

**PSAT/NMSQT®**

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Primary



**PSAT/NMSQT®**

Preliminary SAT/National Merit Scholarship Qualifying Test

# Test Book

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**2**

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VERSION



5QPV03

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NF1T0001



**Test begins on the next page.**

# Reading Test

60 MINUTES, 47 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 1-9 are based on the following passage.

This passage is adapted from Jhumpa Lahiri, "Only Goodness." ©2008 by Jhumpa Lahiri. Sudha's mother has just returned home from the hospital with Rahul, Sudha's new baby brother.

Line She had been hoping for a sister but was delighted  
nevertheless no longer to be an only child, to have  
someone help fill the emptiness she felt in her  
5 parents' home. The few things they owned were  
always in their places, the two most current issues of  
*Time* in the same spot on the coffee table. Sudha  
preferred the homes of her American friends,  
crammed and piled with things, toothpaste caking  
their sinks, their soft beds unmade. Finally, with  
10 Rahul's arrival, there was a similar swelling and  
disorder: his lotions and diapers heaped on the top of  
the dresser, stockpots clattering with boiling bottles  
on the stove, an infant's strong, milky odor  
pervading the rooms. She remembered how  
15 excited she had been, moving her things to one side  
to make space in her bedroom for Rahul's bassinet,  
his changing table, his mobile of stuffed bumblebees.  
Toys and other gifts accumulated in the crib he  
would eventually use; her favorite was a stuffed white  
20 rabbit that played a tune if a key at its throat was  
turned. She had not minded when her mother came  
in the middle of the night to comfort Rahul, sitting in  
a rocking chair, singing a song in Bengali, something  
about a fishbone piercing the foot of a little boy, a  
25 song that would lull Sudha back to sleep also. Birth  
announcements were bought at the drugstore, the  
card of Sudha's choosing, and she helped to put them

in their envelopes, dampening stamps with her father  
on a wet sponge. Countless photographs were  
30 taken—Rahul sleeping in his bassinet, being bathed  
in a plastic tub—and she took it upon herself to  
arrange these in a special album, with a blue denim  
cover because he was a boy.

There was not the same documentation of Sudha's  
35 infancy. In London, her parents had rented two  
rooms in Balham from a Bengali landlord named Mr.  
Pal, and it was he who had taken the few baby  
pictures of Sudha that existed, wearing a white lace  
dress intended for a christening but that her mother  
40 had simply thought pretty. Mr. Pal had opened his  
doors to her parents when her mother was pregnant  
with Sudha, providing refuge from their previous  
landlady, an elderly British woman who did not  
allow children under her roof. Her parents told her  
45 that half the rentals in London in the sixties said  
WHITES ONLY, and the combination of being  
Indian and pregnant limited her parents to the point  
where her father considered sending her mother back  
to India to give birth, until they met Mr. Pal. To  
50 Sudha this story was like an episode out of a Greek  
myth or the Bible, rich with blessing and portent,  
marking her family as survivors in strange intolerant  
seas.

Four years later they moved to Massachusetts, her  
55 father transferring from Badger to Raytheon,  
transporting no evidence of their years in London,  
no trace apart from her mother's fondness for the  
McVitie's biscuits she ate every morning with her tea.  
None of Sudha's toys had made it on the journey  
60 across the Atlantic, no baby clothing or bedding or



keepsake of any kind. In grade school, when Sudha had been required to present her autobiography to the class, a project for which the other students brought in blankets and scuffed shoes and blackened spoons, she came only with an envelope containing pictures Mr. Pal had taken, boring her classmates as she stood in the front of the room.

None of this mattered after Rahul arrived. Sudha had slipped through the cracks, but she was determined that her little brother should leave his mark as a child in America. She sought out all the right toys for him, scavenging from yard sales the Fisher Price barn, Tonka trucks, the Speak and Say that made animal sounds, and other things that she'd discovered in the playrooms of her friends. She asked her parents to buy him the books she'd been read by her first teachers, *Peter Rabbit* and *Frog and Toad*. "What's the point of buying books for someone who can't read?" her parents asked, legitimately enough, and so she checked them out of her school library and read them to Rahul herself. At times she engaged with Rahul's upbringing more than he did—it was she, too heavy by then for the seats, who would swing in the yard after school, she who spent hours building towns out of Lincoln Logs that he would destroy with a gleeful swipe of the hand.

1

Which statement regarding Sudha's relationship with Rahul can be inferred from the passage?

- A) Sudha secretly fears that her parents will become closer to Rahul than they are to her.
- B) Sudha feels protective of Rahul because she knows he will face many challenges in his life.
- C) Sudha wants Rahul to grow up to be a successful adult to help improve the status of the family.
- D) Sudha tries to create for Rahul the type of childhood that she feels he deserves.

2

The description of Sudha's preference for one style of housekeeping over another illustrates her wish that her family had a more

- A) casual home environment.
- B) elegant decorating style.
- C) clear-cut division of labor.
- D) central location for playthings.

3

As used in line 15, "excited" most nearly means

- A) agitated.
- B) enthusiastic.
- C) provoked.
- D) intrigued.

4

Which choice best supports the idea that Sudha finds the activities she arranges for Rahul more interesting than he himself does?

- A) Lines 18-21 ("Toys . . . turned")
- B) Lines 25-29 ("Birth . . . wet sponge")
- C) Lines 75-77 ("She asked . . . *Toad*")
- D) Lines 81-86 ("At times . . . hand")

5

The passage best supports which description of the family's efforts to document Rahul's childhood?

- A) The parents are continually engaged in the efforts, but Sudha loses interest from time to time.
- B) The parents are involved in the efforts, but Sudha takes a more prominent role in the efforts than the parents do.
- C) The parents disagree with Sudha about what approach the efforts should take, but the family eventually reaches a consensus.
- D) The parents are excited by both the efforts and the events being documented, but Sudha is indifferent to the efforts and excited only by the events.

6

It can reasonably be inferred from the passage that Sudha views her parents' problems in London as having been

- A) a somewhat unfortunate but common occurrence for that time period.
- B) an apparently random instance of inequitable treatment.
- C) a strangely whimsical element in an otherwise conventional narrative.
- D) a potentially fraught situation with an appealingly dramatic conclusion.

7

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

- A) Lines 35-40 ("In London . . . pretty")
- B) Lines 44-49 ("Her parents . . . Mr. Pal")
- C) Lines 49-53 ("To Sudha . . . seas")
- D) Lines 61-67 ("In grade . . . room")

8

In line 62, the word "present" refers to an act of

- A) providing an oral account.
- B) assisting in a social introduction.
- C) bestowing an award.
- D) granting a request.

9

The main purpose of the second paragraph (lines 34-53) is to

- A) provide details of the family's life before their move to Massachusetts.
- B) describe Sudha's parents' experiences when they first arrived in London.
- C) analyze the character of an individual who supported Sudha as a child.
- D) criticize the attitudes of some people Sudha's parents encountered in London.

**Questions 10-18 are based on the following passage and supplementary material.**

This passage is adapted from Alexander Todorov, *Face Value: The Irresistible Influence of First Impressions*. ©2017 by Princeton University Press.

In 1975, Carolyn Goren and her colleagues tested whether newborns with no visual experience with faces would show preference for facelike stimuli.

Line Their newborns were 9 minutes old on average. The  
5 newborns were literally taken from the womb to the testing room (the mothers had consented to the experiment prior to the delivery). Because the doctors, nurses, and experimenters wore medical gowns, masks, and scrub hats, the only facelike thing  
10 the infants could have seen was the eyes of the medical staff or the experimenters. To test the newborns' visual preferences for faces, the researchers used four types of stimuli: a schematic face, a partially scrambled schematic face, a fully  
15 scrambled schematic face, and a blank schematic face shape.

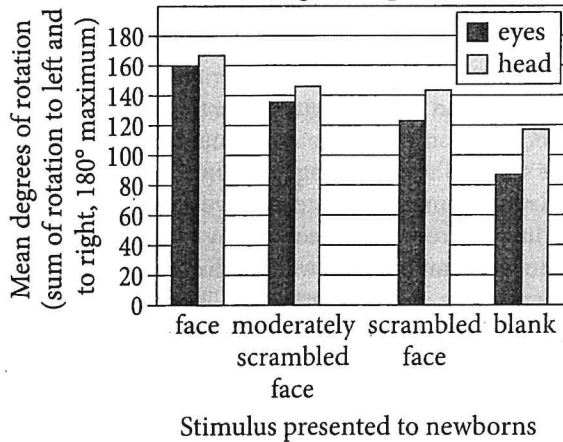
Each newborn was placed in the lap of one of the experimenters. Once the baby was positioned, her head was aligned with the zeroth degree of a large  
20 protractor (just like the ones fourth graders use to measure angles but much larger). The experimenter held one of the four stimuli about 15-30 centimeters from the baby's head. Once the baby fixated on the stimulus, the experimenter rotated it slowly in an arc  
25 from 0 to 90 degrees. Two other experimenters independently observed and recorded the degrees of both head and eyes turning of the baby to verify the consistency of the observations. The results were clear. The newborns turned both their head and eyes  
30 toward the face most, followed by the moderately scrambled face, the scrambled face, and the blank shape. The latter was the least interesting to the newborns. Goren and colleagues concluded that "these results suggest that an evolved predisposition  
35 to respond selectively to faces may be present at birth."

Surprising findings in science are typically met with skepticism expressed in alternative explanations. There are many things that can go  
40 wrong in an experiment. If an observer knows what image the infant is looking at, they can inadvertently bias their measurement in line with the hypothesis. To prevent such biases, Goren and her colleagues designed the experiment so that the experimenters,  
45 who recorded the head and eyes turning, were

unaware of what the infant was seeing; they were able to see only the reverse side of the stimuli, which was identical for all four stimuli. Yet it is still possible that the experimenters were able to deduce what the  
50 infant was seeing. In a subsequent replication, Mark Johnson and his colleagues videotaped the procedure, in which the experimenter (unaware of the stimuli) was showing the stimuli to the infant. The rotations of the head and eye gaze were  
55 estimated from the videotapes by two researchers who were not only unaware of the stimuli but also of the purpose of the experiment. These results ruled out experimenter bias as an explanation of the findings.

60 Still, there could always be other explanations. If the experimental procedures are flawless (although they never are for the skeptic), the skeptic can argue that face and nonface images have different qualities that have nothing to do with the "faceness" of the  
65 images. Newborns may be responding not to faces per se but to something simpler that differentiates face from nonface images. This something can refer to low-level visual properties of the stimuli (like different luminance and contrast) or to high-level  
70 visual properties (like complexity and symmetry). If the face images are symmetric and the nonface images are not, it is plausible and more parsimonious to argue that babies are responding to symmetry rather than to faces. Such arguments are resolved in  
75 subsequent experiments that control for all potentially important differences or confounds.

Newborns' Rotation of Eyes and Head  
in Original Experiment



Adapted from Carolyn C. Goren, Merrill Sarty, and Paul Y. K. Wu, "Visual Following and Pattern Discrimination of Face-like Stimuli by Newborn Infants." ©1975 by American Academy of Pediatrics.

