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 CollegeBoard

Reading Test

65 MINUTES, 52 QUESTIONS

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

DIRECTIONS

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

Questions 1-10 are based on the following passage.

This passage is from Julie Iromuanya, *Mr. and Mrs. Doctor*. ©2015 by Julie Iromuanya. Ifi has just traveled to Nebraska to join her husband, Job, who has been living there since the couple's marriage in Nigeria.

"Have you eaten?"

"No."

"Come now. We'll drop your baggage at the house, and then we will meet other Nigerians at a restaurant. 5 Emeka and Gladys. You'll like them." He paused for a moment, as if choosing his words with care. "You will like Gladys immediately. She is a classical lady. But Emeka, you must become acquainted with him before you can understand his foolish humor."

10 A pale-blue skyline rimmed with ash gray guided the Audi along the interstate. Job drove in silence until they reached a junction and turned off onto a two-lane road. Zonta, the town that would be Ifi's new home, was twenty or thirty miles south of the 15 Red Cloud reservation, and south of Zonta was Omaha, where Job said he went to medical school. They would meet Gladys and Emeka in Omaha for dinner. This was also where Job commuted to for work each night. Zonta, Nebraska, was a town whose 20 name meant "trusted flat waters." The Indians had named it that. Job told her this as they sped over concrete roads surrounded by flats ankle deep in snow. One year, he said, in the middle of winter, there were several hot days, and it all melted. "River 25 drained into street," Job said, thrusting one finger along the skyline. He had finally understood what the name meant.

All the way to town they passed trees, skinny, brown, and gnarled like old hands. Snow wetted the 30 fingers. Overnight, there would be such a freeze that from a distance the trees would look silver. Later, this was the feature that pleased Ifi most when she stared out the window at night while Job was away at the hospital.

35 Dusk melted into a chalk white that floated and exploded into the sky. Job clicked the wipers, and they flipped back and forth at a frenetic pace, splitting the flakes. In defiance, they grew fatter and rimmed the windshield with dust that scattered on 40 the wind.

"Snow," Ifi said as it slowly dawned on her. She had only read of it in books. This was snow, flaking on the car, the same as the blanket laid on the grass. This is America, she said to herself. She would scoop 45 it into an envelope and mail it to Aunty. No, she would not do that. She laughed. Instead, she would take a picture for her little cousins. Without thinking, Ifi reached for the door handle.

Job swerved the car. "What are you doing? Are 50 you crazy?"

Save for a pickup truck that had passed many miles before, there was no one else on the road. "Let's stop. I would like to touch it."

He gave her a strange look. "We cannot be late to 55 dinner."

"Darling," Ifi said, settling on the word she had heard Aunty and Uncle use in the middle of quarrels.

"Okie, okie," he said. "We will stop. We are not far from home."

60 They pulled off the road and parked in a clearing surrounded by twisted metal piping for a fence. Clapboard sheds were spread across the fields. These were the county fairgrounds, where twice a year, during the fair and on Independence Day, everything
65 was lit up. Farther still was just the outline of a string of corrugated-iron warehouses.

Ifi opened her palms and let snow fall into them. She scooped it into her hands, pressed them together. She placed it in her mouth and tasted. It was cold and
70 wet, like rain. That was all. She felt foolish.

At first he sat in the car, wiping away the fog on the inside of the windshield. Then he came out, his back against the car, as she rose from the snow. She looked to him like he imagined himself at nineteen,
75 walking the curious, ginger walk of feet unfamiliar with snow. She shivered. When her eyes met his, he said softly, "I did that as well."

Snow was in her hands. It melted and ran along her palms and evaporated into the white at her feet.
80 Again she looked at him, and it suddenly occurred to her. "I can do anything here," she said, her eyes large and bright. When he looked at her again with a queer expression, she elaborated. "I can be anything. Like you," she said. "I can be a doctor in America if I like."

1

It can be inferred from the passage that Job regards Ifi's first meeting with his friends with

- A) concern that Emeka will not make a good first impression.
- B) hope that Ifi will enjoy the food at the restaurant he has chosen.
- C) doubt that Gladys and Emeka will have anything in common with Ifi.
- D) inattention to Ifi's own reluctance for such a meeting.

2

The passage describes a previous weather event as affecting Job by

- A) showing him how the region's climate can be unpredictable.
- B) leading him to recognize the aptness of a particular place name.
- C) indicating that his assumptions about snow were groundless.
- D) disrupting his daily commute to Omaha temporarily.

3

One purpose of lines 31-34 ("Later . . . hospital") is to

- A) demonstrate Ifi's increasing appreciation of nature.
- B) contrast Ifi's past with her present situation.
- C) provide a glimpse into Ifi and Job's future life together.
- D) hint at Ifi's growing uneasiness about her husband.

4

The description of the snowflakes' "defiance" in line 38 serves primarily to

- A) emphasize the growing power of the storm.
- B) imply that the storm will prove dangerous.
- C) suggest that overcoming the storm requires technology.
- D) underscore the quiet beauty of the storm.

5

According to the passage, when the snow begins to fall

- A) Job stops the car in anticipation of worsening conditions.
- B) Job is concerned that the snow will delay their arrival.
- C) Ifi realizes that the snow is potentially dangerous.
- D) Ifi does not immediately recognize what it actually is.

6

After Ifi asks Job to stop the car (lines 52-53), Job's feelings toward Ifi shift from

- A) defensiveness to a realization of emotional security.
- B) dismissiveness to a respect for an unusual ambition.
- C) puzzlement to a recognition of emotional kinship.
- D) hostility to a powerful surge of genuine affection.

7

In conjunction with line 54 ("He gave . . . look"), which choice provides the best evidence for the answer to the previous question?

- A) Lines 60-61 ("They . . . fence")
- B) Lines 71-73 ("At first . . . snow")
- C) Lines 76-77 ("When . . . well")
- D) Lines 82-84 ("When . . . said")

8

Which statement can be reasonably inferred from the passage regarding Ifi's relationship to her family in Nigeria?

- A) Ifi regrets that her family could not accompany her to the United States.
- B) Ifi is embarrassed about her family's limited experiences with other cultures.
- C) Ifi resents the fact that her family did not approve of her marriage to Job.
- D) Ifi respects some family members as models of appropriate behavior in personal interactions.

9

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

- A) Lines 44-45 ("She would . . . Aunty")
- B) Lines 46-47 ("Instead . . . cousins")
- C) Lines 56-57 ("Darling . . . quarrels")
- D) Lines 58-59 ("Okie . . . home")

10

The description of Ifi's eyes as "large and bright" (lines 81-82) serves to emphasize Ifi's

- A) eager anticipation of the adventures that lie ahead.
- B) feelings of apprehension regarding her future life.
- C) fierce determination to adopt a new value system.
- D) joy at being reunited with Job after so many years.

Questions 11-20 are based on the following passages.

Passage 1 is adapted from a speech delivered to the New York County Lawyers' Luncheon Forum in 1992 by Judge Miriam Cedarbaum, "Women on the Federal Bench." Passage 2 is adapted from a speech delivered to the School of Law at the University of California, Berkeley, in 2001 by Justice Sonia Sotomayor, "A Latina Judge's Voice."

Passage 1

Many women of my generation believed that separateness undermined equality, and we sought integration. I have never referred to myself, for
 Line example, as a woman lawyer or a woman judge
 5 because I have always believed that those were not categories. That is, people are undoubtedly men and women, but lawyers and judges do not have genders. This is a viewpoint that is now controversial, and is under attack by some feminist theorists who
 10 propound the idea that women think differently from men, and that there are gender-based intellectual differences that should be recognized in the work place. . . .

Although undoubtedly we are all affected by our
 15 individual experiences and acculturation, our common legal education has ingrained in us the enormous importance in our democratic society of a tradition of independent and impartial judges. The preservation of this tradition depends on judicial
 20 integrity, which is the ability and willingness of upright judges to set aside, to the extent possible, their personal sympathies and prejudices in deciding legal disputes. This in turn requires of judges honest self-appraisal and the recognition and acceptance of
 25 one's own fallibility. In some cases, this ideal may be more easily said than accomplished. But, after more than six years as a federal trial judge, I have not seen any basis for believing that gender plays a role one way or the other in any particular judge's ability or
 30 willingness to exercise self-restraint.

I also believe that a good judge should recognize as to all litigants, but especially as to criminal
 defendants, that "[t]here but for the grace of God go I." That is, that judges are members of the same
 35 species as all the human beings who appear before us. Whether we call it humility, humanity, or compassion, I have not observed differences in this quality among my colleagues that can fairly be explained by gender. The same can be said of wisdom
 40 and intellect. . . .

Perhaps it is because of my own background that I find it difficult to accept the notion that as judges or lawyers, men and women have fundamentally different approaches.

Passage 2

45 While recognizing the potential effect of individual experiences on perception, Judge Cedarbaum nevertheless believes that judges must transcend their personal sympathies and prejudices and aspire to achieve a greater degree of fairness and
 50 integrity based on the reason of law. Although I agree with and attempt to work toward Judge Cedarbaum's aspiration, I wonder whether achieving that goal is possible in all or even in most cases. And I wonder whether by ignoring our differences as women or
 55 men of color we do a disservice both to the law and society. . . .

Whether born from experience or inherent physiological or cultural differences, a possibility I
 abhor less or discount less than my colleague Judge
 60 Cedarbaum, our gender and national origins may and will make a difference in our judging. Justice [Sandra Day] O'Connor has often been cited as saying that a wise old man and wise old woman will reach the same conclusion in deciding cases. . . . I am also not
 65 so sure that I agree with the statement. . . .

Let us not forget that wise men like Oliver Wendell Holmes and Justice [Benjamin] Cardozo
 voted on cases which upheld both sex and race
 discrimination in our society. Until 1972, no
 70 Supreme Court case ever upheld the claim of a woman in a gender discrimination case. I . . . believe that we should not be so myopic as to believe that others of different experiences or backgrounds are incapable of understanding the values and needs of
 75 people from a different group. Many are so capable. As Judge Cedarbaum pointed out to me, nine white men on the Supreme Court in the past have done so on many occasions and on many issues including
 Brown [v. Board of Education].

