SAT TEST BOOK

YEAR 2021
READING

version 1.1

TABLE OF CONTENTS

CollegeBoard SAT®

MARCH 13, 2021
US

The SAT®

Test Book

IMPORTANT REMINDERS

1

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

2

Sharing any questions with anyone is a violation of Test Security and Fairness policies and may result in your scores being canceled.

Reading Test

65 MINUTES, 52 QUESTIONS

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

DIRECTIONS

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

Questions 1-10 are based on the following passage.

This passage is adapted from Nina Revoyr, *The Age of Dreaming*. ©2008 by Nina Revoyr. The narrator describes acting in silent films in the early 1900s. Moran owns the production company that employs the narrator.

It is amusing, in retrospect, to think how primitive our efforts were in those early years. For my first two films, all of the interiors were shot on outdoor sets, with canvases draped over them to soften the sun. All copies of *Jamestown Junction* have long been lost, but if the film had survived, and if you could see it, you would notice that during the office scene the papers on my desk are disturbed by a mysterious breeze. And in the very next scene, you would see a shadow moving in the corner, caused by the canvas flapping in the wind. These were the conditions in which we shot at that time, and because we worked without the benefit of artificial light, there was always a rush to complete the day's filming before the shadows grew too deep in the afternoon. In late May, when we endured an unexpected heat wave, Moran had giant ice blocks delivered to the sets, and powerful fans placed behind them to blow the cool air in the direction of the players. If it rained, filming would halt altogether, and we would scramble to move all the furniture and props under the complex's few permanent roofs. But despite these challenges, everyone remained in good spirits. We were working, yes, but it felt like play, and it was hard to comprehend the tremendous good fortune that had suddenly befallen me.

Through the making of both films, Hanako gave me constant guidance, which I eagerly accepted. And I immediately discerned the difference between myself, an untrained amateur, and a seasoned professional who knew everything about the art of acting. Indeed, she was perhaps the largest influence on my development as an actor.

"There is no audience to see you," she said one day in Japanese, as I gestured expansively to convey my anguish at the death of one of my fellow soldiers. "You don't need to project like you would in the theater, as if you're trying to be seen by the person in the last row. Pretend the camera is the one man you're playing to."

On another occasion when I was perhaps *too* understated, Hanako approached me after Moran called "cut." "You're painting a picture with your body," she said. "Think of pantomime. You must express physically what you can't with your voice. And use your face, your eyes. You have such eyes. They alone speak volumes."

Moran nodded in agreement, although he couldn't have understood, and I adjusted my actions accordingly. I was surprised by the extent to which he let Hanako direct things—not only my own performance, but also the placement of props, even the movements of the other actors. Yet all of her suggestions improved the films. And between her advice and Moran's direction, I was slowly learning what to do. The transition from theater, which depends on dialogue, was more difficult than I had imagined—indeed, many stage actors, even those who didn't disdain the new medium or moving

CONTINUE

pictures, did not make the change successfully. Hanako Minatoya was one of the few who was equally accomplished in both realms. I was learning under her tutelage every day.

On certain days, when we weren't in scenes, Hanako and I would leave the sets and walk into the hills. They were vibrant with color, with flowers wherever one looked—blue brodiaea and lupin, Mariposa lilacs, the wispy orange California poppies. The beauty of that landscape, when the air was cool, the sun glinting off the ocean, and the breeze carrying the scent of the flowers, was so dramatic I could hardly believe it real. And I was seeing it, feeling it, in the company of an artist whose work I had admired for years.

One day on our walk we were discussing a well-known actor, and Hanako surprised me by her reaction to his name. "He is nothing but a face for the fan magazines," she said dismissively. "He is not a genuine actor."

"What do you mean?" I asked, although I didn't disagree.

"It is impossible to distinguish one of his roles from another. He is always the same, and it is obvious why. In order to project a believable fiction, the actor himself must have substance. You must possess something *internally* to perform it externally. He has only a fraction of the talent of an artist such as you."

I was, of course, deeply flattered by her compliment, and I did not know how to respond. Hanako continued talking of this actor and that, without noting my reaction.

1

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

A) basic.
B) ancient.
C) original.
D) natural.