10

Which choice best describes the overall structure of the passage?

- A) The author describes a research study and its findings, explains steps taken to validate those findings, and then anticipates viewpoints questioning the results.
- B) The author indicates skepticism about an area of research, describes a study that seems to allay this skepticism, and then discusses another related study.
- C) The author provides an overview of a field of study, describes the conclusions of early research in that field, and then reveals complications subsequent studies have uncovered.
- D) The author introduces a controversial hypothesis for a research study, considers different methods for testing the hypothesis, and then explores questions raised about each method.

11

Which choice best supports the conclusion that newborns in Goren's study may have observed certain facial features prior to the start of the experiment?

- A) Lines 1-3 ("In 1975 . . . stimuli")
- B) Lines 4-7 ("The newborns . . . delivery")
- C) Lines 7-11 ("Because . . . experimenters")
- D) Lines 11-16 ("To test . . . shape")

12

As used in line 35, "respond" most nearly means

- A) return.
- B) react.
- C) answer.
- D) submit.

13

The statement made in lines 37-40 ("Surprising . . . experiment") mainly serves to

- A) justify the study's surprising results even though the experiment did not go as Goren had predicted.
- B) contrast the skepticism of other researchers with Goren's positive expectations for the experiment.
- C) situate a discussion of potential sources of error in Goren's study within a broader disciplinary context.
- D) evaluate the merit of certain alternative interpretations of the results of Goren's experiment.

14

It can reasonably be inferred from the passage that some researchers might object to Goren's and Johnson's conclusions on the grounds that Goren's and Johnson's respective experiments

- A) did not control for other factors that might account for their results.
- B) did not use a sufficient number of stimuli for evaluating the newborns.
- C) are not sufficiently different from prior experiments to be noteworthy.
- D) are not reproducible due to certain aspects of their experimental design.

15

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

- A) Lines 40-42 ("If an observer . . . hypothesis")
- B) Lines 50-53 ("In a subsequent . . . infant")
- C) Lines 54-59 ("The rotations . . . findings")
- D) Lines 60-65 ("Still . . . images")

16

As used in line 74, "resolved" most nearly means

- A) focused.
- B) settled.
- C) intended.
- D) determined.

17

Which statement most effectively uses data in the graph to support Goren's conclusions, as presented in the passage?

- A) Newborns fixated on the face stimulus more quickly, on average, than they fixated on the scrambled face stimulus.
- B) Newborns rotated their eyes approximately as much, on average, as they rotated their heads when presented with the face stimulus.
- C) When presented with the moderately scrambled face stimulus, newborns rotated their heads less, on average, than they did when presented with the face stimulus.
- D) When presented with the blank shape stimulus, newborns lost interest in the stimulus more quickly, on average, than they did when presented with the scrambled face stimulus.

18

Which hypothetical finding, if true, would most clearly undermine the conclusions of Goren's study, as presented in the passage?

- A) Newborns show a visual preference for three-dimensional images.
- B) Newborns show a visual preference for symmetrical images.
- C) Newborns show a visual preference for quickly moving images.
- D) Newborns show a visual preference for brightly colored images.

**Questions 19-28 are based on the following passage and supplementary material.**

This passage is adapted from Ashley Yeager, "Petunias Spread Their Scent Using Pushy Proteins." ©2017 by Society for Science & the Public.

When it comes to smelling pretty, petunias are pretty pushy.

Line Instead of just letting scent compounds waft into the air, the plants use a particular molecule called a  
5 transporter protein to help move the compounds along, a new study found. The results could help researchers genetically engineer many kinds of plants both to attract pollinators and to repel pests and plant eaters.

10 "These researchers have been pursuing this transporter protein for a while," says David Clark, an expert in horticultural biotechnology and genetics at the University of Florida in Gainesville. "Now they've got it. And the implications could be big."

15 Plants use scents to communicate. The scent compounds can attract insects and other organisms that spread pollen and help plants reproduce, or can repel pests and plant-eating animals. The proteins found in the new study could be used to dial the  
20 amount of scent up or down so that plants can attract more pollinators or better protect themselves. Currently unscented plants could be engineered to smell, too, giving them a better shot at reproduction and survival, Clark says.

25 Plants get their scents from volatile organic compounds, which easily turn into gases at ambient temperatures. Petunias get their sweet smell from a mix of benzaldehyde, the same compound that gives cherries and almonds their fruity, nutty scent, and  
30 phenylpropanoids, often used in perfumes.

But nice smells have a trade-off: If these volatile compounds build up inside a plant, they can damage the plant's cells.

35 About two years ago, study coauthor Joshua Widhalm, a horticulturist at Purdue University in West Lafayette, Indiana, and colleagues used computer simulations to look at the way petunias' scent compounds moved. The results showed that the compounds can't move out of cells fast enough  
40 on their own to avoid damaging the plant. So the researchers hypothesized that something must be shuttling the compounds out.

In the new study, led by Purdue biochemist Natalia Dudareva, the team looked for genetic  
45 changes as the plant developed from its budding

stage, which had the lowest levels of volatile organic compounds, to its flower-opening stage, with the highest levels. As flowers opened and scent levels peaked, the gene *PhABCG1* went into overdrive;  
50 levels of the protein that it makes jumped to more than 100 times higher than during the budding stage, the researchers report.

The team then genetically engineered petunias to produce 70 to 80 percent less of the *PhABCG1*  
55 protein. Compared with regular petunias, the engineered ones released around half as much of the scent compounds, with levels inside the plant's cells building to double or more the normal levels. Images of the cells show that the accumulation led to  
60 deterioration of cell membranes.

A lot of work has been done to identify the genes and proteins that generate scent compounds, says Clark. But this appears to be the first study to have identified a transporter protein to shuttle those  
65 compounds out of the cell. "That's a big deal," he says.

**Figure 1**

Volatile Organic Compound Emissions in Wild and Genetically Engineered Petunias

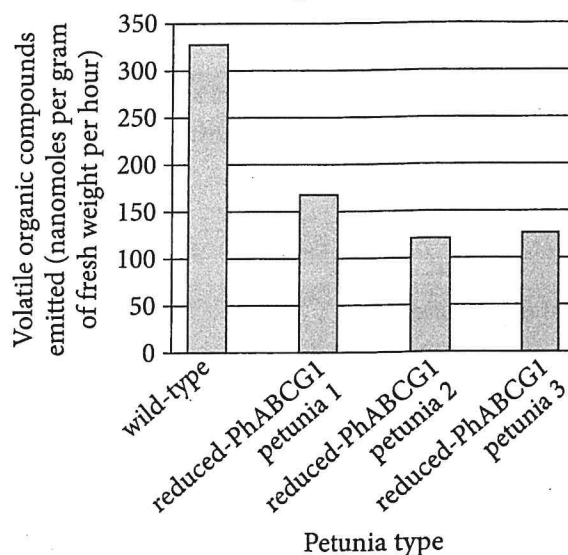
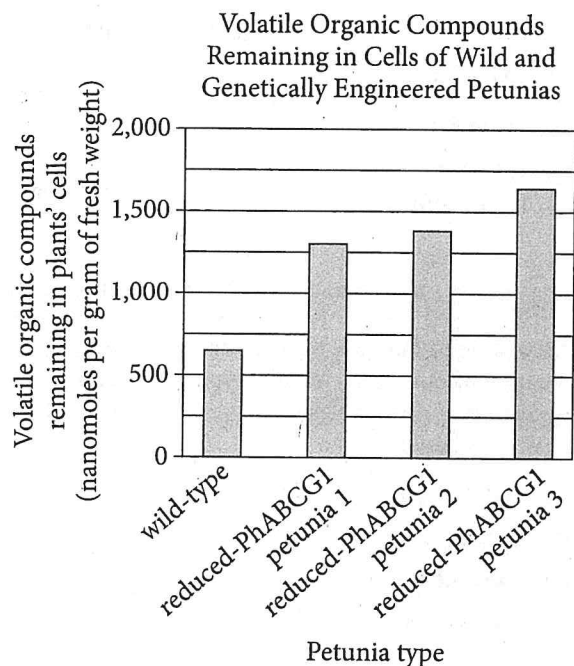




Figure 2



Figures adapted from Funmilayo Adebesein et al., "Emission of Volatile Organic Compounds from Petunia Flowers Is Facilitated by an ABC Transporter." ©2017 by Funmilayo Adebesein et al.

19

As used in lines 14 and 65, "big" most nearly means

- A) important.
- B) bulky.
- C) generous.
- D) imposing.

20

It can reasonably be inferred from the passage that a basic difference in the designs of the two studies it discusses is that, unlike Dudareva's study, Widhalm's study did not

- A) rely on direct observations of petunias.
- B) focus on the movements of petunia scent compounds.
- C) consider the long-term effects of scent compounds on petunias.
- D) collect data to help horticulturalists protect petunias from damage.

21

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

- A) Lines 31-33 ("But nice . . . cells")
- B) Lines 34-38 ("About . . . moved")
- C) Lines 38-40 ("The results . . . plant")
- D) Lines 40-42 ("So the . . . compounds out")

22

The main purpose of the passage is to

- A) outline two contrasting hypotheses regarding transporter proteins in petunias.
- B) compare the function of transporter proteins in petunias to their function in other plants.
- C) discuss new research about the role of transporter proteins in petunias.
- D) suggest practical applications of the results of a study of transporter proteins in petunias.

23

At line 34, the focus of the passage shifts from

- A) a discussion of the function of volatile scent compounds to a discussion about research regarding them.
- B) a consideration of the scents emitted by plants to a consideration of the scents emitted specifically by petunias.
- C) an analysis of the uses of scents in petunias to an analysis of an experiment isolating a particular use.
- D) an evaluation of the conclusion of a study about volatile scent compounds to an evaluation of a study about the genetics of petunias.

24

Based on the passage, which characteristic of petunias provided the basis for Dudareva's study?

- A) The *PhABCG1* gene produces protein during a petunia's budding stage.
- B) Petunias use scent compounds to communicate with one another.
- C) The cell membranes of petunias deteriorate as scent compounds are released.
- D) There is a marked rise in scent levels when petunias start to bloom.

25

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

- A) Lines 48-52 ("As flowers . . . report")
- B) Lines 53-55 ("The team . . . protein")
- C) Lines 55-58 ("Compared . . . levels")
- D) Lines 58-60 ("Images . . . membranes")

26

As used in line 56, "released" most nearly means

- A) abandoned.
- B) dismissed.
- C) gave off.
- D) freed from.

27

According to figure 1, the rate of volatile organic compound emissions in wild-type petunias, as measured in nanomoles per gram of fresh weight per hour, was between

- A) 100 and 150.
- B) 150 and 200.
- C) 250 and 300.
- D) 300 and 350.

28

Based on Dudareva's experiment, if the researchers had instead genetically engineered the altered petunias to produce 30% less of the *PhABCG1* protein than the wild-type petunias produced, how would the graphical representation of the data from the experiment in figure 2 most likely change?

