

AUGUST 2019 USA

The SAT

IMPORTANT REMINDERS

1

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Do not use a mechanical pencil or pen.**

2

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Reading Test

65 MINUTES, 52 QUESTIONS

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

DIRECTIONS

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

Questions 1-10 are based on the following passage.

The passage is from *Alice Munro, Dance of the Happy Shades*.
©1968 by Alice Munro.

Miss Marsalles is having another party. (Out of musical integrity, or her heart's bold yearning for festivity, she never calls it a recital.) My mother is not *Line* an inventive or convincing liar, and the excuses *5* which occur to her are obviously second-rate. The painters are coming. Friends from Ottawa. Poor Carrie is having her tonsils out. In the end all she can say is: Oh, but won't all that be too much trouble, now? Now being weighted with several troublesome *10* meanings; you may take your choice. Now that Miss Marsalles has moved from the brick and frame bungalow on Bank Street, where the last three parties have been rather squashed, to an ever smaller place—if she has described it correctly—on Bala *15* Street. (Bala Street, where is that?) Or: now that Miss Marsalles' older sister is in bed, following a stroke; now that Miss Marsalles herself—as my mother says, we must face these things—is simply getting too old.

Now? asks Miss Marsalles, stung, pretending *20* mystification, or perhaps for that matter really feeling it. And she asks how her June party could ever be too much trouble, at any time, in any place? It is the only entertainment she ever gives any more (so far as my mother knows it is the only entertainment *25* she ever has given, but Miss Marsalles' light old voice, undismayed, indefatigably social, supplies the ghosts of tea parties, private dances, At Homes, mammoth Family Dinners). She would suffer, she

says, as much disappointment as the children, if she *30* were to give it up. Considerably more, says my mother to herself, but of course she cannot say it aloud; she turns her face from the telephone with that look of irritation—as if she had seen something messy which she was unable to clean up—which is *35* her private expression of pity. And she promises to come; weak schemes for getting out of it will occur to her during the next two weeks, but she knows she will be there.

She phones up Marg French who like herself is an *40* old pupil of Miss Marsalles and who has been having lessons for her twins, and they commiserate for a while and promise to go together and buck each other up. They remember the year before last when it rained and the little hall was full of raincoats piled on *45* top of each other because there was no place to hang them up, and the umbrellas dripped puddles on the dark floor. The little girls' dresses were crushed because of the way they all had to squeeze together, and the living room windows would not open. Last *50* year a child had a nosebleed.

"Of course that was not Miss Marsalles' fault."

They giggle despairingly. "No. But things like that did not use to happen."

And that is true; that is the whole thing. There is a *55* feeling that can hardly be put into words about Miss Marsalles' parties; things are getting out of hand, anything may happen. There is even a moment, driving in to such a party, when the question occurs: will anybody else be there? For one of the most *60* disconcerting things about the last two or three parties has been the widening gap in the ranks of the

Regulars, the old pupils whose children seem to be the only new pupils Miss Marsalles ever has. Every June reveals some new and surely significant dropping-out. Mary Lambert's girl no longer takes; neither does Joan Crimble's. What does this mean? Think my mother and Marg French, women who have moved to the suburbs and are plagued sometimes by a feeling that they have fallen behind, that their instincts for doing the right thing have become confused. Piano lessons are not so important now as they once were; everybody knows that. Dancing is believed to be more favourable to the development of the whole child—and the children, at least the girls, don't seem to mind it as much. But how are you to explain that to Miss Marsalles, who says, "All children need music. All children love music in their hearts"? It is one of Miss Marsalles' indestructible beliefs that she can see into children's hearts, and she finds there a treasury of good intentions and a natural love of all good things. The deceits which her spinster's sentimentality has practised on her original good judgment are legendary and colossal; she has this way of speaking of children's hearts as if they were something holy; it is hard for a parent to know what to say.

1

- A central concern of the passage is whether
- A) traditional customs and practices should be upheld when conditions change.
 - B) parents should strive to pass on their own favorite activities to their children.
 - C) promises should be kept even if they involve inappropriate behavior.
 - D) those facing hardship should try to make changes in their lives.

2

The narrator of the passage is best described as a young person who

- A) focuses mainly on herself and reports on events accordingly.
- B) appears to exaggerate certain details of her everyday life.
- C) seems to know almost everything about the adults around her.
- D) is limited by her age from understanding the nuances of the larger world.

3

Which choice best supports the idea that Miss Marsalles has an idealistic view of her profession?

- A) Lines 1-3 ("Out of ... recital")
- B) Lines 15-18 ("Or: now ... old")
- C) Lines 54-57 ("There is ... happen")
- D) Lines 75-78 ("But how ... hearts")

4

By stating that her mother "is not an inventive or convincing liar" (lines 3-4), the narrator most nearly means that her mother is

- A) unable to be trusted.
- B) scrupulously honest.
- C) unskilled at deception.
- D) guarded with her feelings.

5

According to the passage, one reason the narrator's mother is unenthusiastic about the news of Miss Marsalles's party is that the

- A) thinks Miss Marsalles may be fabricating details to persuade people to come.
- B) is very busy that week and does not know if she can find the time to attend.
- C) is concerned that Miss Marsalles's health problems may worsen before the party.
- D) thinks Miss Marsalles's new home will be a poor site for a party.

6

By repeating "Now?" (line 19), miss Marsalles is emphasizing that

- A) the party is not scheduled to happen for another two weeks.
- B) there is nothing about her present circumstances that should prevent her party from occurring.
- C) the party will be a success only if her students can immediately commit to attending.
- D) her new home is a better location for a party than her previous home was.

7

The main effect of the questions in line 59 and line 66 is to reveal the

- A) uncertainty the characters have about whether they misunderstood a request.
- B) anxiety the characters feel about a situation that has become troubling.
- C) lack of attention the characters have paid to another character's problem.
- D) failure of the characters to understand why some other families have made a change.

8

Based on the passage, which of the following characters values piano lessons the least?

- A) The narrator's mother.
- B) Marg French.
- C) Miss Marsalles.
- D) Joan Crimble.

9

The narrator includes details about recent parties at Miss Marsalles's home most likely to emphasize which point?

- A) Miss Marsalles's guests should wear comfortable informal attire.
- B) Miss Marsalles's party will still be fun despite the crowds and chaos.
- C) Miss Marsalles's parties are no longer as successful as they once were.
- D) Miss Marsalles's has always struggled to host parties.

10

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

- A) Lines 43-47 ("They remember...floor")
- B) Lines 47-49 ("The little...open")
- C) Lines 49-51 ("Last...fault")
- D) Lines 52-53 ("They giggle...happen")

Questions 11-20 are based on the following passage.

This passage is adapted from Supriya Syal, Dan Ariely, "Getting Out the Vote." ©2016 by scientific American, a division of Nature America, Inc.

Most theories that examine the mindset of those who do not vote speak to disengagement from electoral politics or disbelief in government's ability to affect progress. Solutions that aim to address these

Line 5 problems typically inform people about the importance of their vote in electing a government that works for them. Yet this tactic does not appear to sway many. Despite such efforts, turnout has consistently hovered around 50 percent for the past

10 nine U.S. presidential elections—the highest being 56.9 percent in 2008.

Behavioral science might explain why these informational interventions fall short. A substantive body of evidence indicated that the environment in 15 which we make decisions can fundamentally alter them. For example, what we think others are doing, how voting makes us feel about ourselves, and what we need to do to vote all affect whether or not we participate on Election Day. So instead of simply telling Americans to vote, the science suggests we 20 need to think about the context in which citizens decide to cast their ballots.

In a field experiment conducted among 287,000 would-be voters in Pennsylvania during the 2008 Democratic primary election, researchers tried to see if voter turnout could be increased by helping people 25 make a concrete plan to implement their intentions. One to three day before the November 2008 election, behavioral scientists David Nickerson, now at Temple University, and Todd Rogers of Harvard asked one 30 group of would-be voters about their intentions to vote and a second group about their intentions and also about when, where and how they would accomplish the goal of voting.

35 Voter records showed that making a plan was more than twice as effective as simply asking people about their intentions. Overall there was a 4.1 percentage point increase in the likelihood of voting by making a plan relative to people who did not receive a phone call. (The average effectiveness of 40 commercial phone banks, assessed from dozens of studies, is about one percentage point.)

Conventional wisdom (and practice) suggests that we could convince people to vote by stressing that 45 their particular ballot is very important because not

many other people are voting. Yet findings in behavioral science indicate that most of us are motivated by the desire to conform to the social norm—meaning we are more likely to do what most 50 people are doing.

Two get-out-the-vote field experiments during the 2005 general election in New Jersey and the 2006 primary election in California tested these hypotheses. They found that individuals were much

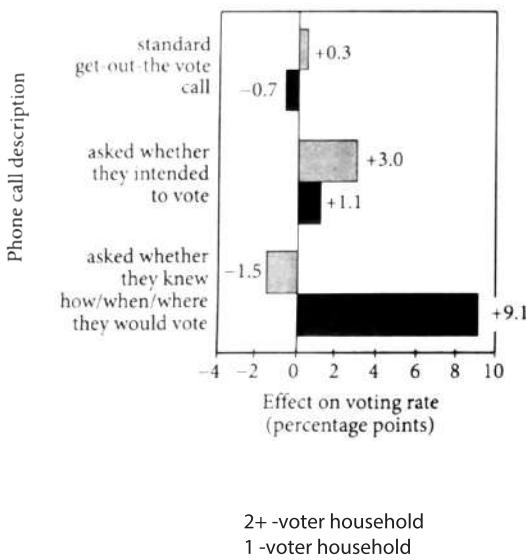
55 more motivated to vote when they believed lots of other people were voting compared with when they thought relatively few others were voting.

In another field experiment run by researchers at Yale University and the University of Northern Iowa 60 during the 2006 primary election in Michigan, potential voters received direct mail noting that both they and their neighbors would be informed of who had voted after the election. Amazingly, this led to an 8.1 percent increase in turnout—one of the most 65 successful get-out-the-vote tactics studied to date. Conventional direct-mail reminders, in contrast, yield just a 0.162 percent increase in turnout on average, according to a 2013 estimate based on 110 studies.

70 If most of us vote, then being part of the truant few who do not feels like we are shirking a social contract. Publicizing voting records may therefore increase the salience of this social obligation and possibly bring shame on nonvoters. Following 75 through, however, allows them to maintain their self-identity as contributing members of society.

Figure 1

Average Change in Households' Likelihood of Voting after Receiving a Phone Call When Compared to Households to Which No Phone Call Was Made



Adapted from David W. Nickerson and Todd Rogers, "Do You Have a Voting Plan?: Implementation intentions, Voter Turnout, and Organic Plan Making." ©2010 by David W. Nickerson and Todd Rogers.