2

The narrator references *Jamestown Junction* (line 5) primarily in order to

A) highlight a film that features acting that the narrator aims to emulate.
B) provide context for the tensions that later surface between the narrator and others on the set.
C) contrast the responsibilities of the director and the actors in film production.
D) showcase the challenges posed by filming in an outdoor setting.

3

The passage is written from the perspective of someone who

A) realizes he cannot meet the challenges of pivoting to a new career.
B) regrets not making more of an effort to achieve his professional goals.
C) is enthusiastic about recent technological developments affecting his profession.
D) is nostalgic about experiences toward the beginning of his career.

4

It can most reasonably be inferred from the passage that, as a young man, the narrator attributed his employment in films to

A) his wide range of acting skills.
B) the fan base he acquired as a stage actor.
C) a lucky happenstance.
D) his friendship with Hanako.

CONTINUE

5

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

A) Lines 11-15 ("These . . . afternoon")
B) Lines 24-26 ("We were . . . befallen me")
C) Lines 27-28 ("Through . . . accepted")
D) Lines 29-32 ("And I . . . acting")

6

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

A) communicate.
B) conduct.
C) guide.
D) experience.

7

Based on the passage, in what way does Hanako most directly influence the narrator's development?

A) She praises his skill as an actor to boost his confidence.
B) She advises him on balancing popularity with artistic integrity.
C) She shares lessons learned from having made the same career shift that he is making.
D) She convinces Moran to allow the narrator to take on more prominent roles in his films.

8

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

A) Lines 53-56 ("Yet . . . to do")
B) Lines 61-63 ("Hanako . . . day")
C) Lines 64-66 ("On certain . . . hills")
D) Lines 89-90 ("I was . . . respond")

9

The passage indicates that when Hanako criticizes a well-known actor, the narrator

A) fears that Hanako will address him with the same criticism but is relieved when she praises him instead.
B) concurs with Hanako's opinion of the actor but is curious about the reasoning behind her criticism.
C) is disappointed that Hanako does not respect the actor but continues to admire the actor himself.
D) understands Hanako's argument but respectfully disagrees with her characterization of the actor.

10

It can most reasonably be inferred from the passage that Hanako believes that an actor's merit depends on the

A) caliber of training that the actor receives from mentors.
B) depth of the actor's own feelings and perceptions.
C) actor's willingness to take on roles that others find unappealing.
D) actor's ability to overlook unfavorable audience reactions.

CONTINUE

Questions 11-20 are based on the following passage and supplementary material.

This passage is adapted from Giorgia Guglielmi, "Small News Outlets Influence Us More Than We Think." ©2017 by American Association for the Advancement of Science.

Assessing the influence of news media is tricky. Researchers can't peer into voting booths or people's living rooms, and news organizations aren't typically willing to have outsiders interfere with their content. That's why it took a team of social scientists 5 years to get 48 U.S. news organizations to agree to run an unusual set of experiments. Instead of simply tracking what the outlets were publishing and analyzing their impact on public opinion, the researchers took an approach similar to that used in clinical trials to evaluate the effects of new drugs. They manipulated the type of news stories run, and then assigned a "treatment" week when the stories would run and a "control" week when they wouldn't. This way they could tell whether those particular stories were having any effect on public discussion.

Most participating outlets were small, with fewer than an estimated 200,000 pageviews per month, and a few were midsized, like the Wisconsin-based magazine *The Progressive*, which had more than 250,000 pageviews per month. The nonprofit news organization Truthout, based in Chicago, Illinois, represented a large outlet, with an estimated 2 million pageviews per month.

The researchers, led by Gary King of Harvard University, asked groups of two to five of these news outlets to write stories on broad policy areas, including race, immigration, and climate. For example, if the broad area was technology policy, the specific story might be what Uber drivers think about self-driving cars. The outlets could choose the policy area, the stories to cover, and the type of articles to write, such as investigative reports or opinion pieces. However, the researchers could reject a story if it was outside a specific policy area. (The outlets were free to publish whatever story they wanted outside of the experiment.)