- A) The bar height for the wild-type petunia would decrease, and the bar heights for the three genetically engineered petunias would remain the same.
- B) The bar height for the wild-type petunia would increase, and the bar heights for the three genetically engineered petunias would decrease.
- C) The bar height for the wild-type petunia and the bar heights for the three genetically engineered petunias would be approximately equal.
- D) The difference in the bar height for the wild-type petunia and the bar heights for the three genetically engineered petunias would be less pronounced.



**Questions 29-38 are based on the following passage.**

This passage is adapted from a speech delivered in 1950 by Margaret Chase Smith, "Declaration of Conscience." When Smith, a US senator, delivered her speech, fellow senator Joseph McCarthy had recently accused the US Department of State of being "infested with Communists" in the context of ongoing congressional investigations of individuals and organizations with alleged Communist ties.

Mr. President, I would like to speak briefly and simply about a serious national condition. It is a national feeling of fear and frustration that could  
 Line result in . . . the end of everything that we Americans  
 5 hold dear. It is a condition that comes from the lack of effective leadership either in the legislative branch or the executive branch of our government.

That leadership is so lacking that serious and responsible proposals are being made that national  
 10 advisory commissions be appointed to provide such critically needed leadership.

I speak as briefly as possible because too much harm has already been done with irresponsible words of bitterness and selfish political opportunism. I  
 15 speak as simply as possible because the issue is too great to be obscured by eloquence. I speak simply and briefly in the hope that my words will be taken to heart.

Mr. President, I speak as a Republican. I speak as  
 20 a woman. I speak as a United States senator. I speak as an American.

The United States Senate has long enjoyed worldwide respect as the greatest deliberative body in the world. But recently that deliberative character has  
 25 too often been debased to the level of a forum of hate and character assassination sheltered by the shield of congressional immunity.

It is ironical that we senators can in debate in the Senate, directly or indirectly, by any form of words,  
 30 impute to any American who is not a senator any conduct or motive unworthy or unbecoming an American—and without that non-senator American having any legal redress against us—yet if we say the same thing in the Senate about our colleagues we can  
 35 be stopped on the grounds of being out of order.

It is strange that we can verbally attack anyone else without restraint and with full protection, and yet we hold ourselves above the same type of

criticism here on the Senate floor. Surely the United  
 40 States Senate is big enough to take self-criticism and self-appraisal. Surely we should be able to take the same kind of character attacks that we "dish out" to outsiders.

I think that it is high time for the United States  
 45 Senate and its members to do some real soul searching and to weigh our consciences as to the manner in which we are performing our duty to the people of America and the manner in which we are using or abusing our individual powers and  
 50 privileges.

I think that it is high time that we remembered that we have sworn to uphold and defend the Constitution. I think that it is high time that we remembered that the Constitution, as amended,  
 55 speaks not only of the freedom of speech but also of trial by jury instead of trial by accusation.

Whether it be a criminal prosecution in court or a character prosecution in the Senate, there is little practical distinction when the life of a person has  
 60 been ruined.

Those of us who shout the loudest about Americanism in making character assassinations are all too frequently those who, by our own words and acts, ignore some of the basic principles of  
 65 Americanism—

The right to criticize.

The right to hold unpopular beliefs.

The right to protest.

The right of independent thought.

70 The exercise of these rights should not cost one single American citizen his reputation or his right to a livelihood nor should he be in danger of losing his reputation or livelihood merely because he happens to know someone who holds unpopular beliefs.

75 Who of us does not? Otherwise none of us could call our souls our own. Otherwise thought control would have set in.

29

The main purpose of the passage is to

- A) identify specific policies that members of a flawed institution can follow to make reforms.
- B) urge members of an institution to cease a reckless practice.
- C) condemn the inability of members of an institution to reach a consensus.
- D) lament the deepening of partisan divisions among members of an institution.

30

The central claim underlying Smith's argument is that current developments in the Senate

- A) demonstrate the need for a stronger judicial branch of government in the United States.
- B) can be counteracted through the creation of US advisory commissions.
- C) are a symptom of moral decline in US society overall.
- D) violate the principles upon which the US government is based.

31

Which choice provides the best evidence for the idea that Smith believes her opinion reflects the sentiments of the public as a whole?

- A) Lines 2-5 ("It is a national . . . dear")
- B) Lines 5-7 ("It is a condition . . . government")
- C) Lines 8-11 ("That . . . leadership")
- D) Lines 12-14 ("I speak . . . opportunism")

32

The primary difference in purpose between Smith's repetition of the phrase "I speak" in the third paragraph (lines 12-18) and her repetition of the same phrase in the fourth paragraph (lines 19-21) is that her repetition in the third paragraph

- A) explains her reasons for speaking, whereas in the fourth paragraph, it reminds the senators of her skill as a speaker.
- B) highlights her reasons for choosing to speak in a certain way, whereas in the fourth paragraph, it emphasizes her diverse roles that compel her to speak.
- C) stresses the strength of the argument she is about to make, whereas in the fourth paragraph, it concedes that she carries certain personal biases.
- D) reinforces the need for swift action on the part of the Senate, whereas in the fourth paragraph, it affirms her solidarity with other senators.

33

In the passage, Smith implies that the investigations conducted by the Senate have resulted in

- A) significant damage to the reputation of the US Senate.
- B) public skepticism about the relevance of the US Constitution.
- C) senators losing popular support from their local constituencies.
- D) the growing power of the legislative branch over the executive branch.

34

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

- A) Lines 22-27 (“The United . . . immunity”)
- B) Lines 36-39 (“It is . . . floor”)
- C) Lines 39-43 (“Surely the United . . . outsiders”)
- D) Lines 44-50 (“I think . . . privileges”)

35

In the passage, Smith criticizes her colleagues for taking public stances that are

- A) insufficiently responsive to the demands of their constituents.
- B) tightly focused on trivial concerns rather than important issues.
- C) overly cautious for the purpose of avoiding criticism.
- D) primarily motivated by concerns for their own interests.

36

In the passage, a contrast Smith makes between senators and other Americans is that senators

- A) are more accustomed to facing criticism than other Americans are.
- B) have a means for defending themselves from accusations that other Americans lack.
- C) should be held to a higher moral standard than other Americans should.
- D) have a greater responsibility to condemn injustice than other Americans do.

37

What main effect does Smith’s repetition of the phrase “I think that it is high time” in the eighth and ninth paragraphs (lines 44-56) have on the tone of the passage?

- A) It creates an optimistic tone that reinforces Smith’s hope that a difficulty can be overcome.
- B) It creates a sarcastic tone that conveys Smith’s anger about the actions of her colleagues.
- C) It creates a skeptical tone that highlights Smith’s lack of confidence in the current leadership.
- D) It creates an urgent tone that emphasizes Smith’s belief that her colleagues must change their actions.

38

The question in line 75 primarily serves to

- A) reinforce how many questions the US Senate still needs to answer before progress can be made.
- B) call on people with ideas that oppose Smith’s to exercise their right to speak publicly.
- C) convey the idea that everyone knows someone with opinions that are not shared by the majority.
- D) suggest that Smith is attempting to determine which of her colleagues agree with her argument.

**Questions 39-47 are based on the following passages.**

Passage 1 is adapted from Sid Perkins, "Why Dark Pigeons Rule the Streets." ©2014 by American Association for the Advancement of Science. Passage 2 is adapted from Ed Yong, "How Humans Turned a Sea Snake to the Dark Side." ©2017 by The Atlantic Monthly Group.

**Passage 1**

The pigment melanin, in its most common form, provides black and brown color to skin, feathers, and hair. It also binds to metal ions such as zinc and lead, says Marion Chatelain, a theoretical ecologist at Pierre and Marie Curie University in Paris. Previous studies suggest that bird populations exposed to higher levels of these heavy metals lay fewer eggs and have reduced male fertility.

If melanin indeed provides birds with an opportunity to remove heavy metals from their bloodstream, the pigment could give darker birds an evolutionary advantage over light-colored individuals that can't detox as effectively, Chatelain suggests. According to that notion, dark-colored birds could better rid themselves of the noxious substances, which bind to the pigments during feather growth and are thus removed from the bloodstream. Generation by generation, they would have more hatchlings than lighter birds, which would over time lead to an increase in their proportion within the population. Indeed, Chatelain says, previous studies have noted a higher proportion of darker colored birds in urban areas.

So Chatelain and her colleagues checked to see if melanin might truly be giving urban pigeons a detox advantage. They captured 97 free-ranging pigeons (*Columba livia*) in the highly urbanized suburbs of Paris and kept them in cages outdoors for 1 year, feeding them a diet of corn, wheat, and peas. The researchers measured the zinc and lead concentrations in two large feathers removed from each bird's wings when they were first caught, and then did the same 1 year later for replacement feathers that had grown from the same follicle.

During the birds' year in captivity, zinc levels in their feathers dropped from an initial average of 328 parts per million (ppm) to 89 ppm. Moreover, after 1 year, the darker pigeons in the group (as measured by the percentage of wing surface covered by dark feathers) had higher concentrations of zinc in their feathers than lighter pigeons did, the researchers report in *Biology Letters*. That suggests

that when fed the same diet and housed under the same conditions, darker birds remove more zinc—and possibly other noxious heavy metals—from their bloodstream than light-colored birds do.

**Passage 2**

Most cases of industrial melanism<sup>1</sup> involve moths, butterflies, and other insects, but Claire Goiran, from the University of New Caledonia, has now discovered a surprising exception. In the waters around Australia, one species of sea snake, which usually has black and white stripes, has also become completely black.

Goiran and her supervisor Rick Shine first started studying these snakes around 15 years ago, and quickly noticed that they varied in color. In most waters, they had black-and-white stripes or blotches. But in New Caledonia's Noumea Lagoon, they were mainly black. "For many years we have been wondering why," Goiran says. Black scales could protect snakes from the sun's ultraviolet radiation, but that's an unlikely explanation, because the Noumea snakes don't get any more sun than those elsewhere. Darker snakes might better blend into certain backgrounds, but again, the Noumea population didn't behave any differently than other turtle-headed sea snakes.

Unexpectedly, Parisian pigeons provided a clue. In 2014, French researchers showed that blacker pigeons have higher levels of zinc and other heavy metals in their feathers than their paler counterparts. When Goiran read about the study, she immediately thought about the sea snakes. The rocks around New Caledonia naturally contain lots of nickel, and the levels of metal in the water have only increased because of mining and industrial runoff. Perhaps the sea snakes, like the pigeons, had adapted to these pollutants by upping the levels of melanin in their scales.

To test this idea, Goiran analyzed discarded skins that had been shed by turtle-headed sea snakes in different parts of Australia and New Caledonia. She found that snakes that lived near towns and industrial sites were more likely to be black than those from pristine waters. Their scales also contained higher levels of 13 heavy metals, like lead, zinc, cobalt, nickel, and manganese, at concentrations known to harm the health of other animals.