80 However, to understand takes time and effort, something that not all people are willing to give. For others, their experiences limit their ability to understand the experiences of others. Other[s] simply do not care. Hence, one must accept the proposition
 85 that a difference there will be by the presence of women and people of color on the bench. Personal experiences affect the facts that judges choose to see.

My hope is that I will take the good from my experiences and extrapolate them further into areas with which I am unfamiliar. I simply do not know exactly what that difference will be in my judging. But I accept there will be some based on my gender and my Latina heritage.

11

The main purpose of the first paragraph of Passage 1 is to

- A) place Cedarbaum’s point of view in a particular cultural context.
- B) suggest Cedarbaum’s openness to the views of those who disagree with her.
- C) express Cedarbaum’s political solidarity with a group of feminist scholars.
- D) defend Cedarbaum’s position from the criticism of her colleagues.

12

Which choice from Passage 1 best supports the idea that judges’ personal backgrounds may be at odds with the professional responsibilities emphasized in their training?

- A) Lines 5-6 (“I have . . . categories”)
- B) Lines 14-18 (“Although . . . judges”)
- C) Lines 23-26 (“This . . . accomplished”)
- D) Lines 36-40 (“Whether . . . intellect”)

13

As used in line 35, “appear” most nearly means

- A) develop.
- B) resemble.
- C) are evident.
- D) are brought.

14

In the first paragraph of Passage 2 (lines 45-56), Sotomayor indicates that race and gender differences among judges are

- A) necessary elements for achieving system-wide judicial integrity.
- B) inevitably problematic for people who dismiss their importance.
- C) ultimately damaging to impartial analysis.
- D) possibly beneficial to the public at large.

15

As used in line 83, “simply” most nearly means

- A) modestly.
- B) easily.
- C) frankly.
- D) barely.

16

In the context of Sotomayor’s speech, the sentences in lines 88-93, Passage 2 (“My hope . . . heritage”) serve mainly to

- A) qualify the evidence provided in the passage with a new consideration.
- B) cast the main argument of the passage in a personal light.
- C) offer a note of ambivalence about the implications of the passage.
- D) summarize the nature of the life experiences outlined in the passage.

17

Which choice best describes the relationship between the two passages?

- A) Passage 2 demonstrates the logical inconsistencies of the arguments in Passage 1.
- B) Passage 2 offers specific anecdotes that support the ideas in Passage 1.
- C) Passage 2 responds directly to the claims put forth in Passage 1.
- D) Passage 2 provides a theoretical justification for the discussion in Passage 1.

18

How do the two passages differ in the attitudes of each author toward the personal views of judges?

- A) Cedarbaum believes that personal views shape judicial decisions, whereas Sotomayor considers personal views to be less relevant to judicial decisions than other factors are.
- B) Cedarbaum argues that judges must strive to overcome personal views, whereas Sotomayor suggests that personal views are a potentially helpful tool for judges.
- C) Cedarbaum implies that personal views slow the judicial process, whereas Sotomayor contends that understanding one's personal views is an important part of the law.
- D) Cedarbaum asserts that personal views are widely considered to be irrelevant in modern society, whereas Sotomayor assumes that personal views are characteristic of human nature.

19

Based on Passage 1, how would Cedarbaum likely comment on Sandra Day O'Connor's statement as reported in Passage 2 (lines 62-64)?

- A) She would agree with the statement because she believes that gender does not serve a genuinely important purpose in judicial analysis.
- B) She would agree with the statement because she believes that older judges have more experience on which to draw than younger judges do.
- C) She would disagree with the statement because she believes that gender is a bias that the best judges eventually learn to suppress in their work.
- D) She would disagree with the statement because she believes that judges in the past did not recognize that personal opinions can harm the judicial process.

20

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

- A) Lines 1-3 ("Many . . . integration")
- B) Lines 26-30 ("But, after . . . self-restraint")
- C) Lines 31-34 ("I also . . . go I")
- D) Lines 34-35 ("That . . . before us")

Questions 21-31 are based on the following passage and supplementary material.

This passage is adapted from Kevin N. Laland, *Darwin's Unfinished Symphony: How Culture Made the Human Mind*. ©2017 by Princeton University Press. Animal behavior researchers have defined teaching as behavior targeted only at a naïve observer and that helps the naïve observer acquire a skill or knowledge at some cost to the teacher.

Meerkats are a small carnivorous species of mongoose that must survive in the harsh African desert through coordination and teamwork. Meerkat pups are almost entirely reliant on food provisioned by older group members, known as “helpers,” which include both parents and other colony members. Yet by three months of age, those same youngsters have become entirely self-sufficient at feeding and can handle a variety of difficult and dangerous prey, including lizards, spiders, and even scorpions with their deadly stings. Recent work shows that the helpers facilitate this transition to nutritional independence by gradually introducing pups to live prey. Cambridge University researchers Alex Thornton and Katherine McAuliffe set out to establish whether this process meets the definition of teaching. This required them to determine whether the transfer of live prey by helpers occurred solely in the presence of the pups, at some cost to the adults, and led to the youngsters learning about food.

Adult meerkats normally consume prey immediately, but when young pups are present, they typically kill or disable mobile prey items before carrying them to a begging pup. Scorpions are often disabled by removing the sting, allowing pups to interact safely with the live prey. As pups grow older, they are increasingly given intact prey, stings and all. Thornton and McAuliffe established that whether or not helpers modify prey through sting removal before provisioning hung critically on the sound of the pups' begging calls, which changes with age. These researchers played recordings of the begging calls of old pups to groups with young pups, which led adults to bring back live prey, while playing the calls of young pups to groups with old pups caused an increase in the proportion of dead prey provisioned. In spite of the adult meerkat being fooled, the experimental manipulation demonstrates that the helpers normally adjusted their behavior to the age, and hence, competence of the pups. Indeed, the adults exhibited considerable sensitivity to the performance of pups, nudging prey items if the pups

ignored them, retrieving escaped prey, and modifying the prey some more (for instance, disabling further) if pups were struggling. This provisioning strategy incurs costs, because considerable time is spent monitoring the pups as they handle live prey, and there is a nontrivial risk that the pups will lose the prey item. However, the strategy creates opportunities for the pups to acquire hunting skills.

Thornton and McAuliffe were also able to provide experimental evidence that the helpers' behavior promoted skill acquisition. Pups that were artificially given additional opportunities to handle live, stingless scorpions subsequently outperformed siblings that had been given dead scorpions, showing that the opportunity to practice on disabled but live scorpions facilitates skill acquisition. Thornton and McAuliffe had demonstrated that the meerkat helpers' behavior was a genuine example of animal teaching. A clue as to why helpers teach is found with the observation that pups very rarely find mobile prey items themselves. Helpers can therefore actively facilitate the pups' acquisition of handling skills by giving them otherwise unavailable opportunities to practice handling prey. In the long term, adults benefit by reducing the costs of provisioning through hastening the time to independence, as well as through increased pup survival.

Figure 1

Prey Provisioning by Helper Meerkats in Response to Begging Calls of Pups

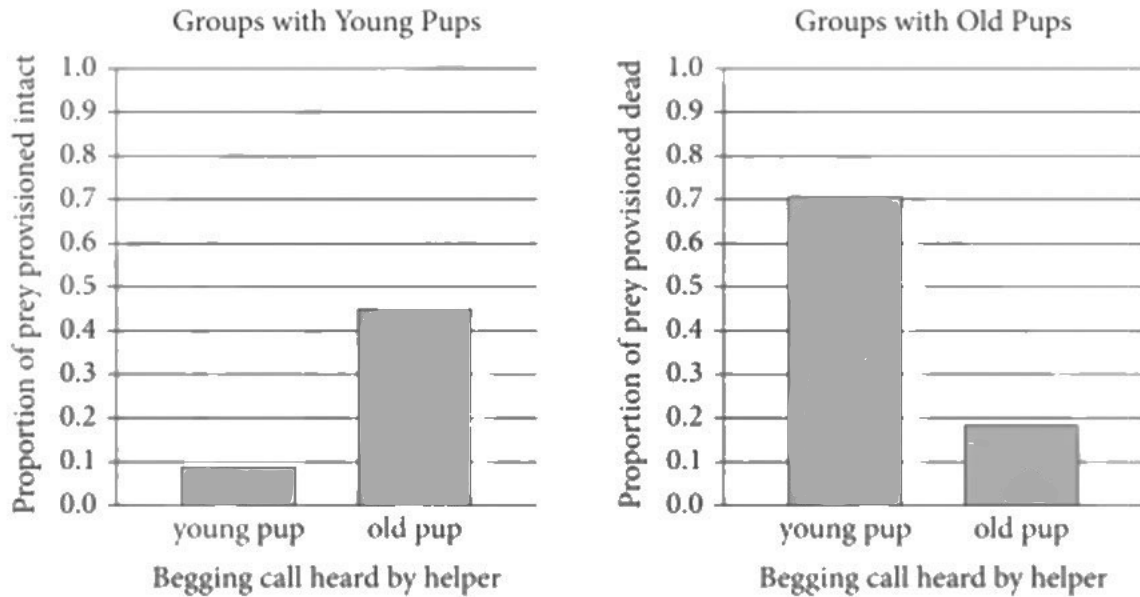
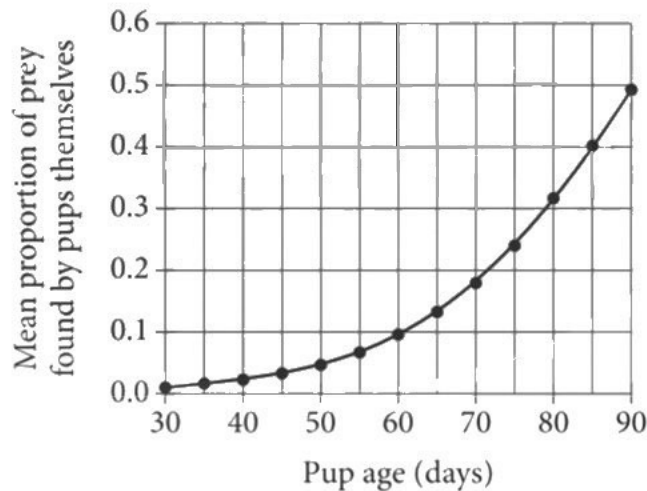


Figure 2

Meerkat Pups' Prey Acquisition by Age



Figures adapted from Alex Thornton and Katherine McAuliffe, "Teaching in Wild Meerkats." ©2006 by American Association for the Advancement of Science.