Then, the researchers flipped a coin to decide during which of two consecutive weeks these clusters of stories, all on the same topic, would run. Finally, they measured the number of tweets about both the specific stories and the broader policy issues during the week when the stories ran compared to the week when they didn't.

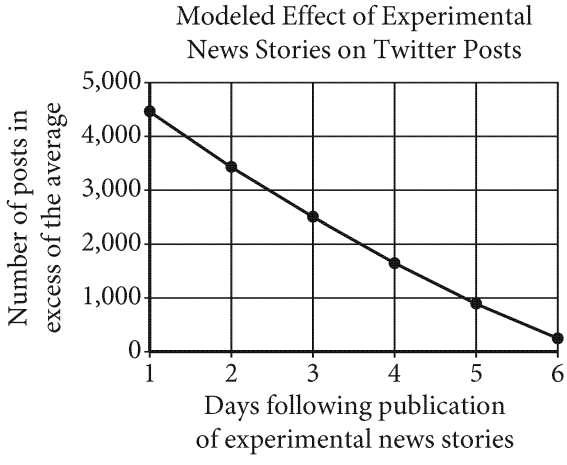
Twitter posts on these topics increased by nearly 63% over the week in which the stories were posted. On average, Americans wrote more than 13,000 additional social media posts about a specific policy area on the day the stories ran and in the following 5 days. What's more, the cluster of stories swayed people's opinion by 2.3% in the ideological direction of opinion articles, suggesting that news media might in some cases change people's beliefs.

The team repeated the experiment 35 times, and observed that stories boosted posting by men and women alike, as well as by people living in different U.S. regions, with different political orientations and influence on Twitter. Removing larger outlets from the analysis didn't change the effect on public conversation much, suggesting that no single large news organization was responsible for the increase.

However, if the researchers had recruited large mainstream outlets, the spike in discussion might have been much bigger: When they looked at stories published by *The New York Times* on little-discussed topics, such as how fracking affects the quality of drinking water, they found that Twitter posts about the broader issue of water quality increased by 300% in just 1 day.

Though excited by the study, economist Matthew Gentzkow points out that only about 20% of Americans use Twitter, so the results might not be widely applicable outside social media. But to King, Twitter users are a valuable resource to assess the agenda-setting power of media because they represent those people who are willing to speak up to influence policy.

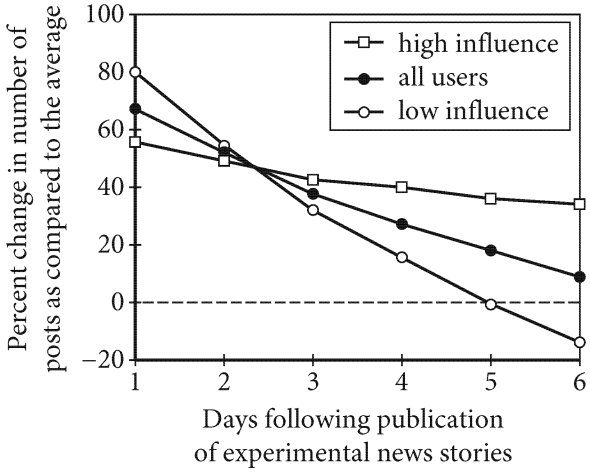
Figure 1



CONTINUE

Figure 2

Modeled Effect of Experimental News Stories on Twitter Posts, by User Influence



Figures adapted from Gary King, Benjamin Schneer, and Ariel White, "How the News Media Activate Public Expression and Influence National Agendas." ©2017 by Gary King, Benjamin Schneer, and Ariel White.

11

The main purpose of the passage is to

A) summarize an open question with respect to social media and propose a study to examine the question in greater depth.

B) introduce a common misunderstanding about mainstream media outlets and describe a study that challenges that misunderstanding.

C) outline a study that compares trends in social media use among different demographic groups and suggest an explanation for the results of that study.

D) describe a study's novel way of assessing the impact of news media on public opinion and report the findings of that study.

12

As used in line 4, "interfere with" most nearly means

A) oppose.

B) prevent.

C) modify.

D) suspend.

13

Which choice best supports the idea that the researchers needed a mechanism to determine whether changes in public opinion were the result of the experimental stories and not some other factor?

