alternatives to the liberal arts, proved to be almost identical: 9.1 percent.

**27** Far from being useless, a liberal arts education imparts many of the traits US employers identify as most valuable in potential employees. According to a 2013 survey conducted by Hart Research Associates, 80 percent of executives believe that every college student should acquire a broad knowledge of the liberal arts and

26

- A) NO CHANGE
- B) had been
- C) being
- D) was

27

Which choice provides the most effective transition from the previous paragraph?

- A) NO CHANGE
- B) Be that as it may,
- C) As a result of this trend,
- D) Despite these statistics,

sciences. Many of the business leaders polled by Hart thought that **28** certain particular aspects of liberal arts education should be expanded: **29** 7 percent said that critical thinking and analytical reasoning should receive greater attention in schools. In addition, a majority of the employers surveyed wanted to see **30** more focus on written and oral communication. Most of the surveyed employers also reported valuing knowledge of diverse cultures and proficiency **31** at foreign languages.

Employer's Opinions of How Much Emphasis Should Be Placed on Selected Learning Outcomes to Increase Graduates' Success in the Global Economy

Outcome	More emphasis	Less emphasis	Same emphasis
Critical thinking and analytical reasoning skills	82%	7%	11%
Ability to effectively communicate orally	80%	8%	12%
Ability to effectively communicate in writing	80%	8%	12%
Knowledge about science and technology	56%	9%	35%
Knowledge about democratic institutions and values	27%	20%	53%

Adapted from Hart Research Associates, "It Takes More Than a Major: Employer Priorities for College Learning and Student Success."  
©2013 by Hart Research Associates.

28

- A) NO CHANGE
- B) certain specific
- C) some certain
- D) certain

29

The writer wants to include accurate information from the table. Which choice accomplishes this goal?

- A) NO CHANGE
- B) 11 percent
- C) 80 percent
- D) 82 percent

30

Evidence from the table best supports which version of the underlined portion?

- A) NO CHANGE
- B) greater concentration on the values of a democratic society.
- C) less focus on the sciences.
- D) more focus on written communication than oral communication.

31

- A) NO CHANGE
- B) in
- C) on
- D) about

Many advocates of the liberal arts emphasize the role these fields can play in **32** growing informed citizens, improving quality of life, and **33** spreading ideals such as tolerance and introspection. These factors are important to consider when one weighs the value of the liberal arts, but it is also true that a liberal arts education can be valuable even in exclusively economic terms. The knowledge and skills instilled by such an education are among the most valuable assets a recent graduate can bring to the job market.

32

- A) NO CHANGE
- B) fabricating
- C) breeding
- D) cultivating

33

- A) NO CHANGE
- B) in spreading
- C) to spread
- D) the spreading of

Questions 34-44 are based on the following passage.

### Self-Publishing: An Alternative Path for Authors

Self-published e-books are on the **34** rise, in 2012: 156,499 e-books and 25 percent of Amazon's 100 top-selling books were self-published. In 2011, author Hugh Howey demonstrated that self-publishing (or indie publishing) could be quite lucrative when he sold half a million copies of his science-fiction series and made \$150,000 per month from royalties. **35** Later, Howey signed a deal with a publisher to distribute the book in stores. Although authors can reap many rewards from self-publishing, they should also be aware of the hard work it requires.

Many authors find self-publishing **36** attractive. Self-publishing offers them freedom and profit margins that traditional publishing does not. Traditional publishing requires securing a contract from a publisher and granting the publisher rights to all forms of the author's work, from paperbacks to e-books to movie adaptations. Conventionally published authors also have to settle for a much smaller profit margin—usually about 15 percent of book sales. **37** Likewise, self-published authors retain the rights to their work. They also have the freedom to set lower prices for their books, which in turn tends to invite a larger audience. Furthermore, self-published authors sell directly to buyers, reaping closer to 80 percent of the profits.

34

- A) NO CHANGE
- B) rise, in 2012
- C) rise in 2012,
- D) rise: in 2012,

35

Which choice most effectively sets up the following sentence?

- A) NO CHANGE
- B) To this day, Howey retains exclusive rights to e-book sales.
- C) However, Howey's case is the exception, not the rule.
- D) Howey's series had started out as a short story.