90 All of this supports the idea that urban sea snakes are ingesting lots of heavy metals, presumably through their food, and getting rid of these elements by storing them in dark scales. Indeed, Goiran found that the black snakes shed their skins more often  
95 than the banded ones.

<sup>1</sup> The dark pigmentation acquired by a population of organisms in locations affected by industrial pollution

39

According to Passage 1, melanin helps certain animals manage heavy metals by

- A) forming chemical bonds with heavy metals and carrying them out of the blood.
- B) attracting heavy metals to specific internal organs and isolating them there.
- C) creating camouflage patterns that make animals safer in areas with fewer heavy metals.
- D) transferring heavy metals to offspring via melanized reproductive cells.

40

Which choice offers the best evidence for the idea that Chatelain's team considered the possibility that there are variations in the zinc levels among different areas of feather growth on an individual bird?

- A) Lines 9-14 ("If melanin . . . suggests")
- B) Lines 21-23 ("Indeed . . . areas")
- C) Lines 29-34 ("The researchers . . . follicle")
- D) Lines 35-37 ("During . . . 89 ppm")

41

As used in line 2, "provides" most nearly means

- A) maintains.
- B) supplies.
- C) transfers.
- D) prepares.

42

In Passage 2, the author's use of the word "unexpectedly" (line 68) primarily has the effect of

- A) suggesting the widespread dismissal of pigeons as valid research subjects prior to the 2014 study conducted by French researchers.
- B) highlighting the unusual degree of similarity in detoxifying mechanisms shared by pigeons and sea snakes.
- C) conveying that Goiran was surprised to receive the news that Parisian pigeons carry more zinc in darker feathers.
- D) emphasizing the seeming unlikelihood of Goiran's receiving insight about sea snakes from information about pigeons.

43

Based on Passage 2, it can most reasonably be inferred that variations in New Caledonia sea snake coloration observed by Goiran and Shine

- A) reflect differences in melanin levels typically found when some members of a marine species live closer to shore than do others.
- B) evolved as an aid to predation in response to a shift in the local insect population.
- C) were always present but have become more pronounced due to human activity.
- D) indicate that industrial chemicals cause less harm to the sea snakes than do naturally occurring metals.

44

Which choice describes a fundamental difference between Chatelain's study of pigeons in Passage 1 and Goiran's study of sea snakes in Passage 2?

- A) Chatelain's study was conducted in controlled conditions, while Goiran's study was based on an observation of natural events.
- B) Chatelain's study involved almost one hundred pigeons, while Goiran's study focused on a small number of sea snakes.
- C) Chatelain counted the offspring of both light and dark subjects, while Goiran excluded subjects' offspring from her study.
- D) Chatelain measured changes in heavy metal levels over one year, while Goiran collected data on heavy metal levels for nearly fifteen years.

45

Based on the passages, it can most reasonably be inferred that the species studied by Chatelain's team and the species studied by Goiran and Shine are somewhat unusual in that they both

- A) display industrial melanism but are not insects.
- B) produce melanin but do not retain it permanently.
- C) display a variety of color patterns within their respective species.
- D) have the ability to leave polluted environments but rarely do so.

46

Based on the passages, Chatelain could potentially strengthen her study's conclusions by applying which adaptation of one of Goiran's methods?

- A) Examining concentrations of nonheavy metal pollutants in pigeon feathers
- B) Comparing the frequency with which darker and lighter pigeons shed their feathers
- C) Analyzing the levels of heavy metals in samples of Parisian air, water, and food waste
- D) Observing the effect of lowering the level of ultraviolet radiation reaching the pigeons' cages

47

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

- A) Lines 80-82 ("To test . . . Caledonia")
- B) Lines 83-85 ("She found . . . waters")
- C) Lines 85-89 ("Their . . . animals")
- D) Lines 93-95 ("Indeed . . . ones")

# 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.

### A New Approach to Fiction

Midway through a story Edward Packard was telling his daughters, he suddenly ran out of ideas. Unable to finish the tale alone, he asked the girls what they thought should happen. As they excitedly offered conclusions to the **1** story. Packard was struck by the girls' eagerness

1

- A) NO CHANGE
- B) story and as
- C) story,
- D) story;



to explore different possibilities. On that evening in 1969, Packard wondered **2** could he write a story that would provide similar creative engagement for other young readers.

[1] Shortly thereafter, Packard wrote *Sugarcane Island*, a book that pioneered interactive fiction.

[2] Written in the second person, the book described all of the **3** protagonist's actions as being done by "you."

[3] These pages led the reader down new narrative paths that in turn offered more choices, resulting in an expanding story with thirty-nine possible endings, including being rescued or remaining on the island forever. [4] Through this approach, readers gained a level of control over the outcome of a story that they had likely never experienced. **4**

2

- A) NO CHANGE
- B) if he could write a story that would provide similar creative engagement for other young readers.
- C) if he could write a story that would provide similar creative engagement for other young readers?
- D) could he write a story that would provide similar creative engagement for other young readers?

3

- A) NO CHANGE
- B) protagonist's actions:
- C) protagonist's actions,
- D) protagonist's, actions

4

The writer wants to add the following sentence to the paragraph.

Each chapter presented a situation, such as a run-in with a pirate, and instructed readers to turn to different pages that corresponded to different actions the protagonist could take.

The best placement for the sentence is

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

Finding a major publisher for the innovative idea

**5** was onerous to the extreme, but in 1979 an assistant editor at Bantam Books named Joëlle Delbourgo helped Packard turn his concept into an entire series of interactive fiction called Choose Your Own Adventure (CYOA). **6** Now part of Random House, Bantam hired Packard and creative partner R. A. Montgomery to write **7** a number of different CYOA books one after another in rapid succession. Although the books adhered to the same structure—a children’s adventure story advanced by the reader’s choices—**8** some books contained realistic depictions of everyday life. In *Inside UFO 54-40*, for example, the only way to reach the best possible ending, finding Planet Ultima, was to ignore the directions for

5

- A) NO CHANGE
- B) emerged as an exceptionally arduous undertaking,
- C) was a nightmare,
- D) proved challenging,

6

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

- A) NO CHANGE
- B) Founded in 1945,
- C) At Delbourgo’s urging,
- D) Having published several novels based on *Star Trek*,

7

- A) NO CHANGE
- B) multiple CYOA books to be written
- C) numerous and multiple CYOA books
- D) a number of CYOA books

8

Which choice most effectively sets up the example that follows in the paragraph?

- A) NO CHANGE
- B) some books offered surprising twists.
- C) a few books were considered failures.
- D) a few books included settings reminiscent of science fiction.

which pages to turn to. **9** Readers who wanted to discover the planet had to cheat and read through every page to find the desired outcome, which contained a message congratulating the reader for breaking the rules—**10** a fitting message for a series that itself disrupted the traditional way of reading a book.

The series was beloved by children throughout the world, selling over 250 million copies and being translated into thirty-eight languages. As an early entrant into an interactive entertainment industry that now **11** include video games, story-making apps, and online hypertext fiction, the CYOA series was groundbreaking, but perhaps its most important achievement was that it accomplished Packard's goal of offering an engaging reading experience to a generation of young readers.

9

- A) NO CHANGE
- B) Readers (who wanted to discover the planet),
- C) Readers, who wanted to discover the planet
- D) Readers, who wanted to discover the planet,

10

Which choice provides the most effective support for the example discussed in the paragraph?

- A) NO CHANGE
- B) a message that reflected Packard's dissatisfaction with his legal career.
- C) even though reading through every page is equally worthy of congratulation.
- D) even though breaking the rules is not usually encouraged in classrooms.

11

- A) NO CHANGE
- B) are including
- C) includes
- D) have included

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

### Hearing the Ocean's Troubles

Many people assume that it is peaceful and quiet beneath the surface of the ocean. However, sounds produced by human activity, such as the churning of commercial ship propellers and the blasts of seismic air guns used by petroleum surveyors, are increasingly affecting marine life. Recently, a team of biologists from a French research center **12** made an observation. They observed how oysters' survival may be threatened by this influx of underwater sound.

[1] Although they don't have ears, **13** underwater sounds can be detected by oysters through a specialized organ called a statocyst. [2] Oysters will often respond to these sounds by shutting their shell casings or **14** valves, this is a clear indication that they feel vulnerable or stressed. [3] If their shells are closed, oysters can no longer sense changes in the tide or ingest nutrients. [4] To investigate which sounds might cause the oysters to close their shells, the scientists placed oysters in a tank with an underwater speaker. [5] This organ allows oysters to "hear" when the tide is bringing in the nutrient-rich water they need to sustain themselves and survive, but it also ensures that they will sense threatening sounds. [6] The team then played a variety of computer-generated single high- or low-frequency tones at different volumes of sound for three-minute intervals and recorded the oysters' reactions. **15**

12

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

- A) observed how the survival of oysters, because of this influx of underwater sound, may be threatened by the influx.
- B) observed how this influx of underwater sound may be threatening the survival of oysters.
- C) saw this influx of underwater sound, making an observation: oysters' survival may be threatened.
- D) observed a threat, this being the influx of underwater sound, to the survival of the oysters.

13

- A) NO CHANGE
- B) oysters can detect underwater sounds
- C) detecting underwater sounds is something oysters can do
- D) sounds under the water are detected by oysters

14

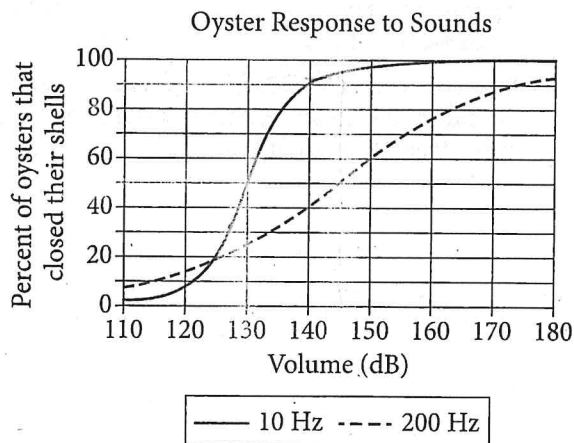
- A) NO CHANGE
- B) valves
- C) valves,
- D) valves; which is

15

To make this paragraph most logical, sentence 5 should be placed

- A) where it is now.
- B) after sentence 1.
- C) after sentence 2.
- D) after sentence 3.

While the oysters responded to sound at all frequencies, **16** it was particularly sensitive to low-frequency sounds at 10 hertz (Hz), such as those produced by some large vessels. At 10 Hz, a sound volume of 130 decibels (dB)—which underwater would sound as loud as a jackhammer at a meter’s distance—caused about **17** 50 percent of the oysters to close their shells. At a higher frequency of 200 Hz at the same volume of sound, however, most of the oysters kept their shells open; only about 25 percent of oysters closed their shells. The team manipulated sound volume in their next test: at the low frequency of 10 Hz, a sound volume of 145 dB caused **18** none of the oysters to close their shells. At 200 Hz, the sounds had to reach 180 dB for nearly all the oysters to close their shells—even underwater, where sound is muffled, this sound level nears the human ear’s **19** origin for pain. This demonstrated that frequency of sound had a greater impact than volume of sound on the oysters.