Figure 2

Effects of Four Type of Mailing on Voter Turnout in 2006 Michigan Primary Election

Group	Percent of individuals in group who voted
Voting record will be shared with neighbors	37.80%
Voting record will be shared with household members	34.50%
Voting record will be observed by researchers but not disclosed	32.20%
Reminder of civic duty to vote	31.50%
Control (on mailing sent)	29.70%

Adapted from Alan S. Gerber, Donald P. Green, and Christopher W. Larimer, "Social Pressure and Voter Turnout: Evidence from a Large Scale Field Experiment." ©2008 by APSA.

11

According to the passage, which question were Nickerson and Rogers seeking to answer in their 2008 study?

- A) Would prompting people to think ahead about logistics increase voter turnout?
- B) Was voter turnout in Pennsylvania in 2008 similar to that in other states?
- C) Why has voter turnout in the United States been consistently low?
- D) Would using peer pressure substantially increase voter turnout?

12

Which choice provides the best support for the idea that voters desire to be viewed as civically responsible?

- A) Lines 23-27 (“In a ...intentions”)
- B) Lines 54-57 (“They...voting”)
- C) Lines 58-63 (“In another...election”)
- D) Lines 74-76 (“Following...society”)

13

The main purpose of the passage is to

- A) present research that accounts for why voter turnout has decreased in recent years.
- B) argue that scientists do not fully understand what motivates peoples to vote.
- C) assert that field studies are necessary for understanding trends in voter turnout.
- D) explain how insights from a particular scientific field might be used to increase voter turnout.

14

As used in lines 19 and 36, “simply” most nearly means

- A) merely.
- B) candidly.
- C) absolutely.
- D) foolishly.

15

Based on the passage, which scenario is most similar to that which motivates many people to vote?

- A) A worker decides to stage a protest after documenting numerous unsafe work conditions jeopardizing worker’s health.
- B) A teacher signs up for a conference after learning that several other teacher in the district will be attending the conference.
- C) A student agrees to run for class president after being informed that few people have expressed interest in the office.
- D) A consumer decides to buy a particular cellular phone after seeing an advertisement describing the phone’s features.

16

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

- A) Lines 35-37 (“Voter...intentions”)
- B) Lines 43-46 (“Conventional...voting”)
- C) Lines 46-50 (“Yet...doing”)
- D) Lines 51-54 (“Two...hypotheses”)

17

As used in line 67, “yield” most nearly means

- A) reward.
- B) produce.
- C) surrender.
- D) acknowledge.

18

According to figure 1, the greatest percentage increase in the likelihood of voting was observed in which group of voters?

- A) Two-plus voter households in which a standard call was received
- B) One-voter households in which a standard call was received
- C) Two-plus voter households in which people were asked about their intention to vote
- D) One voter households in which the person was asked about having a definite plan for voting

19

The following are quotations from the 2010 paper by Nickerson and Rogers from which figure 1 was adapted. Which choice best helps explain a finding regarding multiple-voter households that is presented in figure 1?

- A) “Those in multiple-eligible-voter households voted at the same rates in the 2006 general election as those in one-eligible-voter households.”
- B) “To expedite requesting a specific person while executing the experiment, only households containing three or fewer registered Democrats were included in the experiment.”
- C) “Perhaps targets in one-eligible-voter households were less likely to have made voting plans before our intervention than were those in multiple-eligible-voter households.”
- D) “Our sample came from a list of registered Pennsylvanians eligible to vote in the 2008 presidential primary, purchased from a consumer data firm.”

20

Based on the passage and figure 2, it can reasonably be inferred that the researchers who conducted the 2006 study included the “reminder of civic duty to vote” group in order to assess

- A) whether people are likely to make a concrete plan for voting when reminded of their civic duty to vote.
- B) whether reminding people of their civic duty to vote has a long-term effect on voting habits.
- C) the effectiveness of a conventional direct-mail strategy compared with newer strategies.
- D) the effectiveness of a particular direct-mail strategy in convincing people of the importance of their votes.

Questions 21-31 are based on the following passage.

This passage is adapted from Stephanie Mao, "Human Activity Boosts Brain Size in Animals." 2013 by Yale Scientific Magazine.

It is not easy to develop new habits for a new environment. Many animals have been compelled to adjust their behavior, gradually learning to avoid, *Line* outsmart, or even befriend their new urban

5 neighbors. Now, a recent study conducted by University of Minnesota biologist Emilie C. Snell-Rood and undergraduate Naomi Wick suggests that some animals have adapted to the presence of humans by developing bigger brains.

10 In their study, Snell-Rood and Wick focused on local animal specimens collected at the University of Minnesota Bell Museum. By measuring the breadth, width, and height [i.e., cranial capacity] of various mammal skulls, they were able to estimate the size of 15 the species' brains. Remarkably, in the white-footed mouse (*Peromyscus leucopus*) and the meadow vole, (*Microtus pennsylvanicus*), they found that specimens from the city displayed a 6 percent increase in brain capacity over their rural counterparts.

20 Snell-Rood provides two possible explanations for these findings. An increase in nutritional quantity and quality, which urbanization provides to some extent, may give animals the energy required to maintain larger brains. However, the increase in skull 25 size was not accompanied by an increase in body size, making this theory less likely. A more probable and interesting hypothesis is that adapting to human activity places a larger demand on cognitive skills, such as foraging for food and interacting with 30 humans.

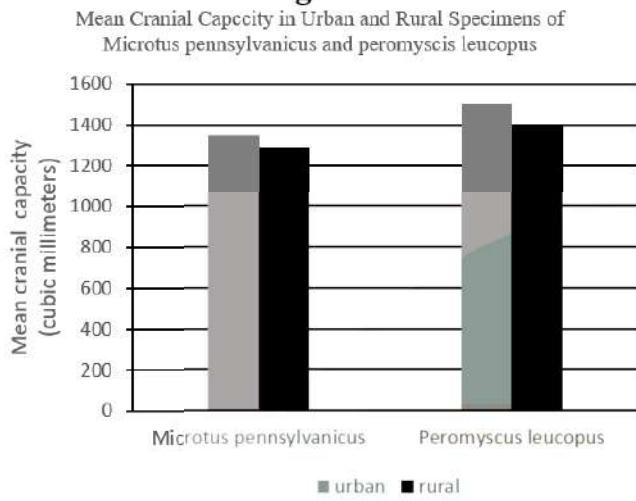
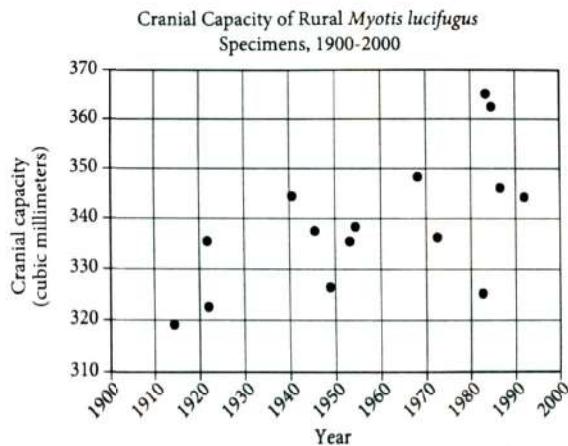
The growing impact of city environments on animal behavior, a trend dubbed "synurbanization," is well-documented. By destroying or radically transforming natural habitats, cities create new, 35 unfulfilled niches and force local species to adapt.

Studies of resulting animal behavior report changes such as increased friendliness toward humans, new nesting preferences, and longer waking hours. For some city-dwelling animals, humans have also 40 become a primary supplier of food. As human metropolises continue to grow, the effects of synurbanization have been conspicuous and profound. Snell-Rood's study, however, is the first that points to a possible link between behavioral 45 change and brain size.

An additional finding in the new study suggests that the influence of human activity extends beyond cities as well. According to Snell-Rood's measurements, four rural species [including *Myotis lucifugus*, the little brown bat] exhibited a boost in brain size, revealing that they, too, may have been affected by changing environments. For instance, an impact like deforestation may force bats in the countryside to change their feeding and roosting 55 habits.

Snell-Rood's discovery is not the first time scientists have found evidence of human activity driving animal evolution. In London, industrial pollution gave dark peppered moths an advantage 60 over the lighter ones, enabling them to blend in with layers of soot. By contrast, the white peppered moths, which once blended in with tree bark and lichens, lost their evolutionary advantage and became less numerous. A second example of human-driven 65 evolution is a type of anole lizard, which developed shorter legs to adapt to urban areas in the Bahamas. While long legs are suitable for perching on wide surfaces, with shorter legs the lizard is better equipped to climb the narrow stalks that are typical 70 of urban plants.

While Snell-Rood's findings are significant, additional research needs to be conducted on other specimens to determine whether the trend continues in other regions. The age of the museum collections 75 is also an important factor, as the Minnesota researchers could only study specimens from the past century—the brain sizes of animals that lived before major industrialization remain unknown.

Figure1**Figure 2**

Figures adapted from Emille C. Snell-Rood and Naomi Wick. "Anthropogenic Environments Exert Variable Selection on Cranial Capacity in Mammals." ©2013 by Emille C. Snell-Rood and Naomi Wick.

21

When saying that animals "befriend their new urban neighbors" (lines 4-5), the author most likely means that the animals

- A) exercise no caution when entering areas inhabited by humans.
- B) lose the ability to forage for food not provided by humans.
- C) take advantage of the benefits provided by humans.
- D) allow themselves to become domesticated by humans.

22

As used in line 18, "displayed" most nearly means

- A) exhibited.
- B) disclosed.
- C) promoted.
- D) announced.

23

Based on the passage, which effect would most likely be seen in white-footed mouse and meadow vole populations if changes in nutrition were the sole explanation for Snell-Rood's findings?

- A) white-footed mice and meadow voles in urban environments would increase the number of hours they spend foraging for food.
- B) The brain sizes and body sizes of white-footed mice and meadow voles in urban environments would increase concurrently.
- C) The brain sizes among rural specimens of white-footed mice and meadow voles would eventually equal those of urban specimens.
- D) White-footed mice and meadow voles in urban environments would become increasingly desensitized to human activity.

24

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

- A) Lines 15-19 (“Remarkably...counterparts”)
- B) Lines 24-26 (“However...likely”)
- C) Lines 26-30 (“A more...humans”)
- D) Lines 36-38 (“Studies...hours”)

25

At line 56, the focus of the passage shifts from

- A) a description of a particular environment to a comparison of that environment with various other environments.
- B) a description of a study and its findings to a discussion of prior observations on related subjects.
- C) an examination of environmental factors involved in a study to speculation regarding their effect on the study’s result.
- D) an analysis of a scientific procedure to recommendations for how that procedure might be improved.

26

Based on the passage, how would the author most likely respond to an attempt to draw general conclusions from the study findings?

- A) By warning that the findings reflect past conditions rather than present ones
- B) By pointing out that the trend observed in the findings is absent from most regions
- C) By pointing to errors in the study’s methodology that cast doubt on the findings
- D) By cautioning that the findings are not definitive and require further research

27

It can reasonably be inferred from the passage that profound changes to an environment can have which effect on organisms native to it?