21

The main purpose of the passage is to

- A) raise questions about meerkat behavior that future research may be able to answer.
- B) present a series of studies about meerkat pups that contradicts previous research into their behavior.
- C) describe research that has furthered scientific understanding of meerkat behavior.
- D) address the limitations of applying research on adult meerkats to the behavior of meerkat pups.

22

Lines 1-11 (“Meerkats . . . stings”) mainly serve to

- A) provide background information on meerkats and their young.
- B) acknowledge the particular difficulties involved in meerkat research.
- C) give an overview of the studies discussed in the rest of the passage.
- D) pose a research question that will be answered in the rest of the passage.

23

Which choice best supports the idea that adult helpers are capable of assessing individual meerkat pups’ skills and adjusting the training they provide based on that assessment?

- A) Lines 14-17 (“Cambridge . . . teaching”)
- B) Lines 24-26 (“Scorpions . . . prey”)
- C) Lines 40-45 (“Indeed . . . struggling”)
- D) Lines 49-51 (“However . . . skills”)

24

As used in line 16, “meets” most nearly means

- A) finds.
- B) joins.
- C) encounters.
- D) fulfills.

25

As used in line 54, “promoted” most nearly means

- A) elevated.
- B) fostered.
- C) announced.
- D) recommended.

26

According to the passage, meerkat pups who played with living but harmless versions of meerkats’ usual prey were

- A) less able to discern when prey was dangerous than were pups who encountered intact prey.
- B) less likely to consume enough to survive than were pups who were provided with dead prey.
- C) more skillful at handling intact prey than were pups who were provided with dead prey.
- D) more likely to lose their prey than were pups who encountered intact prey.

27

Which statement about the provisioning of prey to meerkat pups can most reasonably be inferred from the passage?

- A) Typically, young meerkat pups who are being instructed do not immediately consume prey that has been provided by adults.
- B) Young meerkat pups can safely interact with prey that has been provided by a helper only after the helper has killed it.
- C) As an element of the training process, helper meerkats provide a greater variety of prey to younger pups than they do to older pups.
- D) When pups are still learning, direct experience with manipulating prey takes precedence over direct experience with acquiring prey.

28

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

- A) Lines 11-14 (“Recent . . . prey”)
- B) Lines 21-24 (“Adult . . . pup”)
- C) Lines 52-54 (“Thornton . . . acquisition”)
- D) Lines 62-67 (“A clue . . . prey”)

29

According to figure 1, in groups with young pups, approximately what proportion of prey is provided intact when the helper meerkats hear an old pup’s call?

- A) 0.09
- B) 0.19
- C) 0.45
- D) 0.70

30

The information in figure 1 best supports which claim made in the passage about helper meerkats and the prey they provide?

- A) In groups with young pups, meerkat helpers will reposition prey if the pups ignore it initially.
- B) In groups with old pups, meerkat helpers are more likely to provide dead prey in response to the calls of young pups than in response to the calls of old pups.
- C) If young pups allow prey to escape, helpers will retrieve the prey and further reduce its ability to escape before returning it to the pups.
- D) When pups are allowed to practice on disabled prey, they become more adept at handling intact prey.

31

According to figure 2, the proportion of prey found by a meerkat pup is closest to 0.2 when the pup is

- A) 50 days old.
- B) 60 days old.
- C) 70 days old.
- D) 80 days old.

Questions 32-42 are based on the following passage and supplementary material.

This passage and accompanying graph are adapted from "What History Says about Inequality and Technology."
©2017 by The Economist Newspaper Limited.

As more of the economy becomes automated, doomsayers worry that the gap between the haves and the have-nots will only grow. History shows, however, that this need not be so.

The recent rise in earnings for skilled workers is a rare historical phenomenon. Compiling records from churches, monasteries, colleges, guilds and governments, Gregory Clark, an economist at the University of California, Davis, has put together a comprehensive dataset of English wages that stretches back to the 13th century. Mr Clark notes that in the past the skilled-wage premium, defined as the difference in wages [expressed as a ratio] between craftsmen, such as carpenters and masons, and unskilled labourers has been fairly stable, save for two sharp declines.

The first drop came in the 14th century, and had nothing to do with technological change. Life expectancy in medieval England was short and interest rates were high, meaning that taking on the seven-year apprenticeship needed to become a craftsman came with a heavy opportunity cost. But interest rates started falling in this period, from around 10% in 1290 to 7.5% in 1340. When the Black Death struck England in 1348, wiping out a third of the population, interest rates fell further, to 5%, and apprenticeships became much more attractive. The increased supply of skilled labour relative to unskilled workers drove down the wage premium. Data from Jan Luiten van Zanden of Utrecht University show similar patterns in Belgium, France and the Netherlands.

The second big decline in the skilled-wage premium came after the Industrial Revolution. Inventions like the power loom displaced artisans, and increased the relative demand for unskilled labour. Craftsmen whose skills took years to hone suddenly found themselves being replaced by machines operated by workers with just a few months' training. (The Luddites¹ reacted by smashing the machines.) One study has found that the share of unskilled workers rose from 20% of the labour force in England in 1700 to 39% in 1850. The ratio of craftsmen's wages to labourers' started to fall in the early 1800s, and did not recover until 1960.

Using a different inequality measure leads to slightly different results. Peter Lindert, also at the University of California, Davis, says that as middle-skilled jobs in England disappeared, the Gini coefficient of household earnings rose, peaking in 1800. The share of earnings captured by the top 1% reached a high in around 1870. But the two measures then went on to fall, not bottoming out until the mid-20th century.

What distinguishes the advances of the computer age from those of the Industrial Revolution is that they have favoured skilled workers. So far, university degrees have been a reliable proxy for skill but this may change as artificial intelligence starts taking jobs away from white-collar workers. Projections from America's Bureau of Labor Statistics show that four of the five fastest-growing occupations in the country involve personal care; none of those jobs requires a bachelor's degree.

In any case, to assume that current economic trends will persist is to assume an inefficient labour market. Ken Rogoff, an economist at Harvard, argues that as the wage premium for a particular group of workers rises, firms will have a greater incentive to replace them.

¹ A group of workers in England who protested machinery used in manufacturing, believing that it was threatening their employment



32

Over the course of the passage, the main focus shifts from

- A) a criticism of current methods of measuring income inequality to a suggestion for a better approach.
- B) a discussion of historical trends in income inequality to an analysis of more recent ones.
- C) an overview of patterns in income inequality to an inquiry into the causes of this inequality.
- D) an analysis of the skilled-wage premium to a critique of other related measures.

33

In the context of the passage as a whole, the phrase “doomsayers worry” (line 2) serves mainly to

- A) emphasize that a particular view is overly negative.
- B) associate the author with a specific school of economic thought.
- C) convey the full urgency of a contemporary problem.
- D) suggest the biases of a group of researchers.

34

Which choice provides the best evidence for the idea that Clark’s findings, discussed in the second paragraph (lines 5-16), were part of a more widespread phenomenon?

- A) Lines 17-18 (“The first . . . change”)
- B) Lines 29-32 (“Data . . . Netherlands”)
- C) Lines 46-47 (“Using . . . results”)
- D) Lines 55-57 (“What . . . workers”)

35

Based on the passage, it can reasonably be concluded that there is a strong relationship between fluctuations in the skilled-wage premium and fluctuations in the

- A) average number of years unskilled laborers who take on apprenticeships spend in completing them.
- B) overall supply of industrial machines available for training apprentices.
- C) total number of workers in the labor force of a particular country in a particular time period.
- D) balance of skilled laborers to unskilled ones as a percentage of a particular country’s labor force.

36

As used in line 51, “captured” most nearly means

- A) confined.
- B) found.
- C) apprehended.
- D) acquired.

37

The passage most strongly suggests that major advances in technology are likely to result in

- A) an initial decrease in interest rates and wage premiums.
- B) a rise in wages for craftsmen and other skilled workers.
- C) an overall increase in jobs for both skilled and unskilled workers.
- D) a loss of jobs for certain types of skilled workers.

38

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

- A) Lines 11-16 (“Mr. Clark . . . declines”)
- B) Lines 43-45 (“The ratio . . . 1960”)
- C) Lines 57-60 (“So far . . . workers”)
- D) Lines 65-67 (“In any . . . market”)

39

It can reasonably be inferred from the discussion of projections from the US Bureau of Labor Statistics (lines 60-64) that, over time, university degrees may become

- A) weaker indicators of employability.
- B) easier to attain than they were prior to the computer age.
- C) stronger predictors of earning potential.
- D) less valuable for those who are not studying technology.

40

In which of the years listed in the graph was the craftsman wage greatest relative to the laborer wage?

- A) 1300
- B) 1500
- C) 1700
- D) 1900

41

According to the graph, the interval in which the craftsman wage remained within the narrowest range of values relative to the laborer wage was between

- A) 1200 and 1300.
- B) 1300 and 1400.
- C) 1500 and 1600.
- D) 1800 and 1900.

42

Based on Clark’s findings, as described in the third paragraph (lines 17-32), what is the most likely explanation for the data for 1200–1300 shown in the graph?

- A) Life expectancy rose, so more workers became apprentices, which increased the supply of skilled workers.
- B) Interest rates rose, so fewer workers became apprentices, which decreased the supply of skilled workers.
- C) Cities were growing at a rapid rate, which resulted in projects that increased the demand for unskilled workers.
- D) New inventions were automating complex tasks, which decreased the demand for skilled workers.

Questions 43-52 are based on the following passages.

This passage is adapted from Oliver Morton, *Eating the Sun: How Plants Power the Planet*. ©2008 by Oliver Morton. Phytoplankton are photosynthesizing microscopic organisms that live near the surface of oceans and lakes.

Carbon-dioxide levels during ice ages vary with the extent of the ice, amplifying all the other changes. One of the reasons for this seems to be a fertilization of the open oceans brought about by the dryness and the receding seas.