Adapted from Mohcine Charifi et al., "The Sense of Hearing in the Pacific Oyster, *Magallana gigas*." ©2017 by Mohcine Charifi et al.

16

- A) NO CHANGE
- B) that was
- C) these were
- D) they were

17

Which choice provides accurate information from the graph?

- A) NO CHANGE
- B) 10 percent
- C) 25 percent
- D) 90 percent

18

Which choice provides the most accurate interpretation of the data in the graph?

- A) NO CHANGE
- B) very few
- C) about half of the
- D) almost all the

19

- A) NO CHANGE
- B) entrance
- C) threshold
- D) outset

These results are significant because most human-created sounds in the ocean **20** occur at low **21** frequencies. Lower than 70 Hz for many large commercial ships, for instance. **22** However, researchers have found that oysters probably cannot detect the sound created by small recreational boats and Jet Skis, which emit frequencies in the 1–5 kilohertz (kHz) range.

20

- A) NO CHANGE
- B) occurs
- C) is occurring
- D) has occurred

21

- A) NO CHANGE
- B) frequencies lower
- C) frequencies; lower
- D) frequencies—lower

22

The writer wants an effective concluding sentence that restates the main claim of the passage. Which choice best accomplishes this goal?

- A) NO CHANGE
- B) Other researchers have demonstrated that the oysters' sensitivity to low-frequency sound is shared by other marine creatures, such as fish, whales, and cephalopods.
- C) The acute sensitivity the oysters exhibited to this type of sound demonstrates that the oysters' long-term survival may be at risk if human-created sounds continue to disrupt their underwater habitats.
- D) It is now known that such human-generated sounds in the ocean can travel thousands of miles from their original source.

Questions 23-33 are based on the following passage.

### The Meaning of Seneca Falls

At the 1848 Seneca Falls Convention in upstate New York, activists Elizabeth Cady Stanton and Lucretia Mott **23** held a meeting. The meeting contained three hundred people who were there to discuss the social and legal status of American women. The activists hoped attendees would sign a document coauthored by Stanton—"The Declaration of Sentiments"—that listed a **24** series of demands on the US government. Today, the convention is remembered as the exciting origin of the American women's rights movement. However, this inspiring story misrepresents what actually **25** happened, the Seneca Falls Convention was not necessarily a rallying cry that galvanized women's rights, and it only gained historical significance in retrospect, thanks to conscious efforts to promote it.

23

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

- A) and three hundred other people held a meeting
- B) held, with three hundred people, a meeting in order
- C) met with three hundred people
- D) met with others; three hundred people were there

24

- A) NO CHANGE
- B) series' of demands
- C) series' of demand's
- D) series of demand's

25

- A) NO CHANGE
- B) happened: the Seneca Falls Convention
- C) happened. The Seneca Falls Convention—
- D) happened. The Seneca Falls Convention:

A careful examination of primary sources **26** can be helpful when disagreements arise among historians. For example, historian Lisa Tetrault points to an 1866 speech in which Mott herself placed the origins of the women’s rights movement much earlier **27** compared to Seneca Falls and only casually referred to the “handful who met” in 1848 to demonstrate how the movement had progressed. **28** Mott’s speech also emphasized the importance of learning and remembering the history of the US women’s rights movement. Also, though history textbooks might characterize the spirit of the convention as one of **29** solidarity a close look at “The Declaration of Sentiments” reveals that the convention was marked by divisiveness: only one-third of the attendees signed their names to the document. Surprisingly, many women opposed its demand for women’s suffrage (the right to vote).

26

Which choice most effectively sets up the information that follows in the paragraph?

- A) NO CHANGE
- B) reveals the true story of Seneca Falls.
- C) includes looking at a variety of legal and personal documents.
- D) sometimes provides more questions than answers.

27

- A) NO CHANGE
- B) than that of
- C) than did
- D) than

28

Which choice most logically builds on the information in the previous sentence?

- A) NO CHANGE
- B) Tetrault notes that Mott’s speech also lauded the work of the eighteenth-century English writer Mary Wollstonecraft, who wrote *A Vindication of the Rights of Woman*.
- C) Mott’s speech suggests that Seneca Falls was only one meeting in a series of important events that eventually led to more rights for women.
- D) Tetrault argues that Mott’s speech covered many topics but did not offer a clear narrative of events in the US women’s rights movement.

29

- A) NO CHANGE
- B) solidarity,
- C) solidarity;
- D) solidarity—



[1] The revolutionary reputation of Seneca Falls developed not because of a flaw in historical memory but because Stanton and fellow activist Susan B. Anthony changed history to further **30** its goal of achieving women’s suffrage. [2] With two other women, Stanton and Anthony coauthored the six-volume *History of Woman Suffrage*, creating a narrative of the suffrage movement from their own perspective. [3] With these words, the authors urged readers to honor the women at Seneca Falls and continue the fight for suffrage that the convention “started.” [4] They placed “the eventful day” of Seneca Falls in the first volume: “the brave protests sent out from this Convention touched a responsive chord in the hearts of women all over the country.” **31**

Although Anthony and Stanton **32** were close allies for many years, their book did provide a valuable catalyst for the Nineteenth Amendment—which granted voting rights to citizens regardless of sex—to pass seventy-two years later. They were probably wrong to call their work of **33** ornamentation a “History,” but they did end up on history’s right side.

30

- A) NO CHANGE
- B) it’s
- C) there
- D) their

31

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

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

32

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

- A) NO CHANGE
- B) occasionally antagonized other suffrage supporters,
- C) clearly exaggerated the influence of Seneca Falls,
- D) had not yet met when the Seneca Falls meetings took place,

33

- A) NO CHANGE
- B) enrichment
- C) ostentation
- D) embellishment

Questions 34-44 are based on the following passage.

### Lights, Camera, Cinematography

When people think of their favorite movies, they often think of the actors who starred in them or the directors who brought them to life. Less frequently **34** acknowledged, cinematographers are just as important. Cinematographers are responsible for crafting the visual style of the films. Overseeing a staff of camera and lighting operators and working closely with directors, production designers, and other members of a film crew, cinematographers create a mood that makes each film unique.

Becoming a cinematographer requires technical knowledge, aesthetic sensibility, and skills in problem solving and teamwork. For most cinematographers, these skills are cultivated with a college degree in filmmaking. Alonzo Crawford, who teaches cinematography at Howard **35** University, insists that his students **36** catch on with both practical realities of making

34

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

- A) acknowledged are the cinematographers, who are just as important, and they are the ones who are responsible for crafting the visual style of the films.
- B) acknowledged, cinematographers are responsible for crafting the visual style of the films and just as important.
- C) acknowledged but just as important are the cinematographers, who are responsible for crafting the visual style of the films.
- D) acknowledged, responsible for crafting the visual style of the films, and just as important are the cinematographers.

35

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

36

- A) NO CHANGE
- B) get the hang of
- C) understand
- D) imprint upon their synapses

movies and theoretical aspects of film as an art form.

37 “I impress upon the young people that there’s more to it than just pointing the camera,” he says. While Crawford’s students 38 learn to work in teams and use different lenses and cameras, they also study painters such as Rembrandt and Caravaggio to understand how artists use light and perspective to emphasize details and convey meaning.

37

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

A cinematographer must work with individuals who are key to the production process, such as producers and directors.

Should the writer make this addition here?

- A) Yes, because it effectively sets up the quote in the next sentence.
- B) Yes, because it summarizes the central claim of the paragraph.
- C) No, because it fails to provide sufficient detail about the production process.
- D) No, because it unnecessarily repeats information that is stated elsewhere in the passage.

38

- A) NO CHANGE
- B) had been learning
- C) were learning
- D) had learned

Cinematographers put all of these skills to use in filmmaking. **39** Meanwhile, each shot in a film requires a variety of decisions about how best to visualize the **40** script; and effective communication is equally necessary to realize the goals of the project.

Cinematographers must determine, among other considerations, where the camera should be placed, what lenses should be used, and where lights should be located. These choices about the composition of particular shots must be made in terms of the vision of the film as a whole and the cinematographer's aesthetic style and philosophy of filmmaking. Bradford Young, a Howard graduate who has received award **41** nominations for his cinematography, for films such as *Selma* (2014), which dramatizes part of the struggle to obtain voting rights for African Americans in the 1960s, **42** is known for using softer lighting than that used by most other Hollywood cinematographers. "When you care about your people, you're going to do right by them, and that doesn't have any technical boundaries," he said.

Young's assertion that the technical aspects of filmmaking should not interfere with the cinematographer's artistic aims for the story and its characters **43** stem not from a disregard for practical

39

- A) NO CHANGE
- B) On the other hand,
- C) Likewise,
- D) DELETE the underlined portion, adjusting the capitalization as needed.

40

- A) NO CHANGE
- B) script;
- C) script; but
- D) script,

41

- A) NO CHANGE
- B) nominations, for his cinematography for films
- C) nominations for his cinematography for films
- D) nominations, for his cinematography for films,

42

Which choice most effectively sets up the quote that follows in the next sentence?

- A) NO CHANGE
- B) believes that filmmaking should be as collaborative as making music, particularly jazz.
- C) says that the look of his films flows from his respect for the individuals whose stories they tell.
- D) points out that filmmakers can find the instruction manuals for many cameras online.

43

- A) NO CHANGE
- B) have stemmed
- C) are stemming
- D) stems

considerations but rather from a mastery of them.

44 The best cinematographers are those, like Young, who have both a broad creative vision and a practical concern for the small details of filmmaking that bring that vision to reality.

44

Which choice provides the most effective conclusion to the passage?

- A) NO CHANGE
- B) Aspiring cinematographers should consider attending an undergraduate or graduate program in filmmaking, as Young did, since such programs offer some of the best experience in the field.
- C) Using film as their medium, cinematographers have the opportunity to change a community's culture and perception of others; such a job should not be taken lightly.
- D) The technical aspects of filmmaking, though, are many, and one's ability to make use of film and digital cameras and various types of lighting is imperative for an accomplished cinematographer.

**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, 17 QUESTIONS

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

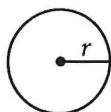
## DIRECTIONS

For questions 1-13, solve each problem, choose the best answer from the choices provided, and fill in the corresponding bubble on your answer sheet. For questions 14-17, solve the problem and enter your answer in the grid on the answer sheet. Please refer to the directions before question 14 on how to enter your answers in the grid. You may use any available space in your test booklet for scratch work.