A) Lines 1-4 ("Assessing . . . content")

B) Lines 5-7 ("That's . . . experiments")

C) Lines 7-11 ("Instead . . . drugs")

D) Lines 12-16 ("They . . . discussion")

14

According to the passage, the opinion articles used in the study had what impact on the opinions of Twitter users?

A) Twitter users' opinions changed to be increasingly negative toward a specific policy area over the five-day period following the articles' publication.

B) Twitter users' opinions changed somewhat toward favoring the articles' position on the policy area.

C) Twitter users' opinions showed no measurable change throughout the two-week experiment.

D) Twitter users' opinions changed only in response to stories on policy areas that already interested them.

CONTINUE

15

As used in line 55, "boosted" most nearly means

A) advanced.
B) raised.
C) supported.
D) improved.

16

It can reasonably be inferred from the passage that the design of King's team's experiment made it less likely that

A) Twitter users would read more stories from participating news media outlets than they usually did.
B) news media outlets would be able to choose which stories to publish outside of treatment weeks.
C) Twitter users would realize that there was something unusual about the media outlets' publication output.
D) news media outlets would run stories on any particular topic for more than one week.

17

The passage most strongly suggests that which additional study would best help to determine more precisely the extent to which news media outlets shape public opinion in the United States?

A) A study that examines how influential news media outlets are to people who do not participate in social media
B) A study that determines whether users on different social media platforms get news from different media outlets
C) A study that captures the most common age range of people who use social media to comment on current events
D) A study that assesses whether people who participate in social media are more likely to become involved in changing US policy

18

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

A) Lines 54-58 ("The team . . . Twitter")
B) Lines 62-64 ("However . . . bigger")
C) Lines 70-73 ("Though . . . media")
D) Lines 73-77 ("But to . . . policy")

19

According to the model in figure 1, the number of Twitter posts on the relevant topics in excess of the average

A) increased from day one to day two following the experimental news stories' publication.
B) was approximately zero by day three following the experimental news stories' publication.
C) was greater than zero for two weeks following the experimental news stories' publication.
D) decreased throughout days one through six following the experimental news stories' publication.

20

Which statement best reflects the model in figure 2?

A) On day one following publication of the experimental news stories, Twitter users with high influence showed a lower percent change in their number of posts on the relevant topic than did those with low influence.
B) On day four following publication of the experimental news stories, Twitter users with low influence had about the same percent change in their number of posts on the relevant topic as all Twitter users.
C) On day five following publication of the experimental news stories, Twitter users with high influence posted about as frequently on the relevant topic as they usually did.
D) On day six following publication of the experimental news stories, all Twitter users posted on the relevant topic less frequently than they usually did.

CONTINUE

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

This passage is adapted from Clint Perry and Olli Loukola, "We Taught Bees to Play Football So We Could Learn about Their Brains." ©2017 by The Conversation US, Inc.

Most people don't often think about bees' brainpower. Bees are generally regarded as tiny unthinking machines, flying from flower to flower, genetically pre-programmed to collect pollen and nectar and make honey.

But bees have some impressive cognitive capacities. Bumblebees and honeybees can count, navigate complex environments, learn concepts, use their uncertainty to guide their decisions, and even display emotion-like behaviour.

Recently, bees have also been trained to solve complex cognitive tasks such as string pulling and cap pushing to gain rewards. But as impressive as these tasks might be, they resemble some of the bees' natural foraging behaviour. Our research group wanted to test the behavioural limits of bumblebees by tasking them with something far removed from anything they encounter in nature.

So we've managed to show that bees can play football. Sort of. We showed that they can learn to move a small ball to a goal to gain a sugary reward.

To do this, we used a plastic model bee on the end of a transparent stick to move a tiny ball across a platform as a real bumblebee watched. When the ball reached a specified location at the centre of the platform, it opened access to rewarding sugar water. After several observations, each real bee we tested picked up how to solve the task and no longer needed demonstrations.