Various places in the ocean offer abundant nitrate and phosphate but no phytoplankton. In the 1930s, a Norwegian oceanographer named Haaken Hasberg Gran suggested that the phytoplankton were absent because there wasn't enough iron to support them. Iron crops up all through the biochemistry of photosynthesis. But unfortunately, because the levels of iron involved are indeed low, and ocean research ships are made of iron, measuring iron levels with enough precision to prove Gran's hypothesis was hard.

In the 1980s the problem was rendered more graphic by brilliantly processed satellite images which used the spectral measurements that picked up the wavelengths associated with chlorophyll and extremely careful modelling of the behaviour of light as it entered and left the oceans to produce pictures which showed where in the oceans there was the most chlorophyll, and thus where the photosynthesis was going on. Combined with maps of nitrate and phosphate, these remarkable pictures made the 'High Nutrient Low Chlorophyll' areas graphically apparent. And at the same time, an ebullient American oceanographer named John Martin made use of 'ultra clean' techniques to get accurate measurements of iron levels in the dead zones. Iron deficiency was indeed a factor—and Martin went on to suggest that it might explain ice-age changes in ocean productivity.

The key to his insight was that the ice ages were also dry. The major source of iron to the mid-oceans is dust from the continents—the tropical North Atlantic is more productive than the southern part of the same ocean because of dust from the Sahara. Martin suggested that the increased amount of dust blown from the drier continents in the ice ages would have made various parts of the ocean more productive. The effect would be particularly marked,

he thought, in the southern oceans, where the level of unused nutrients is currently quite high, and where the dust supply might have been particularly abundant. South America takes on quite a different shape in the ice ages. The coastal shelf to the east becomes an extension of Patagonia; had there been any ice-age Argentinians, they could have walked to the Falkland Islands. Iron-bearing dust from these new plains would enrich the sea all around Antarctica. The rate at which the phytoplankton photosynthesized would increase, and that increase in photosynthetic activity would draw down carbon dioxide from the atmosphere. Thus a change in sea level produced by the growth of icecaps in Canada and Scandinavia would lead to a change in the carbon-dioxide level all around the world. And the dust only had to contain a very small amount of iron to work its magic—a hundred thousand tonnes or so. Give me a couple of tankers full of iron filings, Martin used to say, and I'll give you an ice age.

Biogeochemist Andrew Watson has since taken part in various experiments designed to test the iron fertilization hypothesis. These experiments—which involve setting to sea in a research vessel, dumping carefully prepared iron overboard and measuring what happens next in as many ways as possible—have proved Martin at least partly right, though sadly he died before the results were in. In the most thorough of them, in 1999, the careful application of a few tonnes of iron to the ocean south of New Zealand produced a bloom of phytoplankton nicely visible from space, a great curling comma of chlorophyll that went on to grace the cover of the journal *Nature*. Meanwhile a less controlled and less well documented, but rather more dramatic, experiment on the same effect has been going on in the North Pacific. In parts of China millions of tonnes of topsoil are being dried out and lost to the wind every year, a natural phenomenon exacerbated by over-grazing and the diversion of water to farmlands. Quite a lot of that topsoil ends up in the ocean. The iron supplied by increasing flows of dust over the past decades has been making vast stretches of the ocean north of Hawaii measurably more productive.

43

The primary purpose of the passage is to

- A) consider some competing explanations for a natural phenomenon.
- B) discuss a progression of evidence that addresses a long-standing scientific issue.
- C) describe how a theory has been refined in light of unexpected observations.
- D) propose a hypothesis that would resolve an ongoing scientific controversy.

44

According to the passage, Gran's idea about iron was primarily intended to explain the

- A) lack of certain organisms in some apparently nutrient-rich areas.
- B) relative dryness of most land masses during ice ages.
- C) atypical biochemistry of certain phytoplankton species.
- D) variations in carbon dioxide levels during ice ages.

45

As used in line 10, "support" most nearly means

- A) bolster.
- B) endure.
- C) encourage.
- D) maintain.

46

The passage suggests that Martin's techniques (lines 28-31) allowed him to overcome which impediment that previous researchers had encountered when trying to evaluate Gran's idea?

- A) Equipment used in conducting the research could influence the data.
- B) Technology required to process the collected data did not yet exist.
- C) The locations expected to yield relevant data were largely inaccessible.
- D) Variations in pertinent data did not seem to follow any clear pattern.

47

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

- A) Lines 7-10 ("In the . . . them")
- B) Lines 12-16 ("But unfortunately . . . hard")
- C) Lines 17-25 ("In the . . . going on")
- D) Lines 25-28 ("Combined . . . apparent")

48

According to the passage, Martin thought that ice-age ocean productivity differed from present ocean productivity because of the

- A) higher levels of nitrate and phosphate in the oceans during an ice age.
- B) greater amounts of dust being deposited in the oceans during an ice age.
- C) increased concentrations of atmospheric carbon dioxide during an ice age.
- D) more southerly position of South America during an ice age.

49

As used in line 39, “marked” most nearly means

- A) blemished.
- B) pronounced.
- C) isolated.
- D) inscribed.

50

The author includes the information about Watson’s research mainly to

- A) provide an example of the kind of findings that Martin’s hypothesis was intended to explain.
- B) explain how Martin’s hypothesis has been revised in response to new data.
- C) show that an important part of Martin’s hypothesis has been substantiated.
- D) identify a significant limitation on the scope of Martin’s hypothesis.

51

The passage most strongly suggests that certain agricultural practices in China have

- A) raised the volume of river water flowing into the Pacific Ocean.
- B) compensated to some extent for natural processes of soil erosion.
- C) been studied extensively in an effort to further Martin’s research.
- D) increased chlorophyll levels in parts of the Pacific Ocean.

49

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

- A) Lines 70-73 (“Meanwhile . . . Pacific”)
- B) Lines 73-76 (“In parts . . . farmlands”)
- C) Lines 76-77 (“Quite . . . ocean”)
- D) Lines 77-80 (“The iron . . . productive”)

STOP

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

Writing and Language Test

35 MINUTES, 44 QUESTIONS

Turn to Section 2 of your answer sheet to answer the questions in this section.

DIRECTIONS

Each passage below is accompanied by a number of questions. For some questions, you will consider how the passage might be revised to improve the expression of ideas. For other questions, you will consider how the passage might be edited to correct errors in sentence structure, usage, or punctuation. A passage or a question may be accompanied by one or more graphics (such as a table or graph) that you will consider as you make revising and editing decisions.

Some questions will direct you to an underlined portion of a passage. Other questions will direct you to a location in a passage or ask you to think about the passage as a whole.

After reading each passage, choose the answer to each question that most effectively improves the quality of writing in the passage or that makes the passage conform to the conventions of standard written English. Many questions include a “NO CHANGE” option. Choose that option if you think the best choice is to leave the relevant portion of the passage as it is.

Questions 1-11 are based on the following passage.

Filling in the Blank

1 Every Wednesday on a weekly basis for over fifty years, Nadia Boulanger would invite her current pupils to her Parisian apartment for an afternoon of

1

- A) NO CHANGE
- B) On Wednesdays—that is, every week—
- C) Every Wednesday
- D) Each and every Wednesday in her apartment

music and discussion. **2** Some of the twentieth century's greatest composers attended these intellectually rigorous weekly gatherings. They were just some of the attendees. From the 1920s until her death in 1979, countless aspiring composers—like Aaron Copland, Philip Glass, and Quincy Jones—sought out Boulanger's mentorship, as if it were a rite of passage in their musical careers. Boulanger, a **gifted performer and composer** in her own right, was famous for her demanding curriculum that stressed not only the **3** obligations composers have to their audience but also the need for every student to discover his or her own individuality as a composer.

[1] Central to Boulanger's teaching was her insistence that students master the fundamentals of classical music, which to her meant gaining a proficiency in music theory and analysis while also cultivating listening skills. [2] Boulanger used various exercises to drill her students in music basics such as harmony (combining two or more notes) and counterpoint (combining melodies). [3] During private lessons and weekly gatherings, Boulanger **4** leads line-by-line analyses of

2

Which choice most effectively combines the underlined sentences?

- A) Of the attendees at these intellectually rigorous weekly gatherings, some of them were among the twentieth century's greatest composers.
- B) These intellectually rigorous weekly gatherings had attendees, and among them were some of the twentieth century's greatest composers.
- C) Some of the twentieth century's greatest composers attended because these were intellectually rigorous weekly gatherings.
- D) Among the attendees to these intellectually rigorous weekly gatherings were some of the twentieth century's greatest composers.

3

Which choice best sets up the main idea of the next paragraph?

- A) NO CHANGE
- B) advantages of dramatic formats like opera
- C) importance of musical form
- D) value of learning to play several instruments

4

- A) NO CHANGE
- B) would lead
- C) will lead
- D) has been leading

famous musical compositions, identifying their **5** structures and what she discerned as their weaknesses as well. [4] From these intensive sessions with Boulanger, Glass claims **6** that, he “learned to hear.” **7**

While Boulanger believed devoutly in musical traditions of the past, she also encouraged her students to experiment and forge their own styles—which they certainly did. Copland, who studied for three years with Boulanger, began composing classical pieces that took inspiration from American folk songs, as in his 1938 ballet *Billy the Kid*. Glass, a later student, developed a more minimalist approach, breaking music down to its basic components. In the 1968 composition *Two Pages*, for example, a pattern of five notes is repeated for eighteen dizzying minutes. Jones, one of the few jazz musicians to study with **8** Boulanger, went on to compose dozens of film scores and produce some of the most iconic pop albums of the century, such as Michael Jackson’s 1982 hit *Thriller*. To Boulanger,

5

- A) NO CHANGE
- B) structures and what she discerned as their weakness’s
- C) structures’ and what she discerned as their weaknesses’
- D) structure’s and what she discerned as their weaknesses

6

- A) NO CHANGE
- B) that
- C) that:
- D) that—

7

To make this paragraph most logical, sentence 1 should be placed

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

8

Which choice best sets up the information that follows in the sentence?

- A) NO CHANGE
- B) Boulanger went on—to
- C) Boulanger went on to
- D) Boulanger went on to,

who **9** once taught the composer of the musical *Bye Bye Birdie*, it was only natural her pupils would take such diverse paths and make such unique music.

Above all, Boulanger was truly dedicated to music, and she **10** past on a legacy of musical devotion to several generations of composers. She famously once said, “False notes can be forgiven; false music cannot,” and Boulanger **11** became renowned more for her teaching than for her own musical compositions.