## NOTES

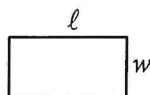
1. The use of a calculator **is not permitted**.
2. All variables and expressions used represent real numbers unless otherwise indicated.
3. Figures provided in this test are drawn to scale unless otherwise indicated.
4. All figures lie in a plane unless otherwise indicated.
5. Unless otherwise indicated,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

## REFERENCE

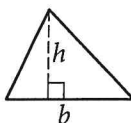


$$A = \pi r^2$$

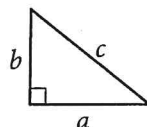
$$C = 2\pi r$$



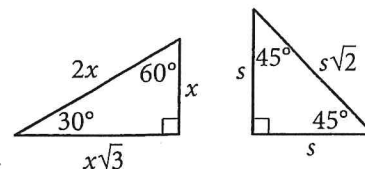
$$A = \ell w$$



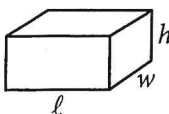
$$A = \frac{1}{2}bh$$



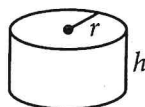
$$c^2 = a^2 + b^2$$



Special Right Triangles



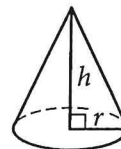
$$V = \ell wh$$



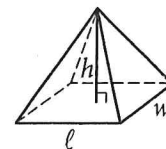
$$V = \pi r^2 h$$



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



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



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

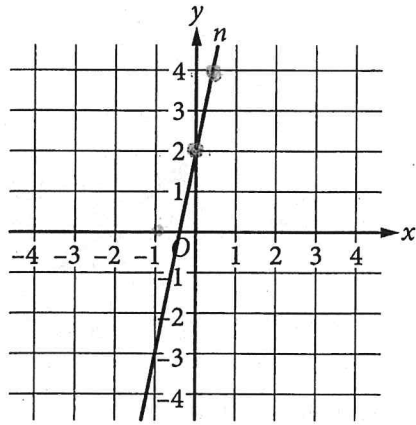
The number of degrees of arc in a circle is 360.

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



Line  $n$  is shown in the  $xy$ -plane. Line  $k$  (not shown) is perpendicular to line  $n$ . What is the slope of line  $k$ ?

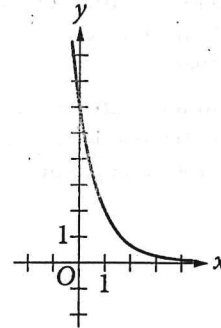
- A)  $-\frac{1}{2}$
- B)  $-\frac{1}{5}$
- C) 2
- D) 5

2

What value of  $n$  is the solution to the equation  $12n + 9 = 6n - 9$ ?

- A) -3
- B) -2
- C) -1
- D) 0

3



What is an equation of the graph shown?

- A)  $y = 2\left(\frac{1}{3}\right)^x$
- B)  $y = 6\left(\frac{1}{3}\right)^x$
- C)  $y = 8\left(\frac{1}{2}\right)^x$
- D)  $y = 12\left(\frac{1}{2}\right)^x$



4

$$f(x) = 200^{\frac{x}{10}}$$

The number of subscribers to a newsletter can be modeled by the given function  $f$ , where  $f(x)$  is the estimated number of subscribers on the  $x$ th day after the newsletter was first published. Which of the following is the best interpretation of  $f(10) = 200$  in this context?

- A) On the 10th day after the newsletter was first published, the newsletter was modeled to have 200 subscribers.
- B) On the 10th day after the newsletter was first published, the newsletter was modeled to have 200 more subscribers than on the 9th day.
- C) On the 200th day after the newsletter was first published, the newsletter was modeled to have 10 subscribers.
- D) On the 200th day after the newsletter was first published, the newsletter was modeled to have 10 more subscribers than on the 199th day.

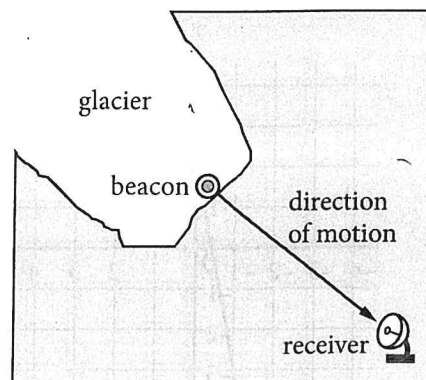
5

$$-5x(3x + 2) - 3x(x + 4)$$

Which of the following is equivalent to the expression above?

- A)  $-(9x - 11x^2)$
- B)  $-2(9x^2 + 11x)$
- C)  $-2(9x^2 + 11)$
- D)  $-2x(6x - 1)$

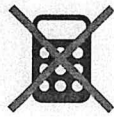
6



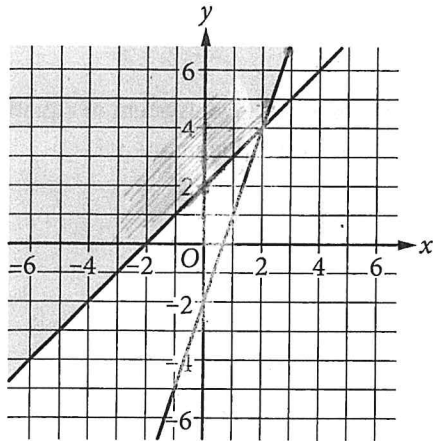
A geologist places a beacon on the leading edge of a glacier to measure its speed. A stationary receiver is placed 200 feet away from the beacon in the direction of motion of the glacier, as represented in the diagram above. The beacon is observed to move at a constant rate. After 30 days it is 185 feet away from the receiver. Assuming the beacon continues to move at the same rate, how far from the receiver will the beacon be after a total of 90 days?

- A) 45 feet
- B) 140 feet
- C) 155 feet
- D) 170 feet





7



The shaded region shown represents all the solutions to which system of inequalities?

- A)  $y \leq \frac{1}{3}x - 2$   
 $y \leq 2x + 1$
- B)  $y \geq \frac{1}{3}x - 2$   
 $y \geq 2x + 1$
- C)  $y \leq 3x - 2$   
 $y \leq x + 2$
- D)  $y \geq 3x - 2$   
 $y \geq x + 2$

8

Which linear equation has no solution?

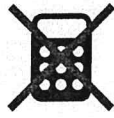
- A)  $2x + 4x = 3x$
- B)  $2x + 4x + 1 = 4x$
- C)  $2x + 4x + 2 = 5x$
- D)  $2x + 4x + 3 = 6x$

9

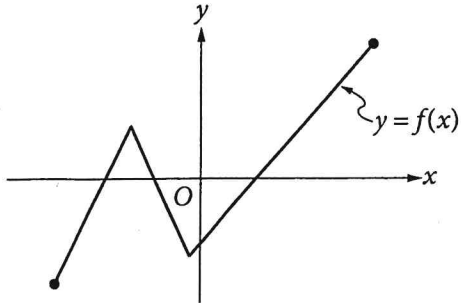
$$ax^2 + bx + c = 0$$

In the equation above,  $a$ ,  $b$ , and  $c$  are nonzero constants. If the equation has exactly one solution, which of the following must be true?

- A)  $b + c = 0$
- B)  $a + b + c = 0$
- C)  $b^2 = 4ac$
- D)  $-b = 4ac$



10



The complete graph of the function  $f$  is shown in the  $xy$ -plane above. How many solutions does the equation  $f(x) = 0$  have?

- A) One
- B) Two
- C) Three
- D) Four

11

$$\begin{aligned}x^2 - y^2 &= 100 \\x + y &= 5\end{aligned}$$

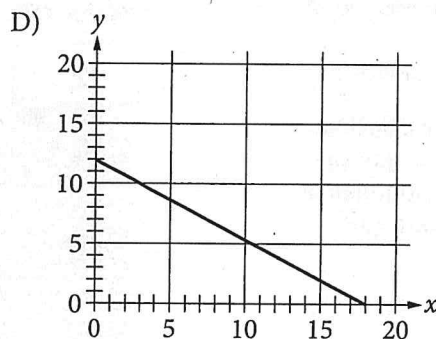
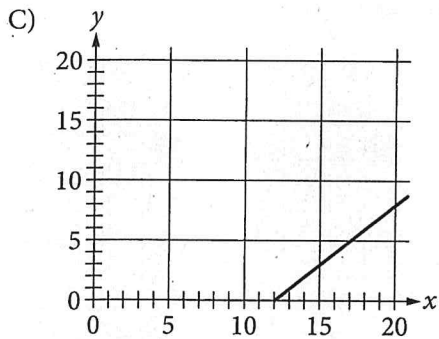
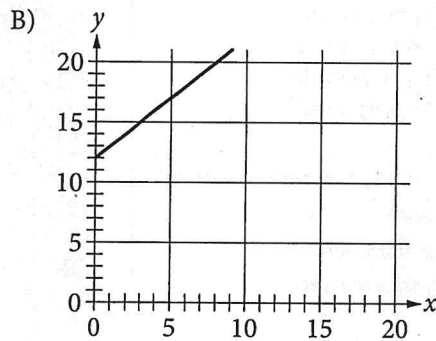
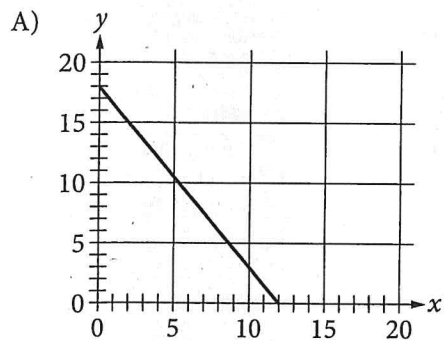
The solution to the given system of equations is  $(x, y)$ . What is the value of  $x - y$ ?

- A) 5
- B) 10
- C) 20
- D) 25



12

A farmer can grow 30 tons of pumpkins per acre in soil type 1 and 20 tons per acre in soil type 2. The farmer plans to grow 360 tons of pumpkins. The farmer's plan can be modeled by the equation  $30x + 20y = 360$ , where  $x$  and  $y$  are the number of acres of soil type 1 and soil type 2, respectively. Which graph represents this equation?



13

$$f(x) = -(x + 100)^2 - 50$$

What is the maximum value of the given function?

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



**DIRECTIONS**

For questions 14-17, 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  $\begin{array}{|c|c|c|} \hline 3 & 1 & / & 2 \\ \hline \bullet & \bullet & \bullet & \bullet \\ \hline 0 & 0 & 0 & 0 \\ \hline 1 & 1 & 1 & 1 \\ \hline 2 & 2 & 2 & 2 \\ \hline 3 & 3 & 3 & 3 \\ \hline 4 & 4 & 4 & 4 \\ \hline 5 & 5 & 5 & 5 \\ \hline 6 & 6 & 6 & 6 \\ \hline 7 & 7 & 7 & 7 \\ \hline 8 & 8 & 8 & 8 \\ \hline 9 & 9 & 9 & 9 \\ \hline \end{array}$  is entered into the grid, it will be interpreted as  $\frac{31}{2}$ , not  $3\frac{1}{2}$ .)
- Decimal answers:** If you obtain a decimal answer with more digits than the grid can accommodate, it may be either rounded or truncated, but it must fill the entire grid.

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

Write answer in boxes. →

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

← Fraction line

Grid in result.