While mastering this unnatural task was impressive, we were curious to know how the bees were actually learning to solve it. So we tested three further groups of bees. One group of bees watched another previously trained bee move the ball to the centre. A second group of bees observed the ball moving to the centre "by itself" (we actually used a magnet under the platform to move the ball). And a third group of bees did not receive any demonstration.

The movement of the ball with the magnet was enough for some of the bees to learn the task significantly better than the bees who did not receive any demonstration. But all ten bees observing another bee move the ball to the centre solved the task much quicker and at a higher success rate than either of the other groups. This suggests the observer bees picked up something important from their fellow bees that helped them learn this unnatural task.

The design of this experiment also allowed us to ask a novel question in social learning experiments: when learning from others, will bees simply copy what they see or can they improve upon it? During each of the observation trials, there were three balls positioned at varying distances from the centre of the platform, but it was always the furthest ball that was moved during the demonstration. But during the test trials, on their own, the observer bees almost always moved the closest ball to the centre. This suggests bees weren't simply copying what they saw during the demonstration but actually improved on the task by using the easiest means.

Our current findings suggest with convincing evidence that a miniature brain is not necessarily simple, and can solve an impressively complex task. In fact, we are not yet aware of a cognitive ability that is specific to large brains. What's more, neurobiology and modelling research suggests that a very limited number of neurons (even just a few) can accomplish some rather complex cognitive tasks.

We have shown that bumblebees can solve a task they've unlikely ever seen in their evolutionary history. No flower has likely ever required bees to move an object into its centre to gain access to nectar. The fact that bees learned this unnatural and complex task through observation alone and could improve on what they saw, rather than simply copy what they observed, shows an unprecedented amount of cognitive flexibility in an animal with such a small brain.

CONTINUE

Figure 1

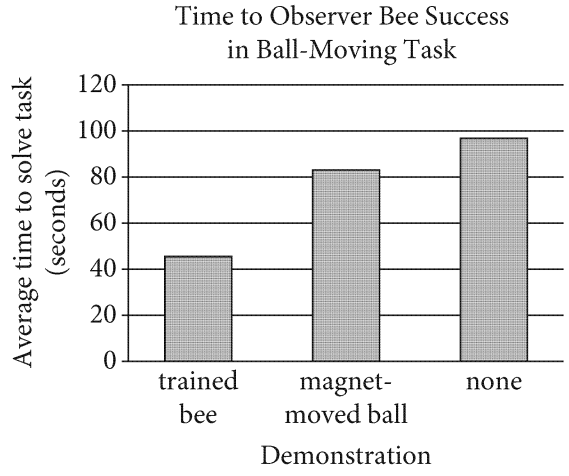
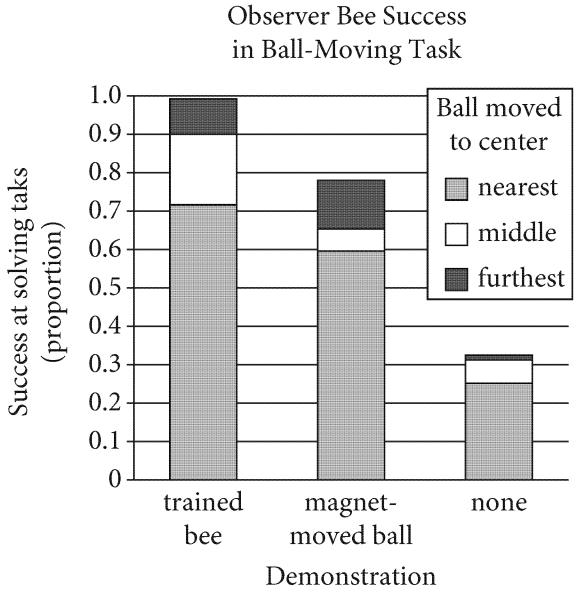


Figure 2



Figures adapted from Olli J. Loukola et al., "Bumblebees Show Cognitive Flexibility by Improving on an Observed Complex Behavior." ©2017 by American Association for the Advancement of Science.

21

The main idea of the passage is that bees

A) learn by mimicking demonstrated behavior.

B) have greater cognitive flexibility than most other insects.

C) can master simple tasks and then demonstrate them for other bees.

D) can learn unfamiliar tasks and then execute them efficiently.