- A) Characteristics previously beneficial to the organisms can become detrimental to their survival in the altered environment.
- B) Efforts to adapt to change can render the organisms unable to thrive in unaltered environments.
- C) Extensive cognitive adaptation to the altered environment can compromise the organisms’ physiology.
- D) The demands of adapting can increase competition among the organisms to the point that all species in the environment suffer.

28

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

- A) Lines 40-43 (“As human...profound”)
- B) Lines 48-52 (“According...environments”)
- C) Lines 61-64 (“By contrast...numerous”)
- D) Lines 64-66 (“A second...Bahamas”)

29

According to figure 1, the mean cranial capacity of the rural specimens of *Peromyscus leucopus* in the study was approximately

- A) 1,200 cubic millimeters.
- B) 1,300 cubic millimeters.
- C) 1,400 cubic millimeters.
- D) 1,500 cubic millimeters.

30

Which comparison of *Microtus pennsylvanicus* and *Peromyscus leucopus* specimens in the study sample is best supported by the data in figure 1?

- A) Rural specimens of *Peromyscus leucopus* have seen a much greater increase in mean cranial capacity over time than rural specimens of *Microtus pennsylvanicus* have.
- B) The mean cranial capacity of rural *Peromyscus leucopus* specimens was greater than that of urban *Microtus pennsylvanicus* specimens.
- C) Specimens of *Microtus pennsylvanicus* showed a much greater range in mean cranial capacity than specimens of *Peromyscus leucopus* did.
- D) Rural specimens of *Microtus pennsylvanicus* had roughly the same mean cranial capacity as urban specimens of *Peromyscus leucopus* did.

31

Figure 2 indicates that the cranial capacity of the rural *Myotis lucifugus* specimen from 1940 is closest to which value?

- A) 315 cubic millimeters
- B) 345 cubic millimeters
- C) 360 cubic millimeters
- D) 370 cubic millimeters

Questions 32-42 are based on the following passages.

Passage 1 is adapted from a speech delivered in 1793 by Hugh Henry Brackenridge, "Oration on the Celebration of the Anniversary of Independence, July 4th, 1793" Passage 2 is adapted from Alexander Hamilton, "Americanus No. I", The works of Alexander Hamilton volume 7. Originally published in 1794. Both passages address the question of whether the United States should help revolutionary France in its conflict with other European powers.

Passage 1

Is it the duty of these states to assist France? That we are bound by treaty, and how far, I will not say because it is not necessary. We are bound by a higher *Line* principle, if our assistance could avail; the great law of humanity.

We might, it is true, allege the stipulations of a treaty and the guarantee of her possessions to France. But as the world would know and we ought to avow...it is the cause of republicanism which would induce our efforts...The heart of America feels the cause of France. She takes a part in all her councils, approves her wisdom, blames her excesses. She is moved, impelled, elevated, and depressed with all the changes of her good and bad fortune. She feels the same fury in her veins. She is tossed and shaken with all the variety of hopes and fears attending her situation. Why not? Can we be indifferent? Is not our fate interlaced with hers? For, O! France, if thy Republic perish, where is the honor due to ours? From whom respect to our flag upon the seas? Not from France restored to a monarch and indignant at those very feelings which are now our glory: not from the despots that are against her. These will easily recollect that the cause of their evils took their rise here.

Can we assist France by arming in her favor? I will not say that we can. But could we, and should France say, "United States, your neutrality is not sufficient; I expect the junction of your arms with mine, your heroes on the soil and your privateers on the ocean to distress the foe," who is there would not say, "It shall be so. You shall have them. Our citizens shall arm; they shall attack; our oaks shall descend from the mountains; our vessels be launched upon the stream; and the voice of our war, however weak, shall be heard with yours."

Passage 2

The war which now rages is & for obvious reasons is likely to continue to be carried on with unusual animosity and rancor. It is highly probable that the resentment of the combined powers against us if we should take part in the war would be if possible still more violent than it is against France Our interference would be regarded as altogether officious and wanton. How far this idea might lead to an aggravation of the ordinary calamities of war would deserve serious reflection.

The certain evils of our joining France in the war are sufficient dissuasives from so intemperate a measure. The possible ones are of a nature to call for all our caution, all our prudence.

To defend its own rights, to vindicate its own honor, there are occasions when a Nation ought to hazard even its existence. Should such an occasion occur, I trust those who are now most averse to commit the peace of the country will not be the last to face the danger, nor the first to turn their backs upon it.

But let us at least have the consolation of not having rashly courted misfortune. Let us have to act under the animating reflection of being engaged in repelling wrongs which we neither sought nor merited, in vindicating our rights, invaded without provocation, in defending our honor violated without cause. Let us not have to reproach ourselves with having voluntarily bartered blessings for calamities.

But we are told that our own Liberty is at stake upon the event of the war against France—that if she falls we shall be the next victim. The combined powers, it is said, will never forgive in us the origination of those principles which were the germs of the French Revolution. They will endeavour to eradicate them from the world...

To subvert by force republican Liberty in this Country, nothing short of entire conquest would suffice, This conquest, with our present increased population; greatly distant as we are from Europe, would either be impracticable or would demand such exertions, as following immediately upon those which will have been requisite to the subversion of the French Revolution, would be absolutely ruinous to the undertakers.

It is against all probability, that an undertaking, pernicious as this would be, even in the event of success, would be attempted against an unoffending
85 Nation by its Geographical position, so little connected with the political concerns of Europe.

32

As used in lines 2 and 3, “bound” most nearly means

- A) limited.
- B) measured.
- C) obligated.
- D) confined.

33

Which choice from Passage I best supports the idea that Brackenridge has some doubts about the ability of US armed forces to assist France effectively?

- A) Lines 1-3 (“Is it...necessary”)
- B) Lines 6-10 (“We might...efforts”)
- C) Lines 15-18 (“She is...hers”)
- D) Lines 26-27 (“Can we...we can”)

34

In Passage 1, Brackenridge indicates his opinion that the treaty between the United States and France

- A) has been poorly understood by both the public and politicians.
- B) is not the most compelling reason for the United States to ally with France.
- C) can be justifiably set aside in the current global political situation.
- D) is not supported by other nations of the world.

35

It can be most reasonably inferred from passage 1 that Brackenridge views the relationship between the United States and France as one in which the

- A) basic principles and destinies of both countries are intertwined.
- B) fundamental political goals of the two countries are in opposition.
- C) social stability of France requires continual interaction with the United States.
- D) global strength of the United States necessitates military assistance to France.

36

In Passage 2, Hamilton’s main purpose is to

- A) attempt to reverse a recent decision before its outcome can cause more harm.
- B) provide several arguments against embarking on a particular course of action.
- C) suggest that two opposing groups actually have significant common interests.
- D) discuss an ongoing international conflict resulting from a diplomatic slight.

37

As used in line 47, “certain” most nearly means

- A) confident.
- B) specific.
- C) valid.
- D) definite.

38

In Passage 2, the fifth paragraph (lines 66-72) primarily serves to

- A) summarize a counterclaim with the intention of refuting it.
- B) criticize an outdated response to a current situation.
- C) outline several arguments for full consideration.
- D) question the overall credibility of a body of evidence.

39

Which choice best states the relationship between the arguments made by Brackenridge in Passage 1 and Hamilton in Passage 2?

- A) Brackenridge defends a choice that Hamilton claims has ultimately proved ruinous.
- B) Brackenridge forecasts an event that Hamilton believes can never come to pass.
- C) Brackenridge offers a solution that Hamilton maintains has failed in the past.
- D) Brackenridge supports a position that Hamilton considers to be unwise.

40

Which statement best reflects the different ways in which Brackenridge (Passage 1) and Hamilton (Passage 2) support their respective arguments?

- A) Brackenridge presents a single extended analogy, whereas Hamilton presents a variety of comparisons.
- B) Brackenridge relies on analyzing abstract concepts, whereas Hamilton exclusively discusses concrete facts and actions.
- C) Brackenridge makes use of historical analogy, whereas Hamilton refers strictly to current events.
- D) Brackenridge appeals to emotion, whereas Hamilton appeals to reason and practical considerations.

41

Based on the Passage 2, what argument would Hamilton most likely offer regarding the despots mentioned in lines 22-23 (“not...her”)?

- A) They would try to engage in diplomacy with the United States if it entered the war on the side of France.
- B) They would fear the involvement of the United States enough to reconsider their position regarding France.
- C) They would probably retaliate strongly if the United States became involved in the conflict with France.
- D) They would most likely have respect for the United States if it chose to stand by its French ally.

42

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

- A) Lines 39-42 (“It is...France”)
- B) Lines 47-50 (“The certain...prudence”)
- C) Lines 66-68 (“But we...victim”)
- D) Lines 75-81 (“This conquest...undertakers”)

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

This passage is adapted from "Ancient Volcanic Explosions Shed Light on Mercury's Origins." ©2010 by Brown University.

On Earth, volcanic explosions like the one that tore the lid off Mount St. Helens happen because our planet's interior is rich in volatiles—water, carbon dioxide, and other compounds with relatively low boiling points. As lava rises from the depths toward the surface, volatiles dissolved within it change phase from liquid to gas, expanding in the process. The pressure of that expansion can cause the crust above to burst like an overinflated balloon.

Mercury, however, was long thought to be bone dry when it comes to volatiles, and without volatiles, there can't be explosive volcanism. But that view started to change in 2008 after NASA's MESSENGER spacecraft made its first flybys of Mercury. Those glimpses of the surface revealed deposits of pyroclastic ash—the telltale signs of volcanic explosions—peppered the planet's surface. It was a clue that at some point in its history Mercury's interior wasn't as bereft of volatiles as had been assumed.

What wasn't clear from those initial flybys was the timeframe over which those explosions occurred. Did Mercury's volatiles escape in a fury of explosions early in the planet's history, or has Mercury held on to its volatiles over a much longer period?

Recent work suggests the latter.

A team of researchers, led by Tim Goudge looked at 51 pyroclastic sites distributed across Mercury's surface. They used data from MESSENGER's cameras and spectrometers collected after the spacecraft entered orbit around Mercury in 2011. Compared with the data from the initial flybys, the orbital data provided a much more detailed view of the deposits and the source vents that spat them out.

The new MESSENGER data revealed that some of the vents have eroded to a much greater degree than others—an indicator that the explosions didn't happen all at the same time.

"If [the explosions] happened over a brief period and then stopped, you'd expect all the vents to be degraded by approximately the same amount," Goudge said. "We don't see that; we see different degradation states. So the eruptions appear to have been taking place over an appreciable period of Mercury's history."

But just where that period of explosiveness fits into Mercury's geological history was another matter. To help figure that out, Goudge and his colleagues took advantage of the fact that most of the sites are located within impact craters. The age of each crater offers an important constraint in the age of the pyroclastic deposit inside it—the deposit has to be younger than its host crater. If the deposit had come first, it would have been obliterated by the impact that formed the crater. So the age of the crater provides an upper limit on how old the pyroclastic deposit can be.

As it happens, there's an established method for dating craters on Mercury. The rims and walls of craters become eroded and degraded over time, and the extent of that degradation can be used to get an approximate age of the crater.