Answer: 2.5

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

← Decimal point

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

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

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

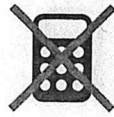
.	6	6	7
•	•	•	•
0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

Answer: 201 – either position is correct

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

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

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



14

$$p(w) = 8w + 4$$

The function  $p$  shown gives the perimeter  $p(w)$ , in inches, of a rectangle that has a width of  $w$  inches and a length of  $3w + 2$  inches. For each inch that the width increases, by how many inches will the perimeter of the rectangle increase?

15

$$x + y = 12$$

$$x - 2y = 9$$

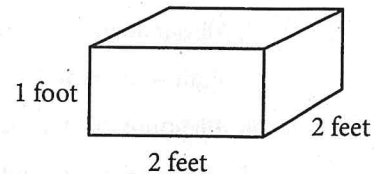
If  $(x, y)$  is the solution to the system of equations above, what is the value of  $x$ ?

16

$$x^2 - 4x + 2 = 0$$

The solutions to the quadratic equation above can be written as  $x = \frac{r + \sqrt{t}}{2}$  and  $x = \frac{r - \sqrt{t}}{2}$ , where  $r$  and  $t$  are constants. What is the value of  $t$ ?

17



A gift-wrapping company charges customers based on the surface area of the gift box. The company charges \$0.30 per square foot of surface area. What will the company charge, in dollars, to gift wrap the box shown? (Disregard the \$ sign when gridding your answer. For example, if your answer is \$1.37, grid 1.37)

# 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

45 MINUTES, 31 QUESTIONS

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

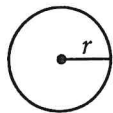
## DIRECTIONS

For questions 1-27, solve each problem, choose the best answer from the choices provided, and fill in the corresponding bubble on your answer sheet. For questions 28-31, solve the problem and enter your answer in the grid on the answer sheet. Please refer to the directions before question 28 on how to enter your answers in the grid. You may use any available space in your test booklet for scratch work.

## NOTES

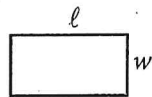
1. The use of a calculator is permitted.
2. All variables and expressions used represent real numbers unless otherwise indicated.
3. Figures provided in this test are drawn to scale unless otherwise indicated.
4. All figures lie in a plane unless otherwise indicated.
5. Unless otherwise indicated, the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

## REFERENCE

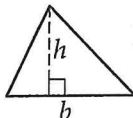


$$A = \pi r^2$$

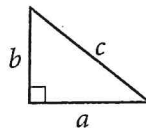
$$C = 2\pi r$$



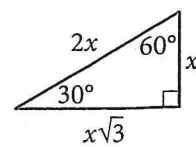
$$A = \ell w$$



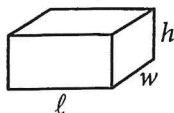
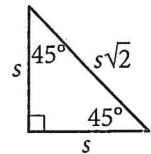
$$A = \frac{1}{2}bh$$



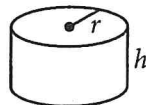
$$c^2 = a^2 + b^2$$



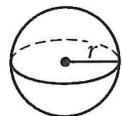
Special Right Triangles



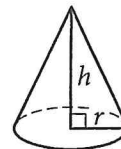
$$V = \ell wh$$



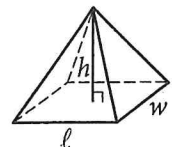
$$V = \pi r^2 h$$



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



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



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

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

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

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



1

The function  $f$  is defined by  $f(x) = 6x - 5$ . For what value of  $x$  does  $f(x) = 7$ ?

- A) 2
- B) 7
- C) 12
- D) 37

2

Which expression is equivalent to  $(-4x^5 + 2x^3 - 6x)(-2x^4 + 3x)$ ?

- A)  $8x^{20} - 4x^{12} - 12x^5 + 12x^4 + 6x^3 - 18x$
- B)  $-8x^{20} + 4x^{12} + 12x^5 - 12x^4 - 6x^3 + 18x$
- C)  $8x^9 - 4x^7 - 12x^6 + 12x^5 + 6x^4 - 18x^2$
- D)  $-8x^9 + 4x^7 + 12x^6 - 12x^5 - 6x^4 + 18x^2$

3

Brass is a metal alloy that consists of copper and zinc. High brass is 65% copper by mass, and low brass is 80% copper by mass. A factory uses 2,000 kilograms of copper to produce  $x$  kilograms of high brass and  $y$  kilograms of low brass. Which equation represents this situation?

- A)  $0.65x + 0.80y = 2,000$
- B)  $0.80x + 0.65y = 2,000$
- C)  $(0.65)(0.80)(x + y) = 2,000$
- D)  $(0.80 + 0.65)(x + y) = 2,000$

4

2, 6, 12, 47, 83

What is the median of the data set shown?

- A) 9
- B) 12
- C) 30
- D) 81

5

The Mississippi River has a length of 2,340 miles. Which value is closest to the length, in kilometers, of the river? (Use 1 mile = 1.61 kilometers.)

- A) 1,453
- B) 2,338
- C) 3,767
- D) 4,680

6

When the expression  $x^2 + 9x - 36$  is factored in the form  $(x + a)(x + b)$ , where  $a$  and  $b$  are integers, which of the following could be the value of  $a$ ?

- A) 3
- B) 4
- C) 9
- D) 12





7

The population density of a certain neighborhood in Chicago is approximately 11,909 people per square mile. The area of this neighborhood is 1.75 square miles. Which value best approximates the population of this neighborhood?

- A) 2,977
- B) 6,805
- C) 20,840
- D) 32,749

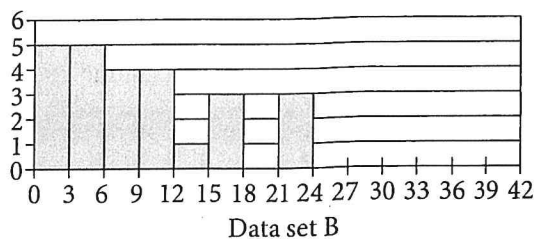
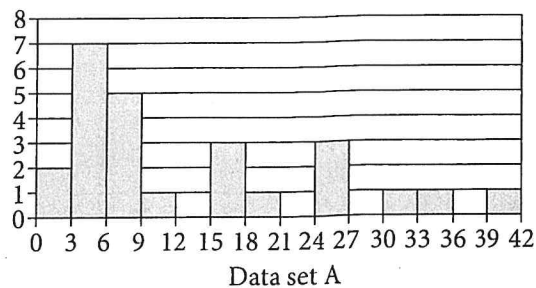
8

The side length of square  $ABCD$  is 3 times the side length of square  $EFGH$ . The perimeter of square  $ABCD$  is how many times the perimeter of square  $EFGH$ ?

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

9

The histograms shown summarize the values in two data sets. Each data set has 25 values.

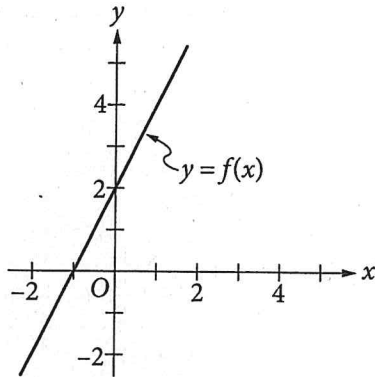


Which of the following statements best compares the standard deviations of the two data sets?

- A) The standard deviation of data set A is greater than the standard deviation of data set B.
- B) The standard deviation of data set B is greater than the standard deviation of data set A.
- C) The standard deviations are equal.
- D) There is not enough information to compare the standard deviations.



10



The line shown is the graph of the function  $f$ . If the line is shifted 6 units down, the resulting line is the graph of the function  $g$ . Which of the following defines  $g$ ?

- A)  $g(x) = x$
- B)  $g(x) = x + 2$
- C)  $g(x) = 2x - 4$
- D)  $g(x) = 2x - 2$

11

For a piano, the ratio of the fundamental frequency of a note to the fundamental frequency of the next higher note is approximately 1 to 1.06. A certain note has a fundamental frequency of 370 hertz. Which of the following is closest to the fundamental frequency, in hertz, of the next higher note?

- A) 392
- B) 376
- C) 364
- D) 349

12

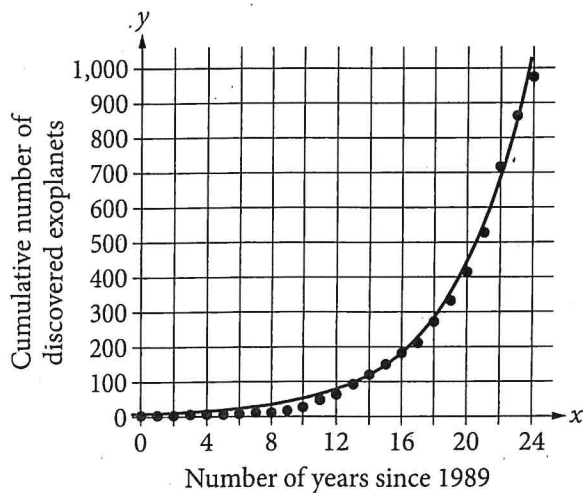
If  $15x + 6 = -2$ , what is the value of  $5x + 2$ ?

- A)  $\frac{4}{15}$
- B)  $-\frac{8}{15}$
- C)  $-\frac{2}{3}$
- D)  $-\frac{2}{5}$



13

An exoplanet is a planet that orbits a star outside of our solar system. The scatterplot shows the relationship between  $x$ , the number of years since 1989, and  $y$ , the cumulative number of discovered exoplanets. An exponential model for the data is also shown.

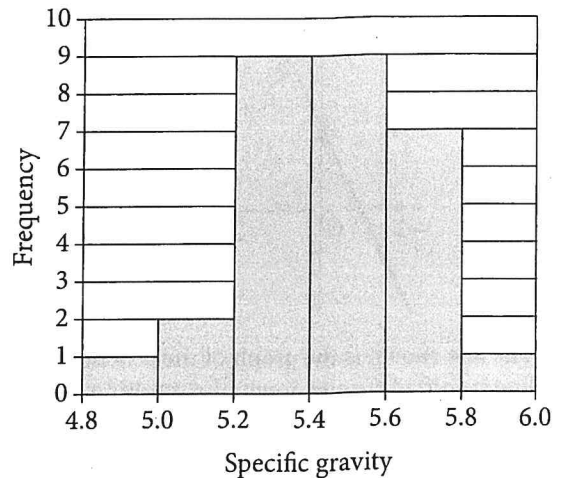


Which equation best represents the exponential model shown in the scatterplot?

- A)  $y = 1.25(5.28)^x$
- B)  $y = 1.25(5.28)^{-x}$
- C)  $y = 5.28(1.25)^x$
- D)  $y = 5.28(1.25)^{-x}$

14

Cavendish's Measurements  
of Earth's Specific Gravity



In 1798, Henry Cavendish measured Earth's specific gravity—the ratio of the density of Earth to the density of water. His measurements are summarized by the histogram shown. The first bar represents measurements of at least 4.8 but less than 5.0. The second bar represents measurements of at least 5.0 but less than 5.2, and so on. How many of his measurements are at least 5.4 but less than 5.8?