36

Which choice best combines the sentences at the underlined portion?

- A) attractive because it
- B) attractive, yet it
- C) attractive in that self-publishing
- D) attractive; plus, it

37

- A) NO CHANGE
- B) Nonetheless,
- C) In contrast,
- D) Moreover,

Some aspects of self-publishing have been facilitated by the digital age. A number of websites, such as Amazon, CreateSpace, and Smashwords, offer low-cost or free self-publishing software that allows writers to format and upload **38** his or her books to be sold online. Many authors take advantage of the software to **39** elude the lengthy timeline of traditional publishing. For instance, scholarly publishing can take up to five years because of the peer-review process, spurring many academics to search for ways to get their material published faster.

**40** In addition to the online resources writers can use, self-publishing is no easy road to riches. It requires substantial work. Tasks such as designing the book cover and proofreading **41** falls to the author rather than a

38

- A) NO CHANGE
- B) one's
- C) their
- D) your

39

- A) NO CHANGE
- B) flee
- C) surmount
- D) circumvent

40

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

- A) NO CHANGE
- B) Despite the benefits of going solo,
- C) Though few self-published writers become famous,
- D) With such a speedy process,

41

- A) NO CHANGE
- B) had fallen
- C) has fallen
- D) fall



publisher. **42** Self-published authors have to be their own entrepreneurs, finding others to package and market their material or learning how to do it themselves. Adam Poswolsky, a self-published **43** author, says, “I spent a year of my life (well over 2,000 hours) working on every single aspect of this project, from storyboarding to running a crowdfunding campaign to writing the back cover copy.” In addition, regardless of an **44** authors effort’s, most self-published books never sell more than 150 copies. Authors who choose to self-publish must be willing to face the drawbacks that exist alongside the potential perks.

42

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

When possible, a book cover should include a selection of praise from well-known writers or reviewers.

Should the writer make this addition here?

- A) Yes, because it offers a constructive suggestion for aspiring self-publishers.
- B) Yes, because it reiterates a point about book covers made earlier in the passage.
- C) No, because it does not specifically pertain to the paragraph’s discussion of self-publishing.
- D) No, because it undermines a point about book covers made earlier in the paragraph.

43

- A) NO CHANGE
- B) author says,
- C) author; says
- D) author—says

44

- A) NO CHANGE
- B) authors’ efforts,
- C) author’s efforts,
- D) authors efforts,

# 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.

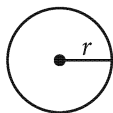
## DIRECTIONS

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

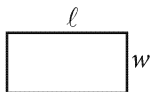
1. The use of a calculator **is not permitted**.
2. All variables and expressions used represent real numbers unless otherwise indicated.
3. Figures provided in this test are drawn to scale unless otherwise indicated.
4. All figures lie in a plane unless otherwise indicated.
5. Unless otherwise indicated,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

## REFERENCE

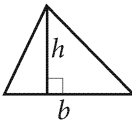


$$A = \pi r^2$$

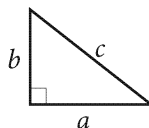
$$C = 2\pi r$$



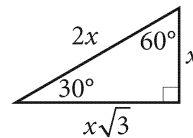
$$A = \ell w$$



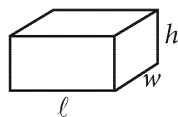
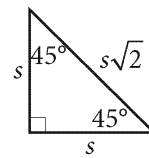
$$A = \frac{1}{2}bh$$



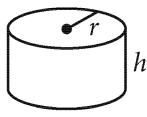
$$c^2 = a^2 + b^2$$



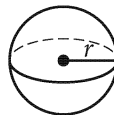
Special Right Triangles



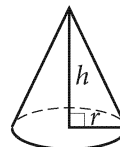
$$V = \ell wh$$



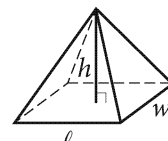
$$V = \pi r^2 h$$



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



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



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

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

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

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



1

An online video streaming company charges customers \$10 per month for its service. During a recent promotion, new customers were given the first two months of service at no charge. Which of the following represents the total charge  $c$ , in dollars, to new customers for  $x$  months of the video streaming service if they signed up during the promotion and  $x \geq 2$  ?