9

Which choice best supports the information that follows in the sentence?

- A) NO CHANGE
- B) held that one must first master the rules of composition before breaking them,
- C) taught for years at the American Conservatory at Fontainebleau,
- D) believed that composers must find ways to individuate themselves,

10

- A) NO CHANGE
- B) past for
- C) passed on
- D) passed for

11

The writer wants a conclusion that summarizes the passage’s discussion of Boulanger’s legacy. Which choice best accomplishes this goal?

- A) NO CHANGE
- B) will long be remembered for her formidable knowledge of composers and compositions as well as her own musical skills.
- C) taught her pupils the foundational skills that allowed them to be trailblazers, true to their own creative impulses.
- D) never claimed to be able to inspire creativity in her students, only to train them in technical matters.

Questions 12-22 are based on the following passage.

Dating Rocks

When a fossilized millipede called *Pneumodesmus newmani* was discovered in Scotland in 2004,

12 it's estimated age led researchers to conclude it could be the oldest air-breathing animal. It would take the efforts of a determined University of Texas student to show a flaw in **13** it.

The fossil was initially dated to around 428 million years **14** ago. This dating of the fossil was based on the abundance of period-specific plant spores found in nearby sediment. Professor Elizabeth Catlos of the Jackson School of Geosciences at the University of Texas at **15** Austin, knew that radiometric analysis could provide a more accurate age, but such an analysis had

12

- A) NO CHANGE
- B) they're
- C) their
- D) its

13

- A) NO CHANGE
- B) this hypothesis.
- C) them.
- D) those.

14

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

- A) ago, with this being
- B) ago: initial dating was
- C) ago
- D) ago, and the dating was

15

- A) NO CHANGE
- B) Austin knew:
- C) Austin knew
- D) Austin; knew

not been performed because researchers were unable to extract the **16** necessary minerals that they required from soil samples. Specifically, they needed grains of zircon, a mineral that traps uranium within its structure when it forms. Uranium isotopes decay into particular isotopes of lead at known rates, so researchers can determine how much time has passed since the zircon formed by measuring the ratios of the lead isotopes to the remaining uranium isotopes in the mineral. Carlos believed that zircon grains, or zircons, could be found in the **17** samples she asked her student Stephanie Suarez to find them.

[1] Suarez received soil samples from three beds near the one where the millipede fossil was found. [2] “The ashes clumped together, and no zircons sank to the bottom,” she recalls. [3] “It was very messy and unsuccessful.” [4] Suarez did some research and came across another method that used sonic vibrations to separate zircons. [5] This technique **18** worked; yielding numerous grains of zircon from two of the

16

- A) NO CHANGE
- B) minerals they needed to extract for analysis
- C) necessary minerals
- D) minerals that were necessarily needed

17

- A) NO CHANGE
- B) samples; and
- C) samples,
- D) samples, and she

18

- A) NO CHANGE
- B) worked, it yielded
- C) worked, yielding
- D) worked, and yielding

beds. [6] Suarez and other researchers isolated forty zircons from each of these beds for analysis. **19**

Performing the radiometric analysis, researchers found that numerous grains in each bed were as old as the original estimate or older. However, they also discovered that some were much younger, including a grain in bed 16COW3 dated to **20** 420.0 million years ago and one in bed 16COW1 dated to 410.4 million years ago. A total of **21** two grains in 16COW3 and eight in 16COW1 dated to the Devonian period, which lasted from about 419.2 to 358.9 million years ago.

Ages of Selected Zircon Grains in Beds near *Pneumodesmus newmani* Fossil

	Grain #	Age (millions of years)
Grains in bed 16COW3	4	414.3
	9	415.0
	26	418.7
	3	426.0
	37	447.7
Grains in bed 16COW1	34	410.4
	6	413.7
	1	413.8
	12	414.0
	14	414.0
	27	415.0
	19	418.8
	2	420.0

Adapted from Stephanie E. Suarez et al., "A U-Pb Zircon Age Constraint on the Oldest-Recorded Air-Breathing Land Animal." ©2017 by Stephanie E. Suarez et al.

19

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

She first tried to separate zircons from volcanic ash in the samples by crushing the minerals up and applying an organic solvent, but this method proved ineffective.

The best placement for the sentence is

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

20

Which choice most accurately represents the information in the table?

- A) NO CHANGE
- B) 413.8
- C) 414.3
- D) 418.8

21

Which choice most accurately represents the information in the table?

- A) NO CHANGE
- B) at least four grains in each bed
- C) five grains in 16COW3 and three in 16COW1
- D) three grains in 16COW3 and seven in 16COW1

Since the Devonian is already known to have given rise to other air-breathing animals, the presence of grains from this period around the fossil indicated that *Pneumodesmus newmani* is not the oldest air-breathing animal. Together with Catlos and two other scientists, Suarez published her results in the journal PLOS ONE in 2017; thanks to Suarez, **22** the search for the oldest air-breathing animal now continues.

22

Which choice most effectively concludes the passage?

- A) NO CHANGE
- B) the tricky problem of how to extract zircons was solved.
- C) important data about the Devonian period were discovered.
- D) researchers have a new reason to be interested in ancient soil beds.

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

Managing Expectations

[1] In the workplace, managers' expectations regularly **23** become self-fulfilling prophecies, for better or worse, employees end up performing like their managers believe they will. [2] Researchers have long known both that positive managerial expectations can lead to increased employee performance and that supervisors often have difficulty communicating such beliefs, especially if **24** it is not sincerely held. [3] For example, subtle nonverbal signals, such as facial expressions, operate on a subconscious **25** level, betraying and showing bosses' true feelings. [4] Although it can be challenging to control such signals, supervisors can create an environment of positive expectations by incorporating two concrete strategies into their leadership style. **26**

Managers can start by setting challenging, yet realistic, performance goals for their employees. In the 1960s, an experiment at the Metropolitan Life Insurance

23

- A) NO CHANGE
- B) become self-fulfilling prophecies
- C) become: self-fulfilling prophecies,
- D) become self-fulfilling prophecies:

24

- A) NO CHANGE
- B) that is
- C) this is
- D) they are

25

- A) NO CHANGE
- B) level, betraying
- C) level beyond conscious awareness, showing
- D) level, and these signals betray

26

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

Thus, managers' words may tell one story, and their faces, another.

The best placement for the sentence is

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

Company demonstrated how **27** can ambitious goals powerfully communicate positive expectations? One of the company's district managers selected his six best insurance agents, placed them under the leadership of his best assistant manager, and tasked the group with a lofty sales **28** goal, which acted as a clear sign of management's confidence in the group's abilities. People within the company began referring to this group as the "super **29** staff." The six agents who made up the group performed accordingly, boosting the performance of the agency by 40 percent. The takeaway is simple: to create super staff, give them super goals.

27

- A) NO CHANGE
- B) can ambitious goals powerfully communicate positive expectations.
- C) ambitious goals can powerfully communicate positive expectations?
- D) ambitious goals can powerfully communicate positive expectations.

28

Which choice most effectively supports the idea in the previous sentence?

- A) NO CHANGE
- B) goal: the manager would report the results of the experiment at an industry meeting in 1963.
- C) goal; sales goals are typically set once the market potential of a product has been determined.
- D) goal, as part of a plan based on the manager's observations of trends at various insurance agencies.

29

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

- A) staff," and the six agents performed
- B) staff," and the group made up of six agents performed
- C) staff"; they (the six agents) performed
- D) staff," with the agents, all six of them, performing

Providing employees with learning opportunities **30** —such as attending a professional conference or taking an online course—also communicates positive expectations because such activities signal to employees that they possess skills and abilities worth developing. In 2009, researchers in the Netherlands surveyed 904 manager-employee pairs from a variety of professions and found that managers who had higher expectations of their employees provided them with more opportunities for learning. However, the research team noted that some bosses were biased; they made these activities available only to employees they considered to have high potential—a behavior that **31** risk creating a situation in which employees considered to have low potential fail to develop their skills. **32** In determining an employee’s potential, supervisors should make these experiences available to all.

30

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

- A) Kept, because it clarifies the paragraph’s main point by offering examples of learning opportunities.
- B) Kept, because it provides a valid counterpoint to a claim about performance made in the previous paragraph.
- C) Deleted, because it fails to effectively set up the discussion of the research that follows in the paragraph.
- D) Deleted, because it introduces a detail that undermines the passage’s argument about employer expectations.

31

- A) NO CHANGE
- B) risks
- C) have risked
- D) are risking

32

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

- A) NO CHANGE
- B) In spite of inevitable failure,
- C) Though some skills are more difficult to learn,
- D) To avoid this pitfall,

These two strategies are simple, yet powerful, and workplace leaders would be wise to employ them. The evidence is clear: managers and staff alike benefit from an atmosphere **33** that expectations are high and opportunities to exceed them are abundant.

33

- A) NO CHANGE
- B) in that
- C) in which
- D) which

Questions 34-44 are based on the following passage.

Postal Privacy

[1] In his 1928 dissent on the case of *Olmstead v. United States*, US Supreme Court Justice Louis Brandeis **34** pledged that phone conversations are **35** subjected to privacy protections under the Fourth Amendment, which prohibits “unreasonable searches and seizures” of people’s “houses, papers, and effects.” [2] Brandeis’s argument is a key precedent for **36** modern legal interpretations of the Fourth Amendment. [3] Indeed, the influence of his argument has been so widespread that many in the United States today assume that the Fourth Amendment plainly guarantees a right to privacy of communications. [4] According to law professor Anuj Desai, the guarantee can principally be ascribed not to the Constitution but rather to the early history of the US Postal Service and the judicial reverberations of that history through time. [5] However, the US Constitution makes no explicit reference to such privacy. **37**

34

- A) NO CHANGE
- B) asserted
- C) demanded
- D) divulged

35

- A) NO CHANGE
- B) subjects of
- C) the subjection of
- D) subject to

36

- A) NO CHANGE
- B) lawyer-type thinking these days on
- C) the things legal bigwigs say today about
- D) what law pundits have reckoned lately regarding

37

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

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

As tensions between loyalists and revolutionaries escalated during the 1770s, the British-controlled colonial postal service became an increasing source of concern, **38** even though the American Secretary, Lord Dartmouth, wanted to avoid going to war. In response to this anxiety, the Second Continental Congress established an independent mail service in 1775 that **39** had provided safeguards for confidentiality, such as **40** a provision that mail for delivery “be under lock and key.” When the US Postal Service was founded in 1792, prohibitions against opening mail without a warrant were written into its charter. Although the Bill of Rights had

38

Which choice most effectively develops the information earlier in the sentence and sets up the information in the sentence that follows?