22

Which choice best describes the overall structure of the passage?

A) An experiment to test an existing hypothesis about bees is presented, that hypothesis is revised based on the experiment's results, and a new study is proposed.

B) An experiment that produces unexpected data about bees is introduced, the source of the data is traced to faulty research design, and a redesigned study is described.

C) A generalization about bees is mentioned, information challenging that generalization is noted, and an experiment that deepens understanding of bees is presented.

D) A criticism about the lack of research on bees is voiced, a new experiment is proposed in response to that criticism, and a hypothesis for that new experiment is discussed.

23

According to the passage, one reason that bees may have mastered tasks such as string pulling is that the

A) bees are exceptionally responsive to sugary rewards.

B) bees are quick to copy trained bees in performing such tasks.

C) behaviors stimulate highly developed part of the bees' brains.

D) motions are similar to behaviors the bees perform in natural settings.

CONTINUE

24

It can most reasonably be inferred from the passage that some of the bees participating in the initial training activity

A) were unable to solve the task after a single demonstration.

B) were transfixed by the appearance of the plastic model bee.

C) could access the sugar water without moving the ball.

D) had no prior experience with goal-oriented tasks.

25

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

A) Lines 19-21 ("So we've . . . reward")

B) Lines 22-24 ("To do . . . watched")

C) Lines 24-26 ("When . . . water")

D) Lines 27-29 ("After . . . demonstrations")

26

Based on the results of the ball-moving tasks, the authors would most likely agree with which statement?

A) Bees learn to master new tasks through the process of trial and error.

B) Bees develop complex behaviors by learning them in incremental steps.

C) Bees learn effectively by observing the behaviors of other bees.

D) Bees imitate the actions of other bees and learn by repeating their movements.

27

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

A) Lines 40-43 ("The movement . . . demonstration")

B) Lines 46-49 ("This . . . task")

C) Lines 50-53 ("The design . . . upon it")

D) Lines 59-62 ("This . . . means")

28

As used in line 62, "means" most nearly means

A) instrument.

B) approach.

C) design.

D) results.

29

Which statement about the bees' success in the ball-moving task is best supported by the data in figure 1?

A) Observer bees benefited from seeing a demonstration of the ball-moving task before attempting to solve the same task.

B) Bees that received no demonstration of the ball-moving task required assistance when attempting to solve the task on their own.

C) Observer bees that saw the demonstration of the magnet-moved ball solved the task as quickly as did bees that received no demonstration.

D) Bees that saw the demonstration with the trained bee were the only bees that succeeded at the ball-moving task.

CONTINUE

30

According to figure 2, which combination of demonstration type and the ball's distance from the center of the platform yielded the least success in solving the task?

A) Trained bee demonstration; furthest ball
B) Magnet-moved demonstration; middle ball
C) No demonstration; nearest ball
D) No demonstration; furthest ball

31

As used in line 69, "limited" most nearly means

A) reduced.
B) small.
C) restricted.
D) exclusive.

CONTINUE

Questions 32-42 are based on the following passage.

This passage is adapted from a speech delivered in 1841 by Thomas Paul to the Massachusetts Anti-Slavery Society, "Let Us Do Justice to an Unfortunate People." Paul, a black abolitionist, worked with white abolitionist leader William Lloyd Garrison, who founded the American Anti-Slavery Society in 1833.

I have often asked myself, what posterity would think of the strange contest in which the abolitionists are engaged. Here we meet, time after time, newspapers are printed and speeches delivered, to prove—what? Why, that a man is a man, and that he is the only human possessor of himself. But these propositions are self-evident propositions, and self-evident propositions we all know, though the most difficult to be proved, are the most easily understood, because they need no proof. The mind sees their truth intuitively, without the aid of reasoning. The attempt to prove them, therefore, would be ridiculous, were it not for the consideration of the amazing state of delusion and vassalage to which prejudice reduces the mind when unenlightened by reason.