- A)  $c = 10x$
- B)  $c = x + 10$
- C)  $c = 10(x + 2)$
- D)  $c = 10(x - 2)$

2

$$A = 1,200 + 45m$$

The equation above models the altitude  $A$ , in feet, of a balloon  $m$  minutes after its altitude starts to change. Which of the following best describes the meaning of the number 45 in the equation?

- A) The number of minutes it takes for the balloon to reach an altitude of 1,200 feet
- B) The rate of increase, in feet per minute, of the balloon's altitude
- C) The rate of decrease, in feet per minute, of the balloon's altitude
- D) The number of feet the balloon travels in 45 minutes

3

$$y = x^2 - 5x + 3$$
$$5x + y = 39$$

Which of the following is the  $x$ -value of a solution to the system of equations above?

- A) 6
- B) 12
- C) 18
- D) 36

4

If  $2k - 4 = 12$ , what is the value of  $2k + 1$  ?

- A) 8
- B) 9
- C) 13
- D) 17



5

Beth bought two types of coffee in single-serve packs for her coffee. The cost of a 24-pack box of French roast coffee was \$12.00, and the cost of a 16-pack box of Colombian coffee was \$9.00. It cost Beth \$528 before tax to buy 992 single-serve packs. If  $x$  represents the number of 24-pack boxes of French roast coffee and  $y$  represents the number of 16-pack boxes of Colombian coffee that Beth bought, which of the following systems of equations can be solved to find the number of 16-pack boxes of Colombian coffee that Beth bought?

- A)  $9x + 12y = 528$   
 $16x + 24y = 992$
- B)  $12x + 9y = 528$   
 $24x + 16y = 992$
- C)  $12x + 9y = 992$   
 $24x + 16y = 528$
- D)  $12x + 16y = 992$   
 $24x + 9y = 528$

6

In right triangle  $PQR$ ,  $m\angle Q = 90^\circ$  and  $\sin R = \frac{5}{13}$ .  
What is the value of  $\cos R$ ?

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

7

Which of the following expressions is equivalent to

$$\frac{x^2 + 7x + 12}{x^2 + 8x + 15} \text{ for } x > 0 ?$$

- A)  $\frac{1}{x+3}$
- B)  $\frac{x+4}{x+3}$
- C)  $\frac{x+4}{x+5}$
- D)  $\frac{7x+12}{8x+15}$

8

$$\frac{3}{x} + \frac{4}{5} = \frac{11}{10}$$

For what value of  $x$  is the equation above true?

- A) 3
- B) 5
- C) 7
- D) 10



9

Which of the following expressions is equivalent to  $[2x + 3(x + y)] - [a(x + y) - 2y]$  ?

- A)  $(1 - a)(x + y)$
- B)  $(5 - a)(x + y)$
- C)  $2x - 2y + (3 - a)(x + y)^2$
- D)  $2x + 2y + (3 - a)(x + y)^2$

10

$$y = \frac{1}{2}x + 2$$

One equation in a system of two linear equations is shown above. If the system has one solution  $(x, y)$ , where  $x = 2$ , which of the following could be the other equation in the system?

- A)  $y = -2x + 4$
- B)  $y = -x + 5$
- C)  $y = 2x$
- D)  $y = 2x + 1$

11

If  $y = a(x - 3)(x - 5)$ , where  $a$  is a nonzero constant, and if the minimum value of  $y$  is  $-a$ , which of the following must be true?

- A)  $a > 0$
- B)  $a < 0$
- C)  $-3 < a < 5$
- D)  $-5 < a < 3$

12

Which of the following is another way to write the expression  $(2x - 2)^2 - (x - 1)$  ?

- A)  $4x^2 - x - 1$
- B)  $4x^2 - x - 3$
- C)  $4x^2 - 5x + 3$
- D)  $4x^2 - 9x + 5$



13

$$\frac{\sqrt{3}}{3}$$

Which of the following is equivalent to the expression above?

- A)  $3^{-\frac{1}{2}}$
- B)  $3^0$
- C)  $3^{\frac{1}{3}}$
- D)  $3^{\frac{3}{2}}$

14

$$2xy + 3xt - 7yt = 0$$

In the equation above,  $x$  and  $y$  are positive and  $x < y$ . What is  $t$  in terms of  $x$  and  $y$ ?