Using that method, Goudge and his colleagues showed that some pyroclastic deposits are found in relatively young—geologically speaking—craters dated to between 3.5 and 1 billion years old. The finding helps rule out the possibility that all the pyroclastic activity happened shortly after Mercury's formation around 4.5 billion years ago.

"These ages tell us that Mercury didn't degas all of its volatiles very early," Goudge said. "It kept some of its volatiles around to more recent geological times."

The extent to which Mercury's volatiles stuck around could shed light on how the planet formed. Despite being the smallest planet in the solar system, (since Pluto was demoted from the ranks of the planets), Mercury has an abnormally large iron core. That finding led to speculation the perhaps Mercury was once much larger, but had its outer layers removed—either fried away by the nearby Sun or perhaps blasted away by a huge impact early in the planet's history. Either of those events, however, would likely have heated the outer parts of Mercury enough to remove volatiles early in its history.

In light of this study and other data collected by MESSENGER showing traces of the volatiles sulfur, potassium, and sodium on Mercury's surface, both those scenarios seem increasingly unlikely.

90 “Together with other results that suggest the Moon may have had more volatiles than previously thought, this research is revolutionizing our thinking about the early history of the planets and satellites,” said Jim Head, a MESSENGER mission
95 co-investigator.

43

Which choice best supports the idea that the study discussed in the passage has broad implications for astronomy in general?

- A) Lines 23-26 (“Did...period”)
- B) Lines 36-39 (“The new...time”)
- C) Lines 83-85 (“Either...history”)
- D) Lines 90-95 (“Together...co-investigator”)

44

Based on the passage, which claim about Mercury do the data provided by the initial MESSENGER flybys support?

- A) Mercury’s interior once contained elements and compounds with relatively low boiling points.
- B) Volcanic explosions occurred on Mercury immediately after the planet’s formation.
- C) Volatiles caused explosions on Mercury in the recent past.
- D) Mercury was once a much larger planet than it is today.

45

The main purpose of the passage is to

- A) suggest the need to explore a particular geographical phenomenon.
- B) describe the investigation of an initially surprising finding.
- C) contrast the results of two experiments attempting to account for a scientific anomaly.
- D) chronicle the historical development of a particular field of science.

46

Based on the passage, which choice best states the conclusion reached by Goudge’s team?

- A) Volcanic explosions were one of the primary causes of Mercury’s formation.
- B) Volcanic explosions on Mercury had an important effect on the ultimate size of the planet.
- C) Volcanic explosions occurred on Mercury over much of the planet’s history.
- D) Volcanic explosions took place on Mercury over a brief period of time.

47

Compare with the MESSENGER data from 2008, the MESSENGER data from 2011 provided information that was more

- A) ambiguous in its implications.
- B) consistent with established theories.
- C) surprising in its complexity.
- D) comprehensive in scope.

48

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

- A) conditions.
- B) positions.
- C) styles.
- D) territories.

49

According to the passage, how did scientists determine that not all the volcanic explosions occurred soon after Mercury's formation?

- A) By demonstrating that pyroclastic deposits were left as residue only during the later periods of Mercury's history
- B) By establishing that some craters containing pyroclastic deposits were created quite a long time after mercury formed
- C) By comparing the ages of craters containing pyroclastic deposits to the ages of craters containing no such deposits
- D) By analyzing the amount of damage that particular volcanic explosion on Mercury caused to the surface of the plant

50

As used in line 75, "shed" most nearly means

- A) cast.
- B) discard.
- C) scatter.
- D) drop.

51

What is implied in the passage about the disparity between Mercury's small size and its abnormally large iron core?

- A) It cannot be explained by current theories regarding Mercury's formation.
- B) It helps scientists date the formation of Mercury.
- C) It proves that Mercury has Changed radically over time.
- D) It suggests a theory about the timing of Mercury's degassing.

52

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

- A) Lines 74-75 ("The extent...formed")
- B) Lines 76-78 ("Despite...core")
- C) Lines 79-83 ("That...history")
- D) Lines 86-89 ("In light...unlikely")

STOP

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

Do not turn to any other section.

CONTINUE 

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.

Science Says

Over the course of their training, scientists are expected to learn critical thinking skills, research methods, and **1** expected to learn detailed subject matter. Given these demands on their time, it may seem unreasonable to add yet another requirement to their studies, especially if that skill is not directly relevant to the quality of their scientific research. However, both the public at large and scientists themselves would benefit if scientists’ training were to include the development of effective communication **2** skills: the public would

1

- A) NO CHANGE
- B) learn the details of their subjects.
- C) to learn detailed subject matter.
- D) detailed subject matter.

2

- A) NO CHANGE
- B) skills,
- C) skills
- D) skills, and

learn about exciting and important research findings, while scientists would see increased support for their work.

Researchers who are able to explain their findings clearly and concisely to the public can **3** come from a variety of different scientific fields. Books by scientists such as Carl Sagan and Stephen Hawking have sold millions of copies and inspired widespread interest in astronomy and physics. **4** In spite of this, scientists can even help shape public policy, as Rachel Carson did with her 1962 book Silent Spring, a work often credited with inspiring the modern environmental movement in the United States. While most researchers will not reach as many people as **5** these celebrated figures have, scientists today have many means of publicizing their research, including **6** blogs; magazine articles, and interviews. To take maximal advantage of these opportunities, they must cultivate their ability to **7** communicate with nonspecialist audiences in ways that are clear and engaging.

3

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

- A) NO CHANGE
- B) potentially make a great deal of money.
- C) help shape popular perception of the sciences.
- D) contribute to public policy debates by providing accurate information.

4

- A) NO CHANGE
- B) In conclusion,
- C) In short,
- D) In some cases,

5

- A) NO CHANGE
- B) the reach of these celebrated figures,
- C) have those of celebrated figures,
- D) those reaching celebrated figures have,

6

- A) NO CHANGE
- B) blogs; magazine articles;
- C) blogs, magazine articles,
- D) blogs, magazine, articles,

7

- A) NO CHANGE
- B) communicate clearly
- C) engage clearly
- D) convoy information to communicate

For scientist, effective communication is not simply a way to reach popular audiences; it also has practical benefits for their work as searchers. Communication skills are perhaps **8** the biggest deal for writing grant proposals. Scientists often must apply to public and private funding organizations for resources to conduct their research, **9** and their funding proposals are read by nonexperts as well as experts. Researchers must therefore be able to explain the significance of their work in simple, compelling terms to people without much background knowledge. In other words, **10** communication among scientists often uses specialized language that other people would not understand.

8

Which choice best maintain the tone used throughout the passage?

- A) NO CHANGE
- B) most essential
- C) needed in a major way
- D) of all-encompassing importance

9

The writer is considering deleting the underlined portion, adjusting the punctuation as needed. Should the underlined portion be kept or deleted?

- A) Kept, because it sets up the claim about researchers that is made in the following sentence.
- B) Kept, because it provides a detailed explanation of how scientific research is funded.
- C) Deleted, because it introduces a distinction between expert and nonexpert readers that is not adequately explained.
- D) Deleted, because it distracts from the paragraph's focus on the communication skills of scientists.

10

The writer wants to conclude the paragraph by explaining the significance of the information provided in the paragraph. Which choice most effectively accomplishes this goal?

- A) NO CHANGE
- B) it is vital that funding organizations raise more money in order to decrease competition for scarce resources among scientists.
- C) the ability to write an accessible grant proposal can have direct effects on how and what research is done.
- D) some scientists may turn to specialized proposal writers to ensure that they have the best chance of gaining funding.

Increasingly, as scientists **11** would recognize the vital role of communication skills in their fields, colleges are introducing classes on communication for undergraduate and graduate students in the sciences. Such classes are not taught everywhere, though, and in many cases they are optional or extracurricular rather than required. Given how critical communication skills are, they deserve a more central role in science education.

11

- A) NO CHANGE
- B) will be recognizing
- C) recognize
- D) recognized

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

Rock and Roll en Espanol

In the 1960s and 1970s a new genre of **12** music, rock en espanol, (rock in Spanish) emerged from the Rio de la Plata region of Argentina and Uruguay. **13** Rock en espanol has grown from an unorthodox crossover experiment to a mainstream genre with millions of **14** fans worldwide.

12

- A) NO CHANGE
- B) music, rock en espanol (rock in Spanish),
- C) music, rock en espanol (rock in Spanish)
- D) music rock en espanol, (rock in Spanish),

13

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

A form of rock and roll that incorporates elements of traditional Latin music, rock

Should the writer make this revision?

- A) Yes, because it provides important introductory information about rock en espanol.
- B) Yes, because it explains why the genre began in the Rio de la Plata region.
- C) No, because it repeats information about musical genres from the first sentence of the passage.
- D) No, because it interrupts the discussion of the music of the Rio de la Plata region with loosely related information.

14

- A) NO CHANGE
- B) international fans worldwide.
- C) worldwide fans everywhere.
- D) international fans all over the world.

The Rio de la Plata region is known **15** as a rich musical heritage that includes such traditional dance music as tango and milonga, which feature the violin, double bass, and bandoneon, an instrument similar to the accordion. By the 1960s, however, the guitar-and-drums music popular in the United States and Great Britain—rock and roll—was captivating young audiences all over the **16** world. Including in the Rio de la Plata region. Argentine musician Gustavo Santaolalla wanted to play rock music but not just copy what English-speaking bands were doing. "I didn't want to create the Beatles in Spanish," he says. **17** Likewise, in his bands Arco Iris and Soluna, Santaolalla blended the heavy beat of US and British rock with the lively and melodic sounds of the Rio de la Plata region. Rock en español was born.

15

- A) NO CHANGE
- B) with
- C) for
- D) in

16

- A) NO CHANGE
- B) world, this includes
- C) world: and including
- D) world, including

17

- A) NO CHANGE
- B) Instead,
- C) Moreover,
- D) At any rate,

The genre soon 18 became a sensation in Mexico. In the 1980s, Mexican band Cafe Tacuba won wide acclaim for blending the old-fashioned bolero and nortario music of Mexico with the energetic sounds of rock-influenced punk, electronic, and hip-hop. Rock en espanol even took root in the United States, in Los Angeles, where the band Los Lobos gained fame in the 1980s for its

19 indiscriminate use of bolero and nortario alongside rock, country, and R&B. Los Lobos's diverse influences are evident in the variety of instruments the band

20 play, including the saxophone, flute, harmonica, mandolin, guitarron, accordion, and banjo. Los Lobos's successful career shows that wide appeal of rock en espanol: the band boasts multiple Grammy awards; chart-topping hits in the United States, Great Britain, and several other countries; and a 2015 Rock and Roll Hall of Fame nomination.

18

Which choice provides the most effective introduction to the topics discussed in this paragraph?

- A) NO CHANGE
- B) garnered major music award.
- C) deviated from what Santaolalla had envisioned.
- D) spread beyond Argentina and Uruguay.