- A) NO CHANGE
- B) but new taxation measures were the immediate catalyst for the outbreak of the American Revolution.
- C) with colonists of both affiliations fearing access to their private communications by opponents.
- D) and Benjamin Franklin’s partner, newspaper publisher William Goddard, was one of its vocal critics.

39

- A) NO CHANGE
- B) provides
- C) provided
- D) will be providing

40

Which choice gives a supporting example that is most relevant to the sentence?

- A) NO CHANGE
- B) service to and from each of the thirteen colonies.
- C) delivery six days out of the week.
- D) the appointment of Benjamin Franklin as the first Postmaster General.

been ratified in 1791, Desai **41** notes that, the legal guarantee of private mail was established independently of the Fourth Amendment. There is no evidence that the amendment was designed to include sealed letters sent through the mail among the “papers” protected from unreasonable searches.

US Supreme Court **42** justices, those who eventually held that certain forms of surveillance violated the Fourth Amendment drew on a tradition of protections derived from colonial experience. In the 1878 case *Ex parte Jackson*, Justice Stephen Johnson Field crucially extended the meaning of “papers” in the Fourth Amendment to include sealed letters in the postal

41

- A) NO CHANGE
- B) notes that
- C) notes, that
- D) notes that:

42

- A) NO CHANGE
- B) justices, and who
- C) justices
- D) justices who

system, **43** moreover, making postal policy a constitutional principle. This opinion, in turn, set the precedent for Brandeis's equating of private phone calls with sealed letters.

Early postal policymakers were instrumental in guaranteeing the right to privacy of correspondence, but new forms of communication in the digital age mean that privacy matters are far from resolved. In grappling with questions surrounding twenty-first-century methods, **44** courts will likely continue to be influenced by decisions made in colonial times.

43

- A) NO CHANGE
- B) thus
- C) conversely,
- D) meanwhile,

44

- A) NO CHANGE
- B) it is by decisions made in colonial times that courts will likely continue to be influenced.
- C) decisions made in colonial times will likely continue to influence courts.
- D) the influence on courts will likely continue to be decisions made in colonial times.

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.

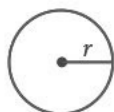
DIRECTIONS

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

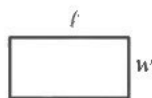
- The use of a calculator **is not permitted**.
- All variables and expressions used represent real numbers unless otherwise indicated.
- Figures provided in this test are drawn to scale unless otherwise indicated.
- All figures lie in a plane unless otherwise indicated.
- Unless otherwise indicated,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

REFERENCE

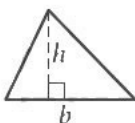


$$A = \pi r^2$$

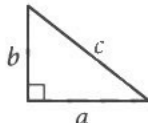
$$C = 2\pi r$$



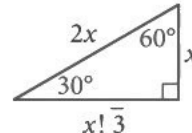
$$A = \ell w$$



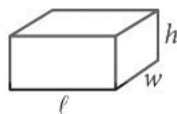
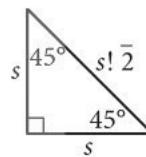
$$A = \frac{1}{2}bh$$



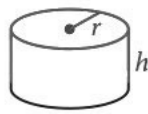
$$c^2 = a^2 + b^2$$



Special Right Triangles



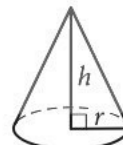
$$V = \ell wh$$



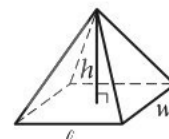
$$V = \pi r^2 h$$



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



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



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

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

$$3k + 2k = 5$$

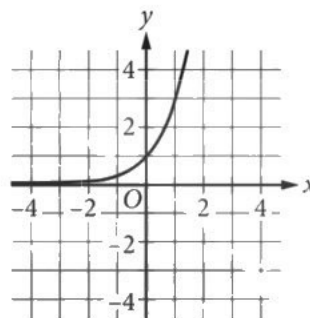
What is the solution to the given equation?

- A) 0
- B) 1
- C) 3
- D) 5

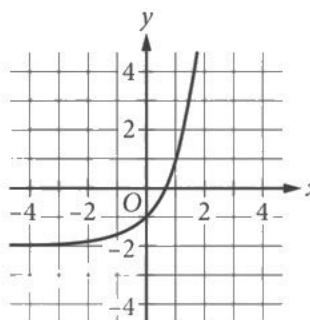
2

What is the graph of the equation $y = 3^x$?

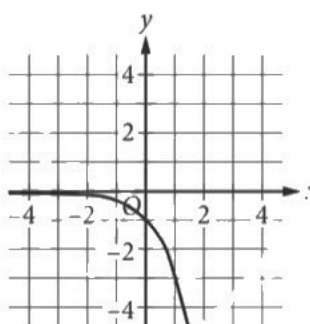
A)



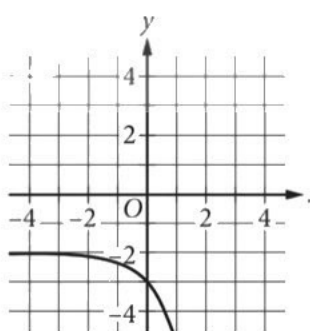
B)



C)



D)

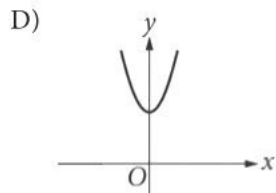
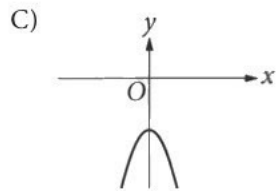
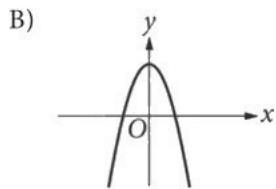
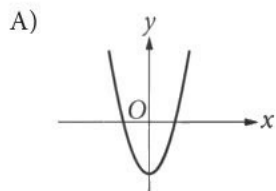




3

For the quadratic function f , the table shows some values of x and their corresponding values of $f(x)$. Which of the following could be the graph of $y = f(x)$?

x	-1	0	1
$f(x)$	0	-4	0



4

$$f(x) = 3x^2 + 4x - c$$

In the given quadratic function f , c is a constant and $f(2) = 12$. What is the value of c ?

- A) 8
- B) 30
- C) 32
- D) 468

5

$$11.5x + 3.5y = 265$$

A person used a total of 265 kilocalories (kcal) while walking and running on a treadmill. Running at a constant rate required 11.5 kcal per minute, and walking at a constant rate required 3.5 kcal per minute. The relationship between the number of minutes running, x , and the number of minutes walking, y , is given by the equation shown. If this person ran for 20 minutes, how many minutes did this person walk?

- A) 35
- B) 29
- C) 17
- D) 10



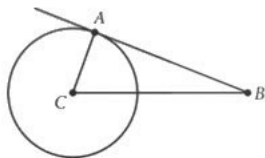
6

$$\frac{\left(\frac{6}{x}\right)}{18}$$

Which of the following is equivalent to the given expression?

- A) $\frac{3}{x}$
- B) $\frac{1}{3x}$
- C) $\frac{108}{x}$
- D) $\frac{x}{12}$

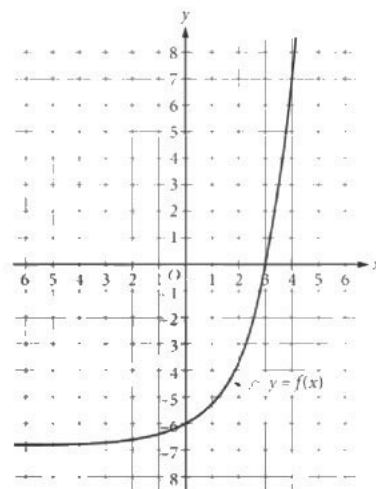
7



In the figure shown, C is the center of the circle and \overline{AB} is tangent to the circle at A. Which of the following is true about the measure of angle BAC?

- A) The measure is less than 90° .
- B) The measure is greater than 90° .
- C) The measure is equal to 90° .
- D) It cannot be determined whether the measure is less than, greater than, or equal to 90° .

8



The graph of the function f is shown. What is the value of x for $f(x) = 0$?

- A) -6
- B) -3
- C) 0
- D) 3

9

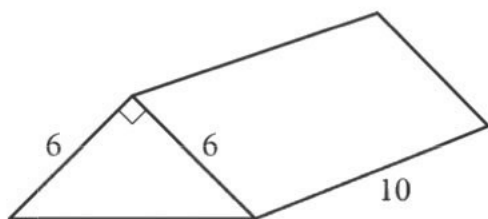
$$A = P(rt + 1)$$

The equation shown gives A in terms of P , r , and t , where P and r are not equal to 0. Which equation gives t in terms of A , P , and r ?

- A) $t = \frac{A}{P} - \frac{1}{r}$
- B) $t = \frac{A}{Pr} - \frac{1}{Pr}$
- C) $t = \frac{A}{Pr} - \frac{1}{r}$
- D) $t = \frac{A}{r} - \frac{P}{r}$



10



What is the volume, in cubic units, of the right triangular prism shown?

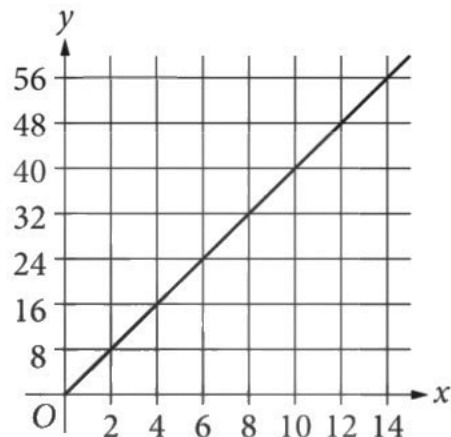
- A) 22
- B) 60
- C) 180
- D) 360

11

A hotel has a total of 180 rooms, and on a certain day, half the rooms were cleaned. There were 9 housekeepers on duty at the hotel that day, and each housekeeper cleaned the same number of rooms, r . Which of the following equations represents the information given in terms of r ?