- A)  $t = \frac{1}{2}$
- B)  $t = \frac{2xy}{3x - 7y}$
- C)  $t = \frac{2xy}{7y - 3x}$
- D)  $t = \frac{xy}{2(y - x)}$


15

A town with a population of 5,000 is being divided into two voting districts: District X and District Y. The populations of the two districts must differ by no more than 500 people. Which of the following systems represents all possible values for the population  $x$  of District X and the population  $y$  of District Y?

- A)  $x - y \leq 500$   
 $x + y = 5,000$
- B)  $x - y = 500$   
 $x + y \leq 5,000$
- C)  $-500 \leq x - y \leq 500$   
 $x + y = 5,000$
- D)  $-250 \leq x - y \leq 250$   
 $x + y = 5,000$


**DIRECTIONS**

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

- Although not required, it is suggested that you write your answer in the boxes at the top of the columns to help you fill in the bubbles accurately. You will receive credit only if the bubbles are filled in correctly.
- Mark no more than one bubble in any column.
- No question has a negative answer.
- Some problems may have more than one correct answer. In such cases, grid only one answer.
- Mixed numbers** such as  $3\frac{1}{2}$  must be gridded as 3.5 or 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.

Write answer in boxes. →

Grid in result.

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

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

← Fraction line

Answer: 2.5

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

← Decimal point

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

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

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

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

Answer: 201 – either position is correct

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

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

**NOTE:**

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



16

Steven opens a savings account with an initial deposit of \$150. Each week after making the initial deposit, he deposits \$50. If Steven makes only his weekly deposits and does not earn interest, pay fees, or make withdrawals, how many weeks after his initial deposit will the account balance be exactly \$1000 ?

17

At her gym, Ximena spends 30 minutes on each aerobic workout and 20 minutes on each weight-lifting workout. Last week, Ximena spent between 190 and 230 minutes, inclusive, on 3 aerobic workouts and  $w$  weight-lifting workouts. What is one possible value of  $w$  ?

18

What is the product of the complex numbers  $2 + 6i$  and  $2 - 6i$  ? (Note:  $i = \sqrt{-1}$  )



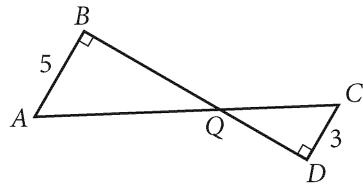


19

$$f(x) = (x + 9)(2x - 7)(3x - 5)(4x + 3)$$

For the function above, what is one possible positive value of  $x$  for which  $f(x) = 0$  ?

20



In the figure above,  $Q$  is the point of intersection of the line segments  $AC$  and  $BD$ . The length of line segment  $BD$  is 16. What is the length of line segment  $BQ$  ?

**STOP**

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



# Math Test – Calculator

55 MINUTES, 38 QUESTIONS

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

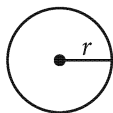
## DIRECTIONS

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

## NOTES

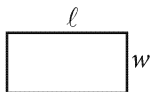
1. The use of a calculator **is not permitted**.
2. All variables and expressions used represent real numbers unless otherwise indicated.
3. Figures provided in this test are drawn to scale unless otherwise indicated.
4. All figures lie in a plane unless otherwise indicated.
5. Unless otherwise indicated,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

## REFERENCE

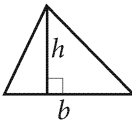


$$A = \pi r^2$$

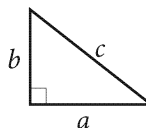
$$C = 2\pi r$$



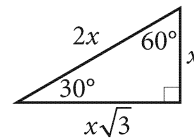
$$A = \ell w$$



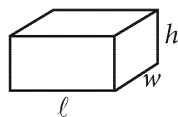
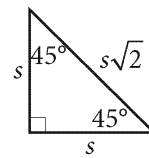
$$A = \frac{1}{2}bh$$



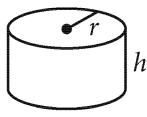
$$c^2 = a^2 + b^2$$



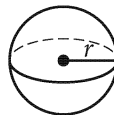
Special Right Triangles



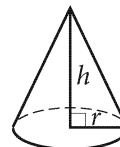
$$V = \ell wh$$



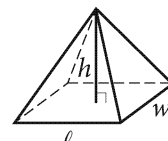
$$V = \pi r^2 h$$



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



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



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

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

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

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



1

If  $2x + 5 = 7$ , what is the value of  $4x + 10$  ?