19

- A) NO CHANGE
- B) divergent
- C) individual
- D) distinctive

20

- A) NO CHANGE
- B) are playing,
- C) plays,
- D) have played,

Like all musical genres, rock en español has evolved in new directions, but the genre is here to stay. Today, newer musical acts Bajofondo and Juanes have joined Café Tacuba and Los Lobos in the pantheon of rock en español stars. Both offer their own unique spin on Santaolalla's original fusion: Bajofondo blends traditional Rio de la Plata sounds with elements of rock, hip-hop, and jazz, and Junanes, a native of Colombia, **21** uses the nostalgic tango as inspiration for his music. The examples of Bajofondo and Junanes show that rock en español is transcending not just cultural and geographical boundaries **22** as also generational ones.

21

Which choice provides an example that best supports the main point of the sentence?

- A) NO CHANGE
- B) draws on not only the rhythmic cumbia but also the music of the Beatles.
- C) enlisted Santaolalla to produce his sold debut album, *Fijate Bien*, in 2000.
- D) won six Latin Grammy Awards for his best-selling album *Un Dia Normal*.

22

- A) NO CHANGE
- B) but generational ones too.
- C) as well as generational ones.
- D) and generational ones too.

Questions 23–33 are based on the following passage.

Gwen Ifill's Legacy

When Gwen Ifill was 23 starting up at journalism, the gains of the civil rights movement had not yet translated into many electoral victories for African American politicians—or many opportunities for African American journalists. Over the course of her nearly forty-year career, Ifill witnessed both situations change as she reported on the rise of African American political leaders and achieved breakthrough success in her own right.

23

- A) NO CHANGE
- B) at the start in
- C) to start at
- D) starting out in

[1] While working in Baltimore in the 1980s, Ifill

24 chronicled and reported information about the early generation of post-civil rights movement African American politicians. [2] This generation included Kurt Schmoke, who was elected mayor of Baltimore in

25 1987, and Jesss Jackson, who campaigned for the Democratic presidential nomination in 1984 and 1988.

[3] Leaders of this generation won local elections, but

26 ones in state elections were rarer, and a presidential victory remained out of reach. [4] In her 2009 book The Breakthrough, Ifill acknowledged Barack Obama as the new group's most prominent figure but noted that it also included important politicians such as Cory Booker. [5]

Ifill reported on Booker and others in this generation,

27 therefore, she helped focus the nation's attention on their views and accomplishments as they ascended political ladders and, in Obama's case, made the breakthrough to the presidential office. **28**

24

- A) NO CHANGE
- B) reported information by chronicling
- C) chronicled information about
- D) chronicled

25

- A) NO CHANGE
- B) 1987 and Jesse Jackson
- C) 1987, and, Jesse Jackson,
- D) 1987 and Jesse Jackson,

26

- A) NO CHANGE
- B) getting these in state elections was
- C) getting those in state elections was
- D) victories in state elections were

27

- A) NO CHANGE
- B) helping
- C) she was helping
- D) helped

28

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

Then, in the first decade of the twenty-first century, a new group of African American politicians began achieving wider success.

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

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

Ifill had **29** been making similar strides toward national accomplishment as a journalist. By 1991, she had become a White House correspondent for the New York Times. Less than a decade later, she became the first African American woman to host a nationally televised political talk **30** show, along-running news program. It was also a public-affairs program and was called Washington Week in Review. Along the way, Ifill gained a reputation for political knowledge and fair treatment of her interview subjects—qualities that made her a natural choice to moderate the vice-presidential debate in 2004. Earning widespread praise for her work in that debate, she went on to moderate the vice presidential debate in 2008 and on to moderate a Democratic presidential debate in 2016. **31** The impact that vice presidential and residential debates have on election outcomes is a subject of much debate among scholars and journalists.

29

Which choice provide the most effective transition to the discussion that follows in the paragraph?

- A) NO CHANGE
- B) earned a degree in communications at Simmons College in 1977.
- C) worked as a journalist in Boston, where she reported on the public school system, before moving to Baltimore.
- D) noted that African American politicians depend on building broad coalitions to accomplish their goals.

30

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

- A) show; it was the news-and-public-affairs long-running program
- B) show, the long-running news and public-affair program
- C) show, the public-affair program that also provided news, the long-running
- D) show: the public-affair program that also provided news and was long-running, called

31

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

- A) Kept, because it provides an appropriate conclusion to the paragraph.
- B) Kept, because the details it provides support one of the passage's main ideas.
- C) Deleted, because it unnecessarily repeats information provided elsewhere in the passage.
- D) Deleted, because the information it offers is irrelevant to the main discussion in the paragraph.

As the previous generation of African American political leaders had led the way for the new generation, so Ifill led the way for a new generation of journalists. CNN reporter Tanzania Vega **32** says, that Ifill was: "a beacon for so many of us [journalists], women of color especially." Ifill's legacy **33** as an advocate for public television and as a mentor for journalists will be remembered for many years to come.

32

- A) NO CHANGE
- B) says that Ifill was
- C) says, that Ifill was,
- D) says that, Ifill was:

33

The writer wants to emphasize the main points of discussion in the passage. Which choice most effectively accomplishes this goal?

- A) NO CHANGE
- B) as the winner of a Peabody Award and of several other prestigious journalism prizes
- C) of engaging the public in US political conversation and of reporting on African American's achievements
- D) as a successful newspaper reporter writing about local as well as national issues

Questions 34-44 are based on the following passage.

A Plant's Response to Temperature

The appearance of flowers on a plant marks a change from the 34 plants' growth phase to its reproductive phase. This change begins when a plant responds to 35 signs from the universe, such as temperature, by flowering, eventually leading to the production of seeds from which another generation of plants can grow. Most plants have, over time, acquired specific adaptations that enable them to flower when their insect pollinators are most abundant. This well-established cooperation between plant and pollinator can be upended, however, if temperature fluctuations delay or advance flowering.

34

- A) NO CHANGE
- B) plant's growth phase to its
- C) plant's growth phase to their
- D) plants' growth phase to their

35

Which choice is most consistent with the tone and style of the rest of the passage?

- A) NO CHANGE
- B) Earth's instructions,
- C) environmental cues,
- D) Mother Nature's messages,

Studies of the molecular control of flowering in the species *Arabidopsis thaliana* have revealed that, in general,

36 some of these plants are exposed to a lower temperature. These plants will flower much later (as measured by the number of leaves a plant has at the time of flowering) than those exposed to a higher temperature. *A. thaliana* plants produce proteins known as floral activators shortly before flowering begins. Lower temperatures have been found to delay the production of the floral activators and the flowering that **37** result, whereas higher temperatures have been found to promote them. But how, exactly, does temperature influence floral-activator production?

36

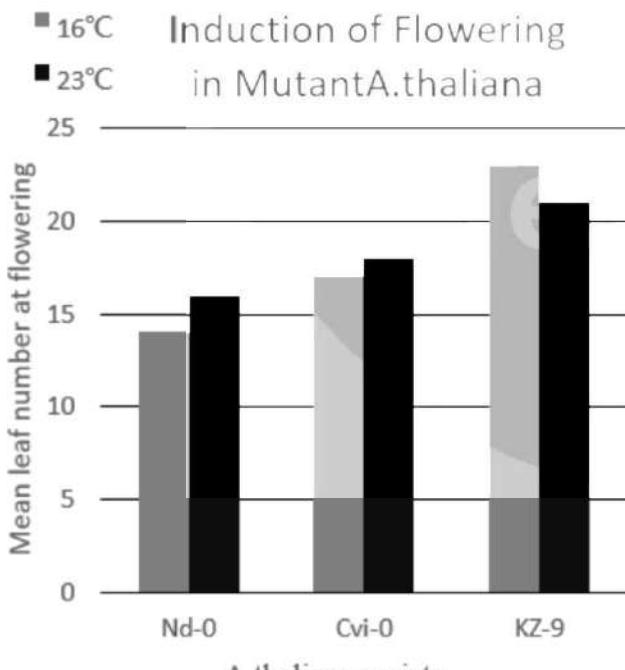
Which choice most effectively combines the sentences at the underlined portion?

- A) some of these plants are exposed to a lower temperature and these plants
- B) some plants, having exposure to lower temperatures,
- C) plants exposed to a lower temperature
- D) the low-temperature plants

37

- A) NO CHANGE
- B) are the result,
- C) results,
- D) have resulted,

38 The life cycle of *A. thaliana* is approximately six weeks, so researchers searched for mutant varieties of *A. thaliana* that flower with nearly the same number of leaves regardless of temperature. They found three such varieties, among them Nd-0, which flowers with approximately **39** 16 leaves per plant at 23°C, **40** and KZ-9, which flowers with more leaves per plant as the temperature rises. The researchers then identified the specific genetic mutations in the mutant varieties that enabled these plants to bypass the normal control of flowering. In each of the mutant varieties, two **41** genes, FLM and SVP, were found to have mutations that disrupted the relationship between flowering and temperature.



Adapted from Jeong Hwan Lee et al, Regulation of Temperature-Responsive Flowering by MADS-Box Transcription Factor Repressors."©2013 by American Association for the Advancement of Science.

38

Which choice provides the best transition from the preceding paragraph?

- A) NO CHANGE
- B) Genes carry genetic information, and
- C) While looking along riverbeds,
- D) To answer this question,

39

Which choice provides accurate information from the graph?

- A) NOCHANGE
- B) 18
- C) 21
- D) 23

40

The writer is considering deleting the underlined portion, adjusting the punctuation as needed. Should the underlined portion be kept or deleted?

- A) Kept, because it notes a key point about *A. thaliana* varieties that is not mentioned elsewhere.
- B) Kept, because it uses information from the graph to support a claim from the previous paragraph.
- C) Deleted, because it unnecessarily repeats information from earlier in the sentence.
- D) Deleted, because it provides inaccurate information from the graph.

41

- A) NO CHANGE
- B) genes FLM and SVP,
- C) genes, FLM and SVP
- D) genes FLM, and SVP,

Further study enabled the researchers to determine the normal function of the FLM and SVP genes. In non-mutant plants, the protein products of the FLM and SVP genes bind to each other and then together **42** repressing production of floral activators. Temperature affects both the shape of the FLM protein and the stability of the SVP protein. At 16°C the protein binding is prevalent, blocking floral-activator production, while at 23°C there are fewer FLM and SVP proteins bound to each other, **43** allowing production to occur.

These molecular interactions demonstrate the **44** affect that an environmental factor can have on genetic control. By affecting the coordination between the induction of flowering and the appearance of insect pollinators, unexpected fluctuations in temperature pose risks to all flowering plants.

42

- A) NO CHANGE
- B) repress
- C) to repress
- D) are repressing

43

The writer wants to conclude the paragraph with a statement that accurately characterizes the outcome of the process described in the sentence. Which choice most effectively accomplishes this goal?

- A) NO CHANGE
- B) but production remains blocked.
- C) inhibiting the activators.
- D) which changes the shape of the floral activator.