- A) 2
- B) 7
- C) 9
- D) 16



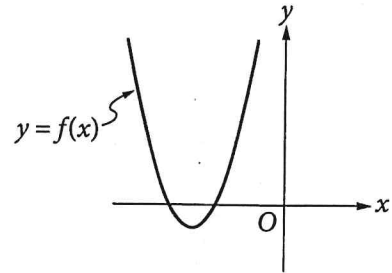
15

$$4|3x - 5| = 16$$

What are all the solutions to the given equation?

- A)  $\frac{1}{3}$
- B) 3
- C)  $-\frac{1}{3}$  and 3
- D)  $\frac{1}{3}$  and 3

16



The graph of the quadratic function  $f$  is shown in the  $xy$ -plane. Which of the following could define  $f$ ?

- A)  $f(x) = (x - 3)(x - 5)$
- B)  $f(x) = (x - 3)(x + 5)$
- C)  $f(x) = (x + 3)(x - 5)$
- D)  $f(x) = (x + 3)(x + 5)$



Questions 17 and 18 refer to the following information.

The Harvey Bakery owns 3 trucks. The table lists selected data about each truck. Maximum fuel capacity is the volume of fuel that the fuel tank holds when full. Average fuel consumption is the mean number of gallons of fuel consumed per mile when the truck is driven.

Harvey Bakery Vehicles

Truck	Maximum fuel capacity (gallons)	Average fuel consumption (gallons per mile)
A	18.0	0.050
B	12.0	0.029
C	15.4	0.040

17

The maximum fuel capacity of truck A is  $p\%$  greater than the maximum fuel capacity of truck B. What is the value of  $p$ ?

- A) 20
- B) 33
- ~~C) 50~~
- D) 67

18

In a week, truck C consumed 15 gallons of fuel. How many miles did truck C travel that week?

- A) 0.6
- B) 375
- C) 600
- D) 2,667

19

The US House of Representatives includes members from all 50 states. On November 12, 2014, it had 87 members from California, Colorado, and New York, which made up 20% of its total members. How many representatives on this date were not from California, Colorado, or New York?

- A) 174
- B) 348
- C) 435
- D) 870



20

$$2x + 3y = 13$$

$$x + 2y = 10$$

If  $(x, y)$  is the solution to the given system of equations, what is the value of  $x + y$ ?

- A) 3
- B) 4
- C) 7
- D) 10

21

Which of the following situations is best modeled by an increasing linear function?

- A) A farmer sells 15% more produce at each successive farmers market compared to the previous market.
- B) A clothing-store chain hires an additional 20 employees for every new store opened.
- C) A jewelry maker creates 10% more necklaces per day than each previous day.
- D) A theater group performs for 8 fewer people than each previous performance.

22

$$y = 2^x$$

$$y = 3x - 1$$

The graphs of the two given equations intersect at points  $(1, 2)$  and  $(3, 8)$  in the  $xy$ -plane. For what values of  $x$  does the graph of the linear equation lie above the graph of the exponential equation?

- A)  $1 < x < 3$
- B)  $2 < x < 8$
- C)  $x < 1$  and  $x > 3$
- D)  $x < 2$  and  $x > 8$

23

$$5x - 3y = 10$$

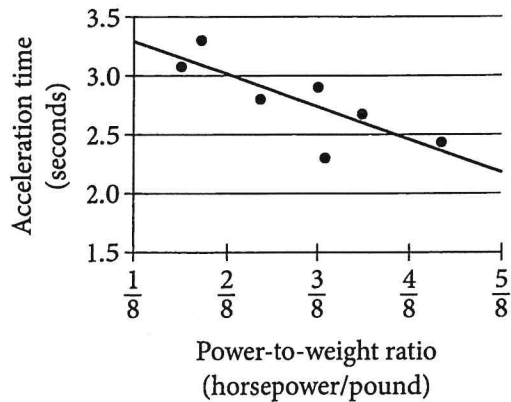
$$20x - 12y = 40$$

How many solutions does the given system of equations have?

- A) Zero
- B) Exactly one
- C) Exactly two
- D) Infinitely many



Questions 24 and 25 refer to the following information.



The power-to-weight ratio of a car is the car's power, in horsepower, divided by its weight, in pounds. The acceleration time of a car, in seconds, is the time that it takes the car to accelerate from 0 to 60 miles per hour. The scatterplot shows the power-to-weight ratio and the acceleration time for each of 7 high-performance cars. A line of best fit for the data is also shown.

24

For how many of the 7 high-performance cars is the acceleration time predicted by the line of best fit less than the actual acceleration time?

- A) 3
- B) 4
- C) 5
- D) 6

25

One of the 7 high-performance cars is to be selected at random. What is the probability that the selected car will have an acceleration time greater than 2.5 seconds and a power-to-weight ratio greater than  $\frac{2}{8}$  horsepower/pound?

- A)  $\frac{2}{5}$
- B)  $\frac{3}{5}$
- C)  $\frac{2}{7}$
- D)  $\frac{3}{7}$





26

For positive values of  $j$  and  $k$ ,  $j$  is 25% of  $k$ . Which expression represents  $k$  in terms of  $j$ ?

- A)  $\frac{j}{25}$
- B)  $\frac{25j}{100}$
- C)  $\frac{100j}{25}$
- D)  $\frac{25j}{1}$

27

Imani pours iced tea into an empty dispenser at a rate of  $x$  liters every  $y$  minutes. Which expression represents the number of minutes it would take Imani to fill the dispenser with 11 liters of iced tea?

- A)  $\frac{x}{11y}$
- B)  $\frac{y}{11x}$
- C)  $\frac{11x}{y}$
- D)  $\frac{11y}{x}$


**DIRECTIONS**

For questions 28-31, 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="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

 is entered into the grid, it will be interpreted as  $\frac{31}{2}$ , not  $3\frac{1}{2}$ .)
- Decimal answers:** If you obtain a decimal answer with more digits than the grid can accommodate, it may be either rounded or truncated, but it must fill the entire grid.

Write answer in boxes. →

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

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

← Fraction line

Grid in result.

Answer: 2.5

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

← Decimal point

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

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

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

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

Answer: 201 – either position is correct

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

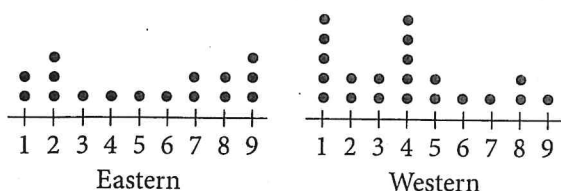
2	0	1	
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3

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



28

Number of House Representatives per State



The dot plots above show the number of House representatives in states with fewer than 10 representatives for 16 eastern states and 21 western states in the United States. What is the median number of House representatives for all 37 states represented in the dot plots?

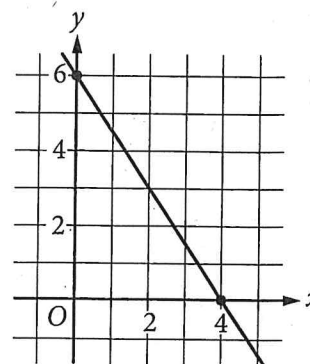
29

A spinner is divided into sections of equal size. Each section is either blue or green and labeled with either an even or odd number, as summarized in the table.

	Blue	Green	Total
Even	10	6	16
Odd	5	10	15
Total	15	16	31

If the spinner landed in a section with an odd number, what is the probability that the spinner landed in a blue section? (Assume that the spinner cannot land on the border between sections. Express your answer as a decimal or fraction, not as a percent.)

30



An equation of the line shown in the  $xy$ -plane can be written as  $Ax + By = 12$ , where  $A$  and  $B$  are constants. What is the value of  $A$ ?

31

The function  $H(x) = -0.0005(x - 1905)^2 + 310$  models the horsepower at the wheels of a vehicle with a poorly maintained diesel engine as a function of the engine speed  $x$ , in revolutions per minute (rpm), where  $1600 \leq x \leq 2100$ . What is the engine speed, in rpm, at which the vehicle's estimated horsepower at the wheels is greatest?

# 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**

# Your Question-Level Feedback

## QUESTIONS OVERVIEW

The questions in your score report may not be in the same order as you saw on test day.

### READING

**47**  
Total Questions

**39**  
Correct Answers

**8**  
Incorrect Answers

**0**  
Omitted Answers

### WRITING AND LANGUAGE

**44**  
Total Questions

**39**  
Correct Answers

**5**  
Incorrect Answers

**0**  
Omitted Answers

### MATH – CALCULATOR

**31**  
Total Questions

**30**  
Correct Answers

**1**  
Incorrect Answers

**0**  
Omitted Answers

### MATH – NO CALCULATOR

**17**  
Total Questions

**16**  
Correct Answers

**1**  
Incorrect Answers

**0**  
Omitted Answers

**\*Tip:** A great way to start improving: check out the easy questions you missed first.

### KEY

- ✓ Correct
- Omitted
- U Unscorable
- X Multi-Grid/Incorrect
- Easy Question
- Medium Question
- Hard Question
- Easy Question Missed\*

### READING

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

### WRITING AND LANGUAGE

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

### MATH – CALCULATOR

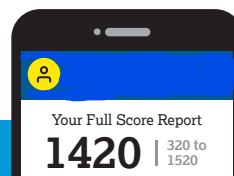
Question #	Correct	Your Answer	Difficulty
1	A	✓	■ ■ ■
2	B	✓	■ ■ ■
3	C	✓	■ ■ ■
4	A	✓	■ ■ ■
5	C	✓	■ ■ ■
6	C	✓	■ ■ ■
7	A	D	■ ■ ■
8	A	✓	■ ■ ■
9	C	✓	■ ■ ■
10	D	✓	■ ■ ■
11	D	✓	■ ■ ■
12	D	✓	■ ■ ■
13	A	✓	■ ■ ■
14	C	✓	■ ■ ■

Question #	Correct	Your Answer	Difficulty
28	1/3, .333	✓	■ ■ ■
29	4	✓	■ ■ ■
30	3	✓	■ ■ ■
31	1905	✓	■ ■ ■

### MATH – NO CALCULATOR

Question #	Correct	Your Answer	Difficulty
1	A	✓	■ ■ ■
2	B	✓	■ ■ ■
3	A	✓	■ ■ ■
4	B	✓	■ ■ ■
5	B	✓	■ ■ ■
6	C	✓	■ ■ ■
7	C	✓	■ ■ ■

Question #	Correct	Your Answer	Difficulty
8	D	✓	■ ■ ■
9	D	✓	■ ■ ■
10	C	✓	■ ■ ■
11	A	✓	■ ■ ■
12	B	A	■ ■ ■
13	C	✓	■ ■ ■
14	11	✓	■ ■ ■
15	8	✓	■ ■ ■
16	8	✓	■ ■ ■
17	4.8, 24/5	✓	■ ■ ■



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