- A) 9
- B) 12
- C) 14
- D) 17

2

An elephant typically weighs 200 pounds at birth and gains approximately 2.5 pounds per day in the first year after birth. Which of the following estimates the weight  $w$ , in pounds,  $d$  days after birth for an elephant in the first year after birth?

- A)  $w = 200 + 2.5d$
- B)  $w = 200 - 2.5d$
- C)  $w = 2.5 + 200d$
- D)  $w = 200(2.5d)$

3

In a certain cabinet there are 8 pens for every 12 pencils. If there are 84 pencils in the cabinet, how many pens are in the cabinet?

- A) 7
- B) 48
- C) 56
- D) 72

4

Howard needs to move a large number of boxes from one floor to another in an office building by using an elevator. The elevator has a weight limit of 650 pounds. Howard weighs 160 pounds and each box weighs 35 pounds. Which of the following inequalities describes the limit on the number of boxes,  $b$ , that Howard can ride with in the elevator in one trip?

- A)  $35b - 160 \leq 650$
- B)  $35b + 160 \leq 650$
- C)  $35(b + 160) \leq 650$
- D)  $160b + 35 \leq 650$



5

Allan rented a truck from a rental agency for one day. The agency charged \$40 for the day and \$0.75 for each mile driven. How many miles was the truck driven if the total charges were \$80.50 before taxes?

- A) 36
- B) 48
- C) 54
- D) 62

6

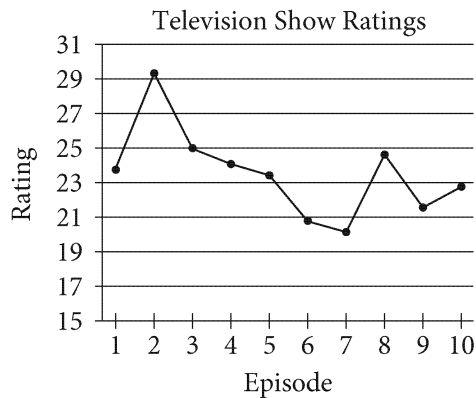
The total time it takes a home office printer to print a document includes the time the printer takes to warm up and the amount of time it takes to print each page of the document. The number of seconds,  $s$ , that it takes to print  $p$  pages can be modeled by the equation  $s = 1.2p + 10$ . Which of the following is the best interpretation of the number 10 in this context?

- A) The number of seconds it takes to print each page of the document
- B) The number of seconds it takes the printer to warm up
- C) The number of pages printed in 1.2 seconds
- D) The number of pages printed in 12 seconds



7

Several households participated in a survey to calculate television show ratings by allowing a device to monitor what television shows they watched. The ratings for several episodes of a television show are shown in the line graph below.



Of the following, between which two episodes did the television show's ratings have the largest positive increase?

- A) Episodes 1 and 2
- B) Episodes 2 and 3
- C) Episodes 6 and 7
- D) Episodes 7 and 8

8

If  $t = 20u$  and  $r = \frac{5u}{2}$ , which of the following is equivalent to  $3rt$ , in terms of  $u$ ?

- A)  $50u^2$
- B)  $150u^2$
- C)  $200u^2$
- D)  $300u^2$

9

$$\sqrt{2x+1} = 4$$

In the equation above, what is the value of  $2x+1$ ?

- A)  $\frac{3}{2}$
- B) 2
- C) 4
- D) 16



Questions 10-12 refer to the following information.

Researchers conducted a study concerning the amount of sleep high school soccer players get. A total of 60 high school soccer players were randomly selected from all high school soccer players in a large school district. The table below shows the ages of the 33 female and 27 male participants.

Age	Number of participants
15	16
16	12
17	18
18	14
Total	60

10

What is the difference between the percent of participants who are female and the percent of participants who are male?