44

- A) NO CHANGE
- B) effect that
- C) affects which
- D) effects for which

STOP

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



Math Test – No Calculator

25 MINUTES, 20 QUESTIONS

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

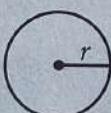
DIRECTIONS

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

NOTES

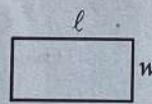
1. The use of a calculator is not permitted.
2. All variables and expressions used represent real numbers unless otherwise indicated.
3. Figures provided in this test are drawn to scale unless otherwise indicated.
4. All figures lie in a plane unless otherwise indicated.
5. Unless otherwise indicated,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

REFERENCE

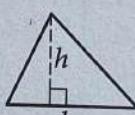


$$A = \pi r^2$$

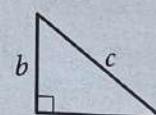
$$C = 2\pi r$$



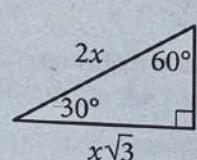
$$A = lw$$



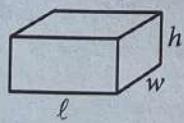
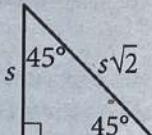
$$A = \frac{1}{2}bh$$



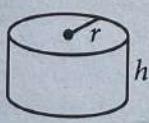
$$c^2 = a^2 + b^2$$



Special Right Triangles



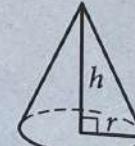
$$V = lwh$$



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



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



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



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

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

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

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



1

$$12x + 8y = 108$$

A movie theater sells two types of tickets, adult tickets for \$12.00 each and child tickets for \$8.00 each. The equation above relates the numbers of adult tickets and child tickets that have a total cost of \$108. Which of the following is the best interpretation of the solution $x = 5$ and $y = 6$ in this context?

- A) A total of 5 adult tickets and 6 child tickets have a cost of \$108.
- B) A total of 6 adult tickets and 5 child tickets have a cost of \$108.
- C) A total of 12 adult tickets and 8 child tickets have a cost of \$108.
- D) A total of 8 adult tickets and 12 child tickets have a cost of \$108.

2

$$(4x + y) + (x - y)$$

Which of the following is equivalent to the given expression?

- A) $3x$
- B) $5x$
- C) $3x - 2y$
- D) $5x + 2y$

3

By March 31 of a certain year, a city manager had received a total of 20 permits for construction for that year. The manager expects to receive 10 permits per month for the rest of the year. Which of the following functions best expresses the total number of permits for the year, $p(m)$, expected to be received by m months after March 31, where m is a nonnegative integer and $m \leq 9$?

- A) $p(m) = 10m$
- B) $p(m) = 10m + 20$
- C) $p(m) = 20m$
- D) $p(m) = 20m + 10$

4

$$y < 2x$$

In which of the following tables do all of the ordered pairs satisfy the inequality shown?

A)

x	2	4	6	8
y	5	13	19	22

B)

x	1	2	3	4
y	2	4	6	8

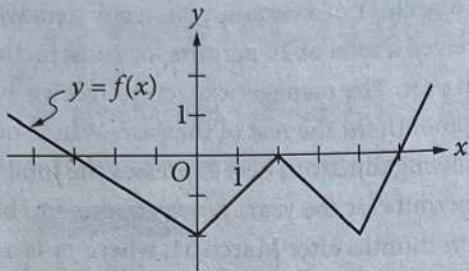
C)

x	5	10	15	20
y	2	4	6	8

D)

x	10	12	14	16
y	6	6	14	35

5



The graph of the function f is shown in the xy -plane.
What is the y -intercept?

- A) $(0, 5)$
- B) $(2, 0)$
- C) $(-3, 0)$
- D) $(0, -2)$

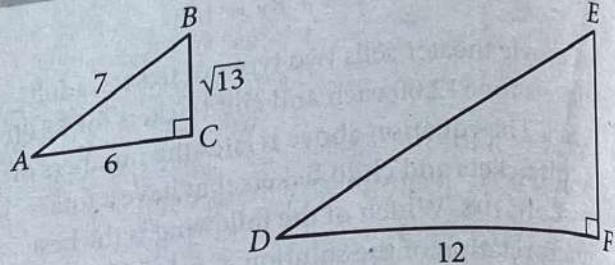
6

$$x - 3 = x + 3b$$

In the equation above, b is a constant. If the equation has infinitely many solutions, what is the value of b ?

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

7



In the figures above, triangle ABC is similar to triangle DEF . What is the value of the cosine of angle D ?

- A) $\frac{\sqrt{13}}{7}$
- B) $\frac{\sqrt{13}}{6}$
- C) $\frac{6}{7}$
- D) $\frac{12}{7}$

8

$$4(x - 5)^2 - 3 = 13$$

Which of the following is a solution to the given equation?

- A) -7
- B) -5
- C) 3
- D) 9

9

$$y = 4x^2$$

$$y = 4x$$

Which of the following ordered pairs (x, y) is a solution to the given system of equations?

- A) $(2, 16)$
- B) $(4, 4)$
- C) $(2, 8)$
- D) $(1, 4)$

10

Mr. Lewis expects an investment of \$5,000 to have a value of $v(n)$ dollars n years after he invests it, where $v(n) = 5,000 \left(2^{\frac{n}{10}}\right)$. After how many years does Mr. Lewis expect the value of his investment to be \$20,000?

- A) 40
- B) 20
- C) 10
- D) 5

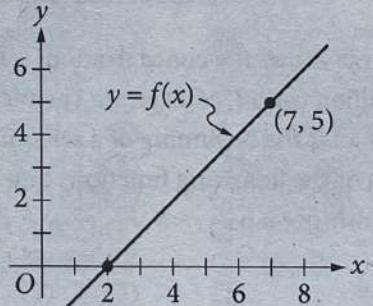
11

$$x^2 + y^2 = 16$$

The graph in the xy -plane of the given equation is a circle centered at the origin. A second circle is centered at the origin and has a radius 2 times the radius of the first circle. Which of the following is an equation of the second circle?

- A) $x^2 + y^2 = 32$
- B) $x^2 + y^2 = 64$
- C) $2x^2 + 2y^2 = 16$
- D) $2x^2 + 2y^2 = 32$

12



Which of the following is an equation of the graph of the linear function f shown in the xy -plane above?

- A) $f(x) = x - 2$
- B) $f(x) = x + 2$
- C) $f(x) = \frac{5}{7}x$
- D) $f(x) = 7x + 5$

3

13

In triangle ABC , $AB = 4$ and $AC = 6$. Which of the following could NOT be the length of \overline{BC} ?

- A) 2
- B) 3
- C) 5
- D) 8

14

Number of years	Concentration (ppm)
0	20.0
6	10.0
12	5.0

The table shows the concentration $f(t)$, in parts per million (ppm), of a certain chemical in a lake t years after the beginning of a scientific study. Which of the following functions best models this relationship?

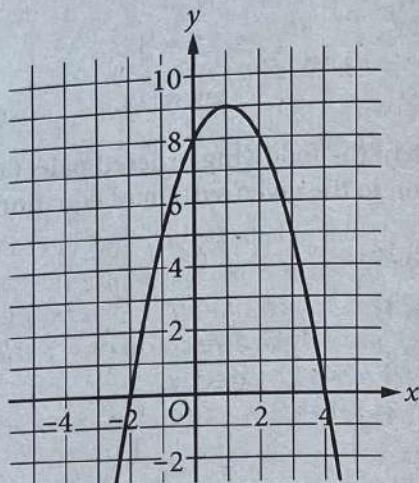
A) $f(t) = 20\left(\frac{1}{2}\right)^{\frac{t}{12}}$

B) $f(t) = 20\left(\frac{1}{2}\right)^{\frac{t}{6}}$

C) $f(t) = 20\left(\frac{1}{2}\right)^{\frac{t}{2}}$

D) $f(t) = 20\left(\frac{1}{2}\right)^t$

15



Which of the following is an equation of the parabola shown in the xy -plane?

A) $y = -(x + 2)(x - 4)$

B) $y = -(x - 2)(x + 4)$

C) $y = (x + 2)(x - 4)$

D) $y = (x - 2)(x + 4)$

DIRECTIONS

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

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

Write answer in boxes.

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

Grid in result.

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

Answer: 2.5

Decimal point

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

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

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

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

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

Answer: 201 – either position is correct

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

2	0	1
0	0	0
1	1	1
2	2	2
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.



3

16

$$3(x - 4) = 2x + 200$$

What value of x satisfies the equation above?

19

$$x + 2y = 1$$

$$2x - y = 1$$

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

17

$$\frac{x^2 - 3x + 2}{x - 1} = 0$$

What is the solution to the equation above?

20

x	$g(x)$
1	5
2	20
3	45

For the quadratic function g , the table shows several values of x and their corresponding values of $g(x)$. If the function is of the form $g(x) = ax^2$, where a is a constant, what is the value of $g(4)$?

18

In the xy -plane, line l passes through the point $(0, 0)$ and is parallel to the line represented by the equation $y = 4x + 2$. If line l also passes through the point $(2, d)$, what is the value of d ?

STOP

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



Math Test – Calculator

55 MINUTES, 38 QUESTIONS

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

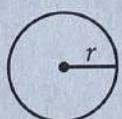
DIRECTIONS

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

NOTES

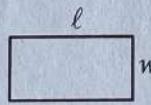
1. The use of a calculator is permitted.
2. All variables and expressions used represent real numbers unless otherwise indicated.
3. Figures provided in this test are drawn to scale unless otherwise indicated.
4. All figures lie in a plane unless otherwise indicated.
5. Unless otherwise indicated, the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

REFERENCE

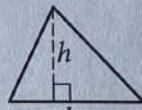


$$A = \pi r^2$$

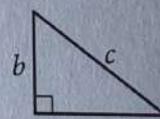
$$C = 2\pi r$$



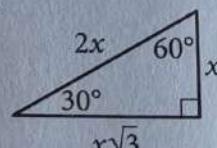
$$A = \ell w$$



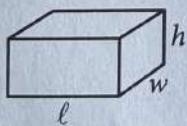
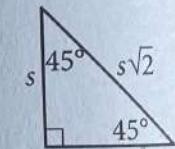
$$A = \frac{1}{2} bh$$



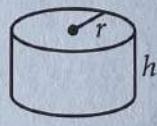
$$c^2 = a^2 + b^2$$



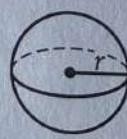
Special Right Triangles



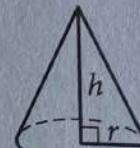
$$V = \ell wh$$



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



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



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



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

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

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

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



1

If $4x + 8 = 16$, what is the value of $2x + 4$?

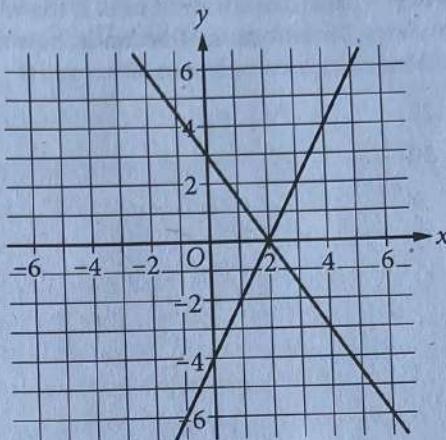
- A) 2
- B) 4
- C) 6
- D) 8

2

It took 90 hours to paint a building that has a surface area of 18,000 square feet. If the building was painted at a constant rate, at what rate, in square feet per hour, was the building painted?