The history of every age shows the truth of this assertion. At one time, we see Galileo thrown into prison by the Inquisition, because he had made some discoveries . . . and forced to purchase his liberty by retracting his opinions. . . . When, therefore, we see the control which prejudice, aided by circumstances and encouraged by self-interest, has in times past exercised over the human mind, and the tenacity with which it has held its deluded victims, stopping up the avenues of improvement, clipping the wings of genius, and retarding the progress of truth—when we see the minds whose energies have been crippled, and whose spheres of action have been curtailed by its influence—when we see the tremendous power which reformers have brought to bear against the prevailing sins of the ages in which they lived, the firm opposition they encountered, and the long and arduous struggles which preceded a better state of things—we are led, by analogical reasoning, to believe, that the contest in which we are engaged is not an unnatural one—that it is not so dissimilar in its character and measures to others which have been carried triumphantly through—that the modern champions of freedom do not savor so much of quixotism [impracticality] as their traducers have represented—and that the unfortunate men, whose cause they have espoused, have as just a claim to humanity as their oppressors, and like them have been created a little lower than the angels. . . .

How was it five years ago in regard to the question of slavery! A gloom hung over the moral atmosphere, which nothing seemingly could dissipate, save a miracle from God himself. All saw it, but no one durst expose his own breast to the pitiless peltings of the gathering storm. The pulpit and the press, instead of being faithful to their trust, were the panders to the general lust. But mind, like matter, must have its legitimate scope. . . . There are always some spirits who will resist such unnatural domination. And such a spirit was found in the father of American anti-slavery. In that dark hour, he arose to cheer us on our gloomy pathway. The shafts of criticism, and sarcasm, and denunciation, which rang against his buckler [shield], told only where he stood up unscathed, in his moral and intellectual might, and bearing down all opposition. The result is well known, nor does Mr. Garrison need any eulogy from me.

The task of a reformer is far from being an agreeable one. The hidden springs which are to be touched by him, and set into motion, are not discernible to common eyes; and, if they were, few would know how to approach or dare to meddle with them. He scatters his truths among the body politic, and the effect is electrical. He is greeted at once with smiles and frowns, with blessing and cursing, with eulogy and abuse. Now he is almost stifled with the caresses of devoted friends, and anon he is exposed to the fury of a blood-thirsty mob. But, if it is melancholy to see some run mad, we have the gratification to behold others restored to their reason. Much may depend upon accidental circumstances for the success of the reformer, but more depends upon himself. In him are found the great qualities of the head and heart. For the burden of proof is upon him, and he is to answer cavils [petty objections], refute sophistry [falsehood], and prove his propositions, while slanderers are crucifying his reputation, and assassins are aiming deadly daggers at his heart. All moral reformations have been attended with more or less persecution; but the American abolitionists stand preeminently distinguished in this respect.

CONTINUE

32

According to the passage, the author considers the campaign of the abolitionists to be "strange" (line 2) because it requires them to

A) predict how future generations will judge their efforts to end slavery.

B) persuade others of a truth that should be very obvious.

C) provide evidence that links slavery to the general lack of enlightenment in society.

D) propose a course of action that is counter to the beliefs of the audience.

33

The author suggests that abolitionists' persuasive methods will have to take into account their opponents' inability to comprehend

A) logical arguments.

B) appeals to emotion.

C) challenges to authority.

D) political rhetoric.

34

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

A) Lines 3-6 ("Here . . . himself")

B) Lines 6-10 ("But these . . . proof")

C) Lines 10-12 ("The mind . . . reasoning")

D) Lines 12-16 ("The attempt . . . reason")

35

A central claim in the passage is that

A) public resistance to a cause delays the progress of justice by discouraging reformers.

B) Garrison is unlike most reformers in that he has been willing to endure constant criticism and abuse.

C) reformers face significant challenges in addressing the social injustices of their eras.

D) slavery is harder to eliminate than other forms of oppression because the press has stifled abolitionist voices.

36

Which statement best describes the method the author employs in the second paragraph (lines 17-45) to present his argument?

A) He accounts for the presence of prejudice by citing a general historical principle.

B) He explains the current situation by drawing a parallel to past reformers' experiences.

C) He shows that a traditional criticism of past reformers is not applicable to the present situation.

D) He disproves the charges made against his fellow reformers by illustrating their moral superiority.