- A) 5%
- B) 8%
- C) 10%
- D) 45%

11

If the results of the study suggest a relationship between age and the amount of sleep high school soccer players get, which of the following aspects of the study will prevent the results from being generalized to all high school students?

- A) The participants are not all from the same high school.
- B) The number of soccer players who participated is too small.
- C) The number of female participants is not equal to the number of male participants.
- D) Not every high school student could have been selected as a participant in the study.

12

What is the median age of the participants in the study?

- A) 15
- B) 16
- C) 17
- D) 18



13

$$1 \text{ cubit} = 6 \text{ palms}$$

$$2 \text{ cubits} = 3 \text{ Roman feet}$$

$$1 \text{ Roman foot} = 296 \text{ millimeters}$$

Cubits, palms, and Roman feet are linear measurements that were used in ancient Rome. Based on the relationships shown above, how many millimeters equals 1 palm?

- A) 16
- B) 36
- C) 72
- D) 74

14

The function  $f$  is defined by  $f(x) = x(x + 3)$ . If  $f(a) = 40$  and  $a > 0$ , what is the value of  $a$ ?

- A) 3
- B) 5
- C) 7
- D) 8

15

For which of the following forms of the linear equation  $4x - 2y = 10$  is the coefficient of  $x$  the slope of the graph in the  $xy$ -plane?

- A)  $x = \frac{1}{2}y + \frac{5}{2}$
- B)  $y = 2x - 5$
- C)  $4x = 2y + 10$
- D)  $2y = 4x - 10$

16

The formula  $V = IR$  describes a component of an electric circuit, where  $V$  is the potential difference in volts,  $I$  is the current in amperes, and  $R$  is the resistance in ohms. Which of the following describes 1 ohm in terms of volts and amperes?

- A)  $1 \text{ ohm} = 1 \text{ ampere} - 1 \text{ volt}$
- B)  $1 \text{ ohm} = (1 \text{ volt}) \times (1 \text{ ampere})$
- C)  $1 \text{ ohm} = \frac{1 \text{ ampere}}{1 \text{ volt}}$
- D)  $1 \text{ ohm} = \frac{1 \text{ volt}}{1 \text{ ampere}}$



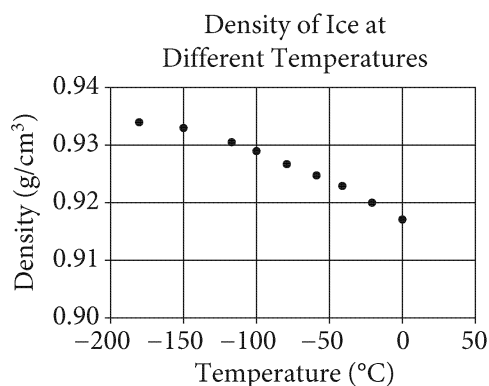
17

$$\begin{aligned}y &= 3x \\ 5x - 4y &= -21\end{aligned}$$

The system of equations above has solution  $(x, y)$ .  
What is the value of  $x + y$ ?

- A) 12
- B) 9
- C) 6
- D) 3

18



The graph above shows the density  $d$ , in grams per cubic centimeter ( $\text{g}/\text{cm}^3$ ), of ice at various temperatures  $T$ , in degrees Celsius ( $^{\circ}\text{C}$ ). Of the following linear functions, which function best models the data for  $-180 \leq T \leq 0$ ?

- A)  $d = -0.0001T$
- B)  $d = 0.918 - 0.0001T$
- C)  $d = 0.918 + 0.0001T$
- D)  $d = 0.938 - 0.0001T$

Questions 19-21 refer to the following information.

Type of silver alloy	Percent of pure silver
Mexican silver	95%
Sterling silver	92.5%
Coin silver	90%
Scandinavian silver	83%
Egyptian silver	80%

Pure silver is often combined with copper and other metals in different proportions to create alloys with desirable properties. The table above shows the percent of pure silver, by mass, found in five different silver alloys.

The mass of silver can be measured in troy ounces. On a particular day, the value of pure silver is \$19.85 per troy ounce.

19

How much more pure silver, in grams, is in a 10-gram object made of Mexican silver than in a 10-gram object made of sterling silver?