- A) 100
- B) 200
- C) 400
- D) 500

3



The equations in a system are graphed in the xy -plane shown. Which of the following ordered pairs (x, y) is the solution to this system?

- A) $(0, -4)$
- B) $(0, 3)$
- C) $(2, 0)$
- D) $(2, 2)$



4

A wheel rotates at a constant rate. If the wheel completes 2 rotations in 10 seconds, how many rotations does it complete in 30 seconds?

- A) 22
- B) 20
- C) 6
- D) 5

5

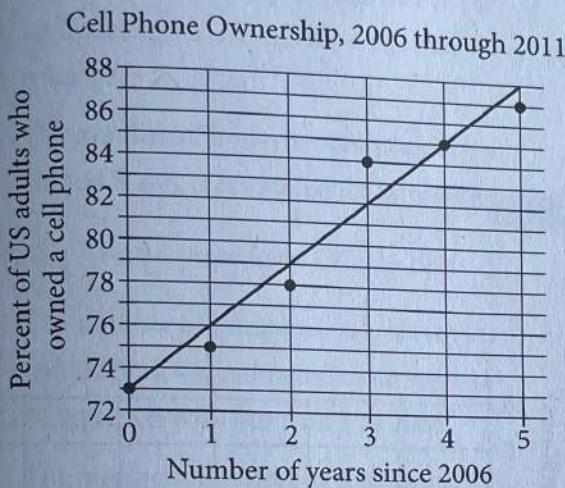
A veterinarian recommends that a certain puppy eat 21 ounces of puppy food per day. At this rate, how many ounces of puppy food is recommended per week?

- A) 3
- B) 14
- C) 28
- D) 147



6

The scatterplot shows the percent of US adults who owned a cell phone from 2006 through 2011. A line of best fit for the data is also shown.



Which of the following linear functions could be the equation for the line of best fit, where $p(x)$ is the percent of US adults who owned a cell phone, x is the number of years since 2006, and $0 \leq x \leq 5$?

- A) $p(x) = -3x$
- B) $p(x) = -3x + 73$
- C) $p(x) = 3x$
- D) $p(x) = 3x + 73$

7

Approximately how many kilograms are equivalent to 88 pounds? (Use 1 kilogram = 2.2 pounds.)

- A) 40
- B) 44
- C) 176
- D) 194

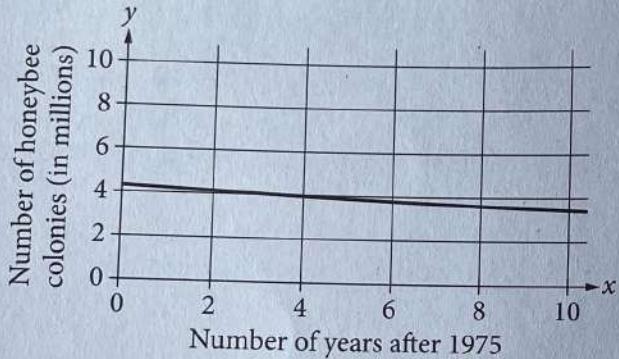
Questions 8 and 9 refer to the following information.

The relationship between the estimated number of honeybee colonies y , in millions, in the United States, and the number of years after 1975, x , can be modeled by the equation $y = -0.08x + 4.30$, where $0 \leq x \leq 30$.
(1 million = 1,000,000)

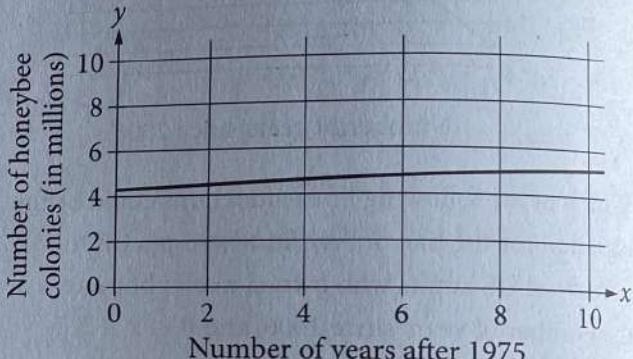
8

Which of the following is the graph of the given equation in the xy -plane?

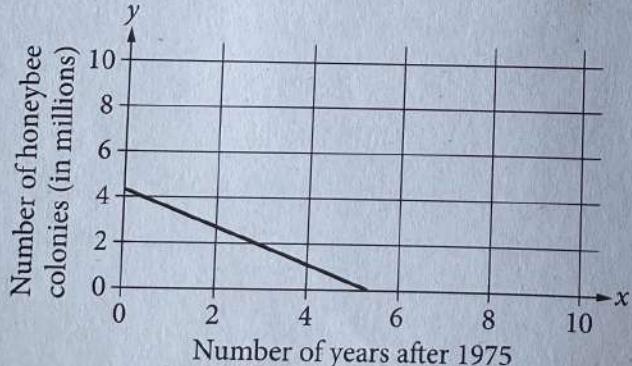
A)



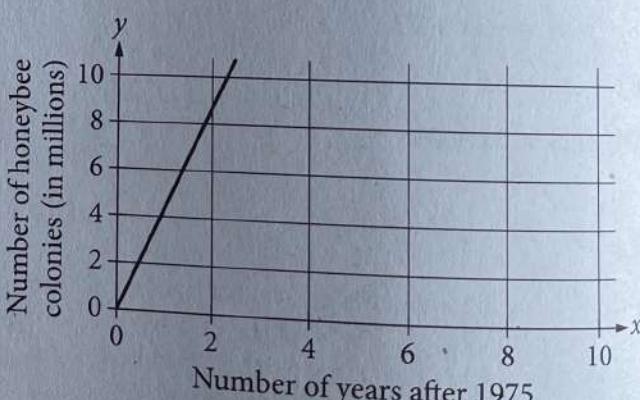
B)



C)



D)



9

Which of the following is the best interpretation of -0.08 in this context?

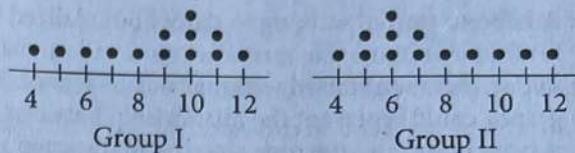
- A) The number of honeybee colonies in the United States is estimated to double every 8 years from 1975 to 2005.
- B) The number of honeybee colonies in the United States is estimated to decrease by a factor of $\frac{1}{2}$ every 8 years from 1975 to 2005.
- C) The number of honeybee colonies in the United States is estimated to increase by 80,000 each year from 1975 to 2005.
- D) The number of honeybee colonies in the United States is estimated to decrease by 80,000 each year from 1975 to 2005.

10

During a recent week, a travel agent booked a total of 50 vacation packages. If one of the 50 vacation packages is selected at random, the probability that it includes airfare is 0.4. How many of the 50 vacation packages that the travel agent booked include airfare?

- A) 4
- B) 20
- C) 40
- D) 50

11



The dot plots show 13 data values from group I and 13 data values from group II. Which of the following statements best compares the means and standard deviations of the values for each group?

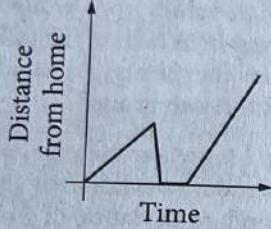
- A) The mean of group I is greater than the mean of group II, and the standard deviation of group I is greater than the standard deviation of group II.
- B) The mean of group II is greater than the mean of group I, and the standard deviation of group II is greater than the standard deviation of group I.
- C) The mean of group I is greater than the mean of group II, but the standard deviations of group I and group II are the same.
- D) The mean of group II is greater than the mean of group I, but the standard deviations of group I and group II are the same.



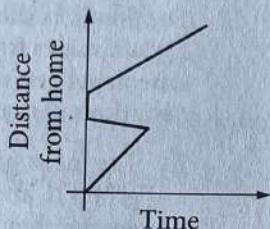
12

Adalberto started walking to school but realized halfway that he had left his folder at home. He turned around and ran back home, got the folder, and then started walking back to school. Which of the following graphs could represent the relationship between the distance Adalberto is from home and the time since he first started walking to school?

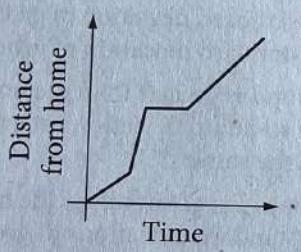
A)



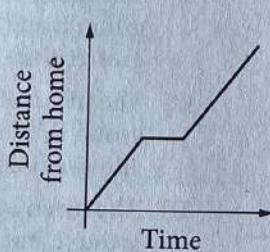
B)



C)



D)



13

Which of the following expressions is equivalent to

$$\frac{6x + 4}{2x}, \text{ where } x \neq 0 ?$$

A) $3 + \frac{2}{x}$

B) $3x + 2$

C) $3x + \frac{1}{2x}$

D) $3 + 2$

14

During a basketball tournament, the number of teams playing in each round is half the number of teams playing in the previous round. Which of the following types of functions best models the number of teams playing as a function of the number of the round being played?

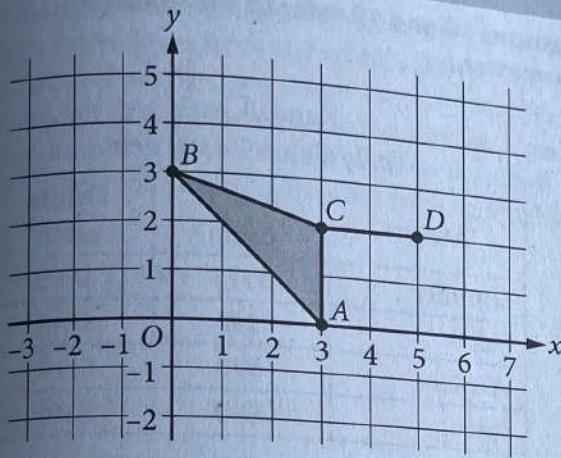
A) Decreasing linear

B) Increasing linear

C) Decreasing exponential

D) Increasing exponential

15



In the xy -plane shown, \overline{AC} and \overline{CD} are congruent. Point E (not shown), with coordinates (x, y) , will be placed on the plane so that $\triangle DEC$ is congruent to $\triangle ABC$. Which of the following could be the value of y ?

- A) 2
- B) 3
- C) 5
- D) 7

16

$$P(x) = -0.09x^2 + 26.8x - 24.5$$

The function shown models the relationship between the profit $P(x)$, in thousands of dollars, a company makes, and x , the number of product units sold. Which of the following is the best interpretation of the value -24.5 in this context?