37

The description of Galileo's experiences in lines 18-21 primarily serves to

A) encourage the audience to appreciate the contributions of an earlier reformer.

B) introduce an alternative explanation for the pervasive prejudice in society.

C) caution the audience about the dangers of espousing revolutionary ideas.

D) illustrate a preceding generalization about the effects of ignorance.

CONTINUE

38

The passage most strongly suggests that a society dominated by prejudice most likely has which effect on its members?

A) They readily become inspired to fight injustice.
B) They are prevented from reaching their fullest potential.
C) They most commonly feel discouraged and frightened.
D) They inevitably become corrupt in their dealings with others.

39

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

A) Lines 21-30 ("When . . . influence")
B) Lines 30-35 ("when . . . things")
C) Lines 47-51 ("A gloom . . . storm")
D) Lines 53-58 ("But mind . . . pathway")

40

In context, the phrase "as their traducers have represented" in lines 41-42 most strongly suggests that opponents to abolition

A) concealed their motives.
B) became symbols of ideals.
C) distorted the truth.
D) misinterpreted an event.

41

The author's attitude toward Garrison is best described as one of

A) deep admiration.
B) cheerful gratitude.
C) mild impatience.
D) grave disappointment.

42

As used in line 71, "at once" most nearly means

A) simultaneously.
B) initially.
C) correspondingly.
D) decisively.

CONTINUE

Questions 43-52 are based on the following passages.

Passage 1 is adapted from "Free-Floating Planets May Be More Common Than Stars." Published in 2011 by National Aeronautics and Space Administration. Passage 2 is adapted from Ashley Yeager, "Fewer Big Rogue Planets Roam the Galaxy, Recount Shows." ©2017 by Society for Science & the Public.

Passage 1

A survey scanned toward the center of the Milky Way galaxy during 2006 and 2007, revealing evidence for up to 10 free-floating planets roughly the mass of Jupiter. The isolated orbs, also known as orphan planets, are difficult to spot, and had gone undetected until now. The planets are located at an average approximate distance of 10,000 to 20,000 light years from Earth.

This could be just the tip of the iceberg. The team estimates there are about twice as many free-floating Jupiter-mass planets as stars. In addition, these worlds are thought to be at least as common as planets that orbit stars. This adds up to hundreds of billions of lone planets in our Milky Way galaxy alone.

"Our survey is like a population census," said David Bennett, a coauthor of the 2011 study. "We sampled a portion of the galaxy, and based on these data, can estimate overall numbers in the galaxy."

The survey is not sensitive to planets smaller than [with lower mass than] Jupiter and Saturn, but theories suggest lower-mass planets like Earth should be ejected from their stars more often. As a result, they are thought to be more common than free-floating Jupiters.

Previous observations spotted a handful of free-floating planet-like objects within star-forming clusters, with masses three times that of Jupiter. But scientists suspect the gaseous bodies form more like stars than planets. These small, dim orbs, called brown dwarfs, grow from collapsing balls of gas and dust, but lack the mass to ignite their nuclear fuel and shine with starlight. It is thought the smallest brown dwarfs are approximately the size of large planets.

On the other hand, it is likely that some planets are ejected from their early, turbulent solar systems, due to close gravitational encounters with other planets or stars. Without a star to circle, these planets would move through the galaxy as our sun and others stars do, in stable orbits around the galaxy's center. The discovery of 10 free-floating Jupiters supports the ejection scenario, though it's possible both mechanisms are at play.

"If free-floating planets formed like stars, then we would have expected to see only one or two of them in our survey instead of 10," Bennett said. "Our results suggest that planetary systems often become unstable, with planets being kicked out from their places of birth."

Passage 2

In a new study, Przemek Mróz of the Astronomical Observatory of the University of Warsaw and colleagues estimated the number of large, rogue planets in our galaxy using a technique called microlensing. When an object with a mass of a planet passes in front of a distant, background star, the gravity of the planet acts as a gravitational magnifying glass. It distorts and focuses the light, giving up the planet's existence.

Mróz and colleagues looked at 2,617 microlensing events recorded between 2010 and 2015 and determined which were caused by a rogue planet. For every typical star, called