- A) 0.025
- B) 0.25
- C) 0.5
- D) 2.5

20

What is the value in dollars, rounded to the nearest cent, of the pure silver in an object that is made of 10 troy ounces of Scandinavian silver?

- A) \$16.48
- B) \$19.85
- C) \$164.76
- D) \$198.50





21

How many grams of Egyptian silver contain exactly 16 grams of pure silver?

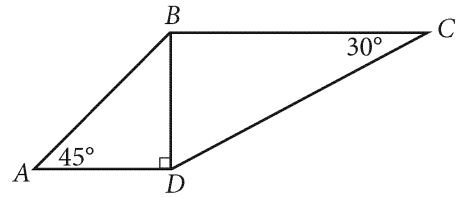
- A) 6.3
- B) 12.8
- C) 19.2
- D) 20.0

22

Which of the following can be defined by a linear function?

- A) A worker's salary, where the salary increases by 2.6% over the preceding year's salary each year for 10 years
- B) The volume of water in a reservoir, where the amount of water in the reservoir doubles every 4 days
- C) The total number of miles a person walks over several days, where the person walks 3 miles each day
- D) The number of teams remaining in each round of a softball tournament, where half of the teams remaining in each round are eliminated for each successive round

23



In the figure above,  $AD = 100$  and segment  $AD$  is parallel to segment  $BC$ . Of the following, which best approximates the perimeter of quadrilateral  $ABCD$ ?

- A) 400
- B) 483
- C) 528
- D) 614

24

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

If  $x_1$  and  $x_2$  are the solutions to the equation above, what is the value of  $x_1 + x_2$ ?

- A) 0
- B) 1
- C) 2
- D) 4



25

If  $x^2 + kx + 6 = (x + n)(x + 3)$  for all values of  $x$ , where  $k$  and  $n$  are constants, what is the value of  $k$ ?

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

26

Javonne purchased some art supplies and paid for them with a \$20 bill. The cashier handed her  $c$  dollars in change, which was a mistake. To fix the mistake, Javonne returned \$1.00 to the cashier. If the purchase price was twice the amount of change Javonne was originally given, what is the value of  $c$ ?

- A) \$5.50
- B) \$7.00
- C) \$9.50
- D) \$10.50

27

Which of the following is an equation of a circle in the  $xy$ -plane with center  $(1, 2)$  that has a radius with an endpoint at  $(-5, -6)$ ?

- A)  $(x - 1)^2 + (y - 2)^2 = 100$
- B)  $(x - 1)^2 + (y - 2)^2 = 10$
- C)  $(x + 1)^2 + (y + 2)^2 = 100$
- D)  $(x + 1)^2 + (y + 2)^2 = 10$

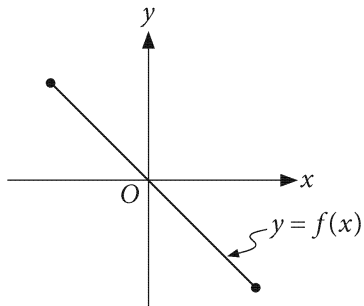
28

In any given week, Anthony earns \$13.50 an hour for time worked up to and including 40 hours and 1.5 times that rate for time worked over 40 hours. His employer withholds  $y\%$  of his weekly earnings for taxes. Anthony would like his after-tax pay to be no less than \$550 per week. If Anthony works  $x$  hours in a week, which of the following inequalities represents the conditions to be met for Anthony's pay that week?

- A)  $\frac{100 - y}{100}[13.5(40) + 20.25(x - 40)] \geq 550$
- B)  $\frac{100 - y}{100}[13.5x + 20.25(x - 40)] \geq 550$
- C)  $(1 - y)[13.5(40) + 20.25(x - 40)] \geq 550$
- D)  $(1 - y)[13.5x + 20.25(x - 40)] \geq 550$



29



The complete graph of the function  $f$  is shown in the  $xy$ -plane above. If  $a$  and  $b$  are in the domain of  $f$ , which of the following must be true?