- A) The maximum profit, in thousands of dollars, the company can make from selling this product
- B) The profit, in thousands of dollars, when 0 product units are sold
- C) The number, in thousands, of product units sold to make a profit of 0 dollars
- D) The number, in thousands, of product units sold to maximize the profit made

17

In 2016, an energy company recorded the number of homes powered by solar energy in nine US states the company serviced.

State	Number of homes powered by solar energy (in thousands)
California	3,319
Arizona	327
New Jersey	257
North Carolina	223
Nevada	191
Massachusetts	163
Hawaii	146
New York	108
Colorado	103

If the company excluded California and Colorado from the data set, which of the following best describes how the mean and median number of homes powered by solar energy would change?

- A) The mean and median would both remain unchanged.
- B) The mean and median would both decrease.
- C) The mean would remain unchanged, and the median would decrease.
- D) The mean would decrease, and the median would remain unchanged.

Questions 18 and 19 refer to the following information.

Kendall Park
Daily Cabin Rental Fees

Season	Rustic cabin	Deluxe cabin
Summer	\$115	\$175
Fall	\$90	\$140
Winter	\$70	\$110
Spring	\$90	\$140

Kendall Park offers 2 cabins for rent. The rental fee for each cabin depends on the season of the year. The table above shows the daily rental fees for the 2 cabins this year.

In order to cover maintenance costs, the total summer rental fees from the rustic cabin and the deluxe cabin need to be greater than \$15,000. If a is the number of days the rustic cabin is rented, and b is the number of days the deluxe cabin is rented, which of the following inequalities represents this condition?

- A) $175a + 115b > 15,000$
- B) $290(a + b) > 15,000$
- C) $115a + 175b < 15,000$
- D) $115a + 175b > 15,000$

19

The rental fees this fall are 20% higher than they were last fall. If Jerome rented the rustic cabin for 6 days last fall, what was the total cost of his rental?

- A) \$450
- B) \$540
- C) \$575
- D) \$648

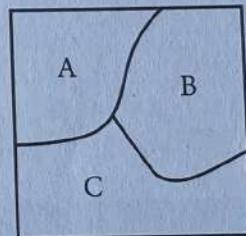
20

$$5x + k = 5x + 3$$

In the given equation, k is a constant. If the equation has no solution, which of the following must be true?

- A) $k > 3$
- B) $k < 3$
- C) $k = 3$
- D) $k \neq 3$

21



The figure above shows a square that is divided into three regions. The areas of regions A, B, and C are a , b , and c , respectively. A point will be selected at random from the square. If the point selected is not from region A, what is the probability that it is from region C?

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



22

The length of a side of square X is $\frac{2}{3}$ the length of a side of square Y . The perimeter of square Y is how many times the perimeter of square X ?

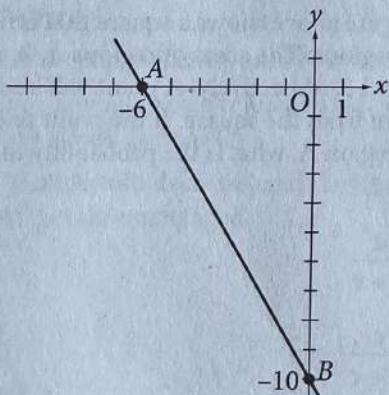
A) 3

B) 2

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

D) $\frac{2}{3}$

23



Which of the following is an equation of line AB in the xy -plane shown?

- A) $10x + 6y = -60$
- B) $10x - 6y = -60$
- C) $10x + 6y = 60$
- D) $10x - 6y = 60$

24

If $n > 0$, which of the following is equivalent to n decreased by 20%?

A) $0.2n$

B) $0.8n$

C) $1.2n$

D) $1.8n$

25

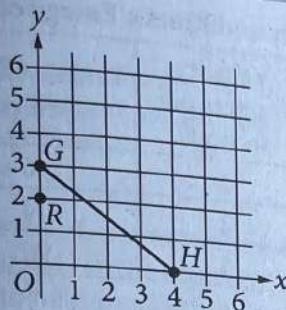
$y = 9.8x$

The equation above can be used to estimate the speed y , in meters per second, of an object x seconds after the object is dropped. The graph of the equation in the xy -plane is a line. What does the slope of the line represent?

- A) The speed of the object x seconds after it is dropped
- B) The increase in the speed of the object per second after it is dropped
- C) The initial speed of the object as it is dropped
- D) The distance that the object has fallen since it was dropped



26



Line segment GH and point R are shown in the xy -plane. If line ℓ (not shown) contains point R and is perpendicular to line segment GH , which of the following is an equation of line ℓ ?

- A) $-4x + 3y = 6$
- B) $-3x + 4y = 8$.
- C) $3x + 4y = 8$
- D) $4x + 3y = 6$

28

Each morning for 5 consecutive days, the value of an initial \$1,000 investment is reported to have lost 15% of the value it had on the previous day. Which of the following models gives the value of the investment V for a given day d , where $d = 1$ corresponds to the first of the 5 days that the investment lost 15% of its value?

- A) $V = 1,000(0.15d)$
- B) $V = 1,000(0.85d)$
- C) $V = 1,000(0.15)^d$
- D) $V = 1,000(0.85)^d$

27

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

In the equation shown, k is a constant. If the equation has no real solutions, which of the following could be the value of k ?

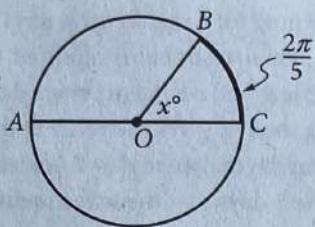
- A) 6
- B) 4
- C) 3
- D) 2

4



4

29



Note: Figure not drawn to scale.

The circle above has center O , and \overline{AC} is a diameter of the circle. If the radius of the circle is $\frac{4}{3}$ and the length of arc \widehat{BC} is $\frac{2\pi}{5}$, what is the value of x ?

- A) 24
- B) 36
- C) 42
- D) 54

30

Velocity and Kinetic Energy of an Object

Velocity (meters per second)	Kinetic energy (joules)
1	6
2	24
4	96

The table above shows the velocity v , in meters per second, of an object and its corresponding kinetic energy $K(v)$, in joules, for three different velocities. The function K is quadratic with respect to v . What is the kinetic energy, in joules, of the object when its velocity is 3 meters per second?

- A) 42
- B) 48
- C) 54
- D) 60

DIRECTIONS

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

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

5. **Mixed numbers** such as $3\frac{1}{2}$ must be gridded

as 3.5 or $\frac{7}{2}$. (If  is entered into the

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

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

Write answer in boxes.
Grid in result.

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

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

Answer: 2.5

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

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

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

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

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

Answer: 201 – either position is correct

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

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

NOTE:

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



31

$$\sqrt[3]{p^2} = \sqrt[5]{p^t}$$

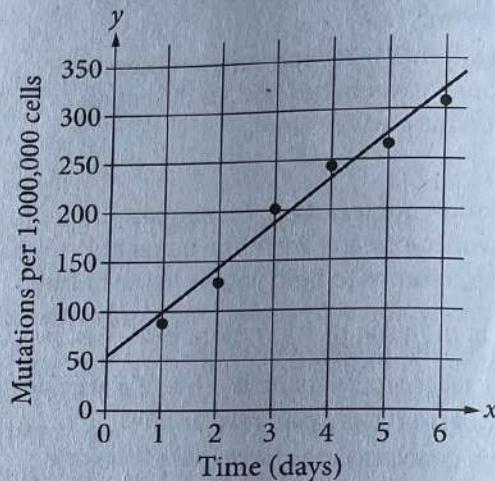
In the equation above, p is a constant greater than 1. What is the value of t ?

32

$$\begin{aligned}(x + 3) + (y - 2) &= 43 \\ (x + 3) - (y - 2) &= 67\end{aligned}$$

If (x, y) is the solution to the system of equations above, what is the value of $4(x + 3)$?

33



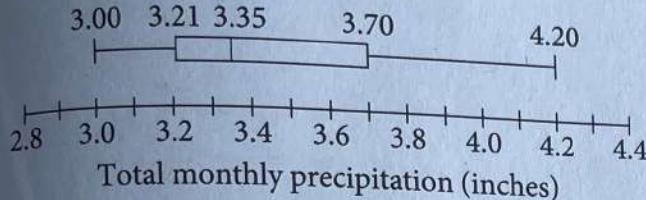
The points on the scatterplot for each day show the number of times a specific mutation was observed in a culture of a certain strain of cells. A line of best fit for the data is also shown. For how many of the observations was the number of mutations less than predicted by the line of best fit?

34

$$g(x) = 2x - 141$$

The function g is defined above. For what value of x does $g(x) = 71$?

Questions 35 and 36 refer to the following information.



The total monthly precipitation, in inches, was recorded for each of 12 consecutive months in Charlotte, North Carolina. The data collected contain no duplicate measurements and are summarized in the box plot shown.

35

Based on the box plot, what is the median total monthly precipitation, in inches, in Charlotte?

36

Based on the box plot, what is the range, in inches, of the total monthly precipitation in Charlotte?

37

$$4(x - 3)^2 = 9(x - 2)^2$$

If $x = c$ is a solution to the equation above and $c > 0$, what is the value of c ?

38

The volume of a rectangular prism with a square base is 6000 cubic inches. If the area of each of the four lateral faces is 300 square inches, what is the area, in square inches, of the square base?

STOP

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

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August 2019 USA Answers

Reading				Writing				Math1		Math2	
Question	Answer	Question	Answer								
1	A	41	C	1	D	41	A	1	A	1	D
2	C	42	A	2	A	42	B	2	B	2	B
3	D	43	D	3	C	43	A	3	B	3	C
4	C	44	A	4	D	44	B	4	C	4	C
5	D	45	B	5	A			5	D	5	D
6	B	46	C	6	C			6	A	6	D
7	B	47	D	7	A			7	C	7	A
8	D	48	A	8	B			8	C	8	A
9	C	49	B	9	A			9	D	9	D
10	D	50	A	10	C			10	B	10	B
11	A	51	A	11	C			11	B	11	C
12	D	52	D	12	B			12	A	12	A
13	D			13	A			13	A	13	A
14	A			14	A			14	B	14	C
15	B			15	C			15	A	15	C
16	C			16	D			16	212	16	B
17	B			17	B			17	2	17	D
18	D			18	D			18	8	18	D
19	C			19	D			19	1/5, 0.2	19	A
20	C			20	C			20	80	20	D
21	C			21	B					21	B
22	A			22	B					22	C
23	B			23	D					23	A
24	B			24	D					24	B
25	B			25	A					25	B
26	D			26	D					26	A
27	A			27	B					27	A
28	C			28	C					28	D
29	C			29	A					29	D
30	B			30	B					30	C
31	B			31	D					31	10/3, 3.33
32	C			32	B					32	220
33	D			33	C					33	4
34	B			34	B					34	106
35	A			35	C					35	3.35
36	B			36	C					36	1.20
37	D			37	C					37	12/5, 2.4
38	A			38	D					38	400
39	D			39	A						
40	D			40	D						

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