- A) $2(9r) = 180$
- B) $\frac{1}{2}(9r) = 180$
- C) $2(r+9) = 180$
- D) $\frac{1}{2}(r+9) = 180$

12

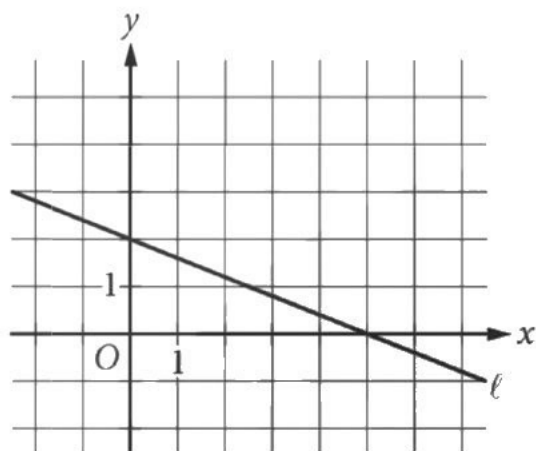


A patio is to be made using square paving stones that are all the same size. There will be no gaps between the paving stones, and they will not overlap. The line in the xy -plane above represents the relationship between the area y , in square feet, of the patio and the number of paving stones, x , used to make the patio. The top surface of each paving stone is a square with side length k feet. What is the value of k ?

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



13



Line ℓ is shown in the xy -plane above. Which of the following is an equation of line ℓ ?

- A) $5x - 2y = 10$
- B) $5x + 2y = 10$
- C) $2x - 5y = 10$
- D) $2x + 5y = 10$

14

$$\begin{aligned} nx + 3y &= 1 \\ 12x - 6y &= 0 \end{aligned}$$

In the system of equations above, n is a constant. If the system has no solution, what is the value of n ?

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

15

Which of the following is equivalent to $\sqrt{16a^{16}}$?

- A) $4a^4$
- B) $4a^8$
- C) $8a^4$
- D) $8a^8$

**DIRECTIONS**

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

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

Write answer in boxes. →

Grid in result. ←

← Fraction line

← Decimal point

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	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

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

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

.	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

.	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

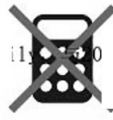
Answer: 201 – either position is correct

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

2	0	1	
•	•	•	•
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

NOTE:

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



16

The graph of $y = \frac{3}{5}x - 8$ in the xy -plane is a line.
What is the slope of this line?

17

$$\begin{aligned}3x + 2y &= 8 \\4x - 3y &= 5\end{aligned}$$

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

18

In right triangle XYZ , $\sin X = \cos 20^\circ$. What is the measure, in degrees, of angle X ?

19

$$|x - 2| = 3$$

What is the sum of the solutions to the given equation?

20

$$x^2(x + 3)(x - b) = 0$$

In the given equation, b is a positive constant. The sum of the solutions of the equation is 5. What is the value of b ?



Math Test – Calculator

55 MINUTES, 38 QUESTIONS

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

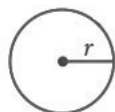
DIRECTIONS

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

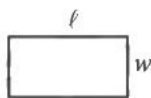
- The use of a calculator **is permitted**.
- All variables and expressions used represent real numbers unless otherwise indicated.
- Figures provided in this test are drawn to scale unless otherwise indicated.
- All figures lie in a plane unless otherwise indicated.
- Unless otherwise indicated, the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

REFERENCE

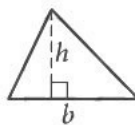


$$A = \pi r^2$$

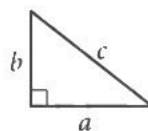
$$C = 2\pi r$$



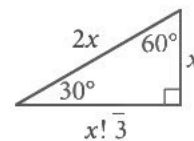
$$A = \ell w$$



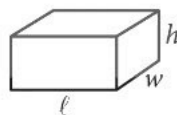
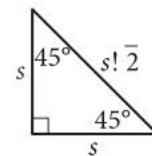
$$A = \frac{1}{2}bh$$



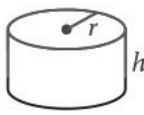
$$c^2 = a^2 + b^2$$



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.

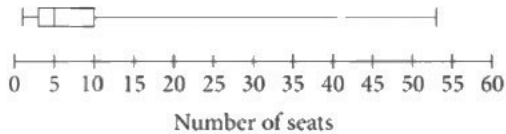


1

The mass of a piece of wood is 10.0 grams. The volume of the wood is 12.5 cubic centimeters. What is the density, in grams per cubic centimeter, of the piece of wood? (Density equals mass divided by volume.)

- A) 0.80
- B) 1.25
- C) 2.50
- D) 22.5

2



The box plot summarizes the number of seats in the US House of Representatives currently allocated to each of the 50 states. What is the median number of allocated seats in the US House of Representatives?

- A) 2
- B) 5
- C) 10
- D) 53

3

A calf, the offspring of a cow, weighed 62 pounds at birth. The calf is expected to gain 2 pounds every day for the first 2 years of its life. For this time period, which of the following types of functions best models the weight of the calf as a function of time?

- A) Increasing linear
- B) Decreasing linear
- C) Increasing exponential
- D) Decreasing exponential



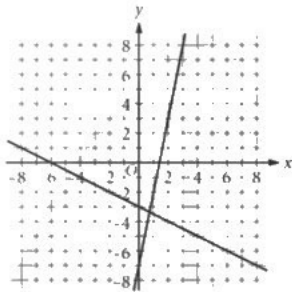
4

$$y = -\frac{1}{2}x - 3$$

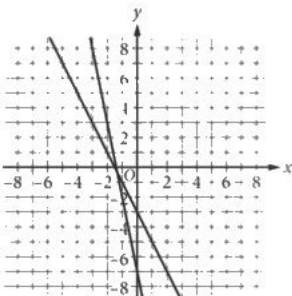
$$y = -5x - 7$$

Which of the following graphs in the xy -plane represents the equations in the given system?

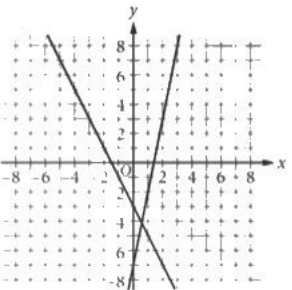
A)



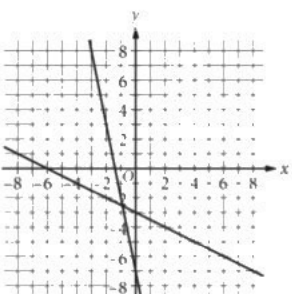
B)



C)



D)



5

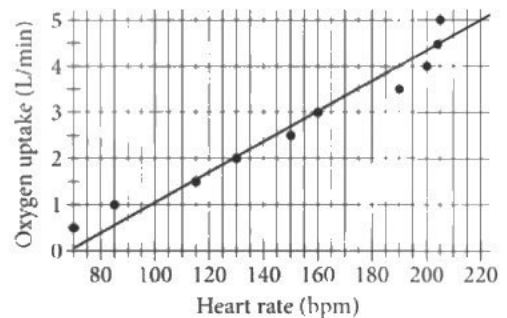
If $6(x + 4) = 36$, what is the value of $x + 4$?

- A) 2
- B) 6
- C) 9
- D) 30

6

For a particular cross-country skier, each point in the scatterplot gives the skier's heart rate, in beats per minute (bpm), and the skier's oxygen uptake, in liters per minute (L/min), as measured at various points on a cross-country ski course. A line of best fit is also shown.

Cross-Country Skier's Heart Rate and Oxygen Uptake



When the skier's heart rate was 85 bpm, which of the following is closest to the difference, in L/min, between the skier's actual oxygen uptake and the oxygen uptake predicted by the line of best fit shown?

- A) 0.5
- B) 1.0
- C) 2.5
- D) 5.0



7

Data set X: 5.50, 5.50, 5.60, 5.65, 5.66
 Data set Y: 4.00, 5.50, 5.50, 5.60, 5.65, 5.66

Data sets X and Y show the acidity, or pH, of rainwater samples from two different locations. Which statement about the mean pH of data set X and data set Y is true?

- A) The mean pH of data set X is greater than the mean pH of data set Y.
- B) The mean pH of data set X is less than the mean pH of data set Y.
- C) The mean pH of data set X is equal to the mean pH of data set Y.
- D) There is not enough information to compare the mean pH of the two data sets.

Questions 8 and 9 refer to the following information.

$$f(t) = 0.025t + 10.30$$

The function f models the length $f(t)$, in micrometers, of a yeast cell of a certain strain t minutes after completing cell division for $0 \leq t \leq 30$.

8

What is the predicted length, rounded to the nearest tenth of a micrometer, of a yeast cell 10 minutes after completing cell division?

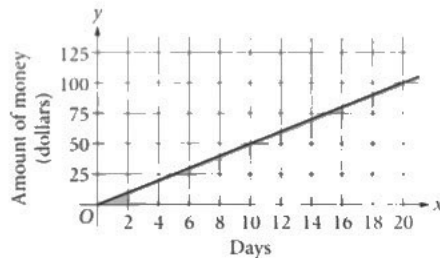
- A) 10.1
- B) 10.3
- C) 10.6
- D) 12.8

9

What is the best interpretation of the number 0.025 in the context of this model?

- A) The predicted length, in micrometers, of a yeast cell before cell division starts
- B) The predicted length, in micrometers, of a yeast cell each minute after completing cell division
- C) The increase in the predicted length, in micrometers, of a yeast cell every 10.3 minutes after completing cell division
- D) The increase in the predicted length, in micrometers, of a yeast cell each minute after completing cell division

10

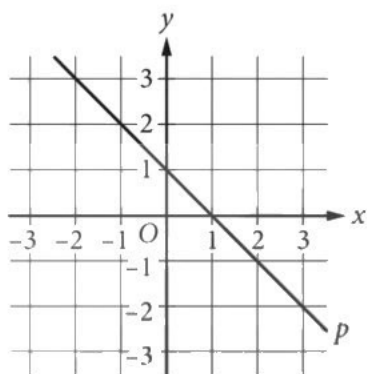


Ivan plans to save up to \$5 per day. The graph shows the possible amounts of money y , in dollars, he saved after x days. Which ordered pair (x,y) represents a possible amount of money y , in dollars, he saved after x days?

- A) (18,50)
- B) (12,75)
- C) (8,100)
- D) (4,125)



11



Line p is shown in the xy -plane. Line q (not shown) is perpendicular to line p and also passes through $(0, 1)$. Which of the following points lies on line q ?

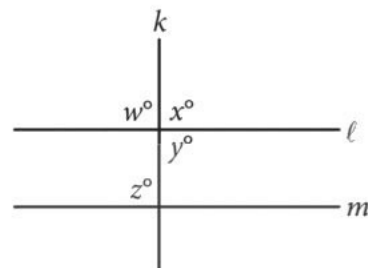
- A) $(-1, 0)$
- B) $(0, -1)$
- C) $(0, 1)$
- D) $(1, 1)$

12

The function $A(t) = 10\left(\frac{1}{2}\right)^{\frac{t}{30}}$ represents the mass $A(t)$, in grams, of a certain radioactive isotope remaining in a substance after t seconds. Which of the following is the best interpretation of the value 10 in this context?

- A) The initial mass, in grams, of the radioactive isotope in the substance when $t = 0$
- B) The mass, in grams, of the radioactive isotope in the substance after 30 seconds
- C) The number of seconds it takes for the radioactive isotope in the substance to completely disappear
- D) The number of seconds it takes for half of the initial mass of radioactive isotope in the substance to disappear

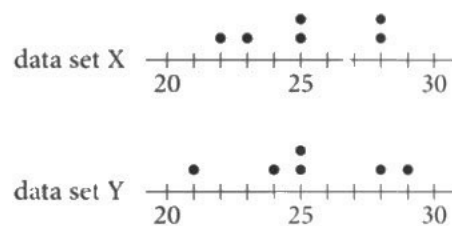
13



In the figure, lines ℓ and m each intersect line k . Which of the following is sufficient to prove that lines ℓ and m are parallel?

- A) $w = y$
- B) $w = z$
- C) $x = y$
- D) $x = z$

14



Data set X and data set Y are displayed by the two dot plots shown. Which of the following is(are) the same for both data sets?

1. The mean
2. The median

- A) I only
- B) II only
- C) I and II
- D) Neither I nor II

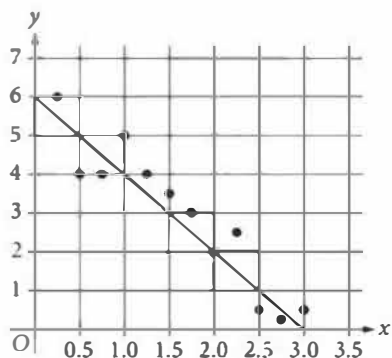


15

In 480 BC, the population of the Persian Empire was approximately 49.4 million. The population of the Persian Empire was 44% of the world population at that time. Which of the following is the best estimate of the world population in 480 BC?

- A) 21.7 million
- B) 89.1 million
- C) 93.4 million
- D) 112.3 million

16



The scatterplot shows 12 values from a data set. A line of best fit for the data is also shown. Which of the following is the best interpretation of the y -coordinate of the y -intercept of the line of best fit?

- A) For the value $x = 6$, the line of best fit predicts the corresponding y -value to be approximately 0.
- B) For the value $y = 0$, the line of best fit predicts the corresponding x -value to be approximately 3.
- C) For the value $x = 0$, the line of best fit predicts the corresponding y -value to be approximately 6.
- D) For the value $y = 3$, the line of best fit predicts the corresponding x -value to be approximately 0.

17

The graph of the equation $4x + 3y = q$, where q is a constant, is a line in the xy -plane. What are the coordinates of the point at which the line crosses the x -axis?

- A) $\left(\frac{q}{3}, 0\right)$
- B) $\left(\frac{q}{4}, 0\right)$
- C) $\left(\frac{3}{q}, 0\right)$
- D) $\left(\frac{4}{q}, 0\right)$

18

It took 20 minutes for a jet to climb from a starting altitude of 10,000 feet to a final altitude of 30,000 feet. If the jet climbed at a constant rate, what was its altitude, in feet, 14 minutes after the climb began?

- A) 14,000
- B) 21,000
- C) 24,000
- D) 28,000



19

$$x(x+2)^2 = x^3 + bx^2 + cx$$

In the equation above, b and c are constants. If the equation is true for all values of x , what is the value of $b+c$?

- A) 4
- B) 6
- C) 8
- D) 16

20

$$f(x) = \frac{k-x}{1+x}$$

In the given function f , k is a positive constant. Which of the following could be the graph of f in the xy -plane?

- A)
- B)
- C)
- D)

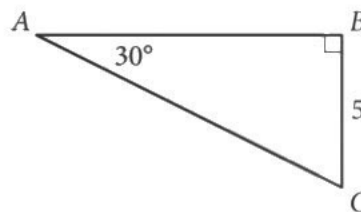
21

A circle has center C at $(1,1)$ and radius 2. Which of the following is an equation of this circle?

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

22

What is the length of side AC in the triangle below?



- A) $5\sqrt{3}$
- B) 10
- C) 15
- D) $10\sqrt{3}$



23

A function f has the property that if point (a, b) is on the graph of the equation $y = f(x)$ in the xy -plane, then the point $(a+1, \frac{1}{3}b)$ is also on the graph. Which of the following could define f ?

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

24

Approximately 90% of the volume of an iceberg lies below the surface of the water. If A represents the volume of an iceberg that lies above the surface of the water and V represents the total volume of the iceberg, which of the following equations best approximates A in terms of V ?

- A) $A = 10V$
- B) $A = 0.9V$
- C) $A = 0.1V$
- D) $A = 0.1V + 0.9$

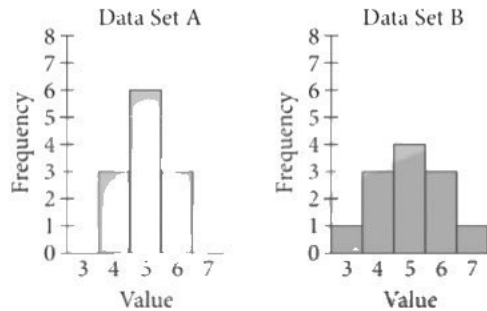
25

In 2007, US economists gathered data about money collected for the arts, entertainment, and recreation industries in eight states. The ratio of money collected in all eight states to the money collected in the state of Florida was 11 to 8. If a total of x dollars was collected in all eight states, which expression represents the total amount of money, in dollars, collected in Florida?

- A) $\frac{8x}{11}$
- B) $\frac{11x}{8}$
- C) 8
- D) 11



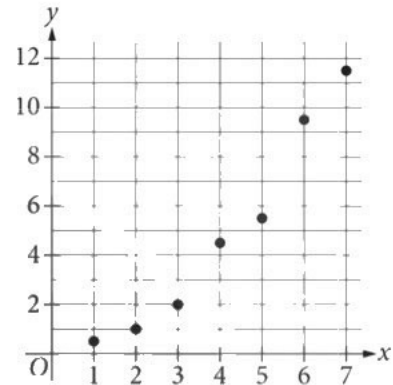
26



Data sets A and B are summarized in the graphs above. Each data set consists of 12 whole numbers. Which of the following statements must be true?

- A) Data sets A and B have the same mean, but the standard deviation of data set A is greater than the standard deviation of data set B.
- B) Data sets A and B have the same mean, but the standard deviation of data set B is greater than the standard deviation of data set A.
- C) Data sets A and B have the same standard deviation, but the mean of data set A is greater than the mean of data set B.
- D) Data sets A and B have the same standard deviation, but the mean of data set B is greater than the mean of data set A.

27



Which equation is the most appropriate quadratic model for the data shown in the scatterplot?

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



28

Which of the following functions has a maximum value of m , where m is a positive constant?

- A) $f(x) = mx^2$
- B) $f(x) = -mx^2$
- C) $f(x) = -x^2 + m$
- D) $f(x) = -(x+m)^2$

29

A quantity is decreased by 45% of its value. The resulting value is x . Which expression gives the value of the original quantity in terms of x ?

- A) $\frac{x}{0.45}$
- B) $\frac{x}{0.55}$
- C) $\frac{x}{1.45}$
- D) $\frac{x}{1.55}$

30

The area of the Mountain Island Educational State Forest in North Carolina is 3 square miles. What is the area, in square yards, of this forest? (1 mile = 1,760 yards)

- A) 5,280
- B) 15,840
- C) 3,097,600
- D) 9,292,800

31

The ratio of students to teachers in a high school is 18 to 1. If the school has 105 teachers, how many students does it have?



32

$$2x + 7 = bx + 5$$

In the given equation, b is a constant. If the equation has no solution, what is the value of b ?

33

There are a total of 1000 four-digit numbers from 1000 to 1999. If one of these numbers is selected at random, what is the probability that the number is greater than 1499?

34

$$3x + 4y = 35$$

$$2x + 2y = 15$$

The solution to the given system of equations is (x, y) . What is the value of $x + 2y$?

35

$$2x^2 - 3x - 7 = 0$$

If c and d are the two solutions of the quadratic equation above, what is the value of $c + d$?

36

$$(x + 2) = (x - 5)(x + 2)$$

What is the sum of the solutions to the given equation?



Questions 37 and 38 refer to the following information.

The table gives the age groups of the total population of women and the number of registered women voters in the United States in 2012, rounded to the nearest million.

	Total population of women (in millions)	Registered women voters (in millions)
18 to 24 years old	15	8
25 to 44 years old	41	25
45 to 64 years old	42	30
65 to 74 years old	13	10
75 years old and over	11	8
Total	122	81

37

In 2012, the number of registered women voters was $p\%$ of the total population of women. What is the value of p , to the nearest whole number?

38

If a woman is selected at random from the total population of women ages 45 to 64 years old, what is the probability of selecting a registered woman voter, rounded to the nearest hundredth? (Express your answer as a decimal, not as a percent.)

STOP

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