- I. If  $a > b$ , then  $f(a) < f(b)$ .
  - II. If  $a < 0$ , then  $f(a) > 0$ .
  - III. If  $a > 0$ , then  $f(a) < 0$ .
- A) II only  
B) I and III only  
C) II and III only  
D) I, II, and III

30

Each person in a random sample of 150 city residents was asked if he or she favored the building of a new stadium in their city. Of the residents surveyed, 34% were in favor of building a new stadium. If the margin of error associated with the survey results is 8 percentage points, which of the following is most plausible?

- A) About 8% of all of the city residents surveyed did not tell the truth.  
B) About 25% of all of the city residents surveyed were in favor of building a new stadium.  
C) About 39% of all of the city residents surveyed were in favor of building a new stadium.  
D) About 43% of all of the city residents surveyed were in favor of building a new stadium.


**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 

3	1	/	2
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

 is entered into the

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

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

Write answer in boxes. →

Grid in result. →

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

7	/	1	2
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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
<input type="checkbox"/>	7	7	7
8	8	8	8
9	9	9	9

← Fraction line

Answer: 2.5

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

.	6	6	7
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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	<input type="checkbox"/>	<input type="checkbox"/>	6
7	7	7	<input type="checkbox"/>
8	8	8	8
9	9	9	9

Answer: 201 – either position is correct

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

2	0	1	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	0	0	0
1	1	<input type="checkbox"/>	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

Each molecule of aluminum oxide ( $\text{Al}_2\text{O}_3$ ) is composed of 2 aluminum atoms and 3 oxygen atoms. How many more oxygen atoms than aluminum atoms are present in 100 molecules of aluminum oxide?

32

The manager of a small baseball stadium uses the equation  $y = 9000 - 2.4x$  to model the relationship between  $y$ , the number of unfilled seats in the stadium, and  $x$ , the number of cars in the parking lot. According to the model, how many cars will be in the parking lot when there are no unfilled seats in the stadium?

33

Survey of 9th- and 10th-Grade Students

	Take a foreign language	Do not take a foreign language	Total
9th grade	47	21	68
10th grade	53	18	71
Total	100	39	139

A survey of all the 9th- and 10th-grade students at a school asked whether they are taking a foreign language. The results of the survey are shown in the table above. If one of the students in 9th or 10th grade who is taking a foreign language is to be selected at random, what is the probability that the student is in the 10th grade?

34

At a certain point in time, a physicist measures the speed of a falling object to be 17.6 feet per second. What is the equivalent speed in miles per hour? (5280 feet = 1 mile)

35

An audio engineer purchases new recording equipment for \$2500. The engineer estimates that the equipment will decrease in value by 15% each year from the preceding year's value. Based on the engineer's estimate, what is the value, to the nearest dollar, of the equipment 4 years after purchase? (Disregard the \$ sign when gridding your answer.)

36

If  $\cos(\pi r) = 2\cos(\pi r)$  and  $0 < r < 3$ , what is one possible value of  $r$ ?



Questions 37 and 38 refer to the following information.

The table below shows how many flowers there were on each of 15 different rose bushes in a yard on Monday.

Number of flowers	Number of bushes
0 or 1	7
2 or 3	1
4 or 5	1
6 or 7	6

37

On Monday, the median number of flowers that were on a bush in the yard was  $m$ . What is one possible value of  $m$ ?

38

On Monday,  $\frac{1}{3}$  of the 15 bushes had 6 flowers each.

How many of the bushes had 7 flowers?

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

READING TEST  
RAW SCORE  
(NUMBER OF  
CORRECT ANSWERS)

### Writing and Language Test Answers

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

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

### Math Test – No Calculator Answers

1 D	11 A
2 B	12 D
3 A	13 A
4 D	14 C
5 B	15 C
6 C	16 17
7 C	17 5, 6, 7
8 D	18 40
9 B	19 $7/2$ , $5/3$
10 B	20 10

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

### Math Test – Calculator Answers

1 C	11 D	21 D	31 100
2 A	12 C	22 C	32 3750
3 C	13 D	23 D	33 .53
4 B	14 B	24 A	34 12
5 C	15 B	25 A	35 1305
6 B	16 D	26 B	36 .5, 1.5, 2.5, $1/2$ , $3/2$ , $5/2$
7 A	17 A	27 A	37 2, 3
8 B	18 B	28 A	38 1
9 D	19 B	29 D	
10 C	20 C	30 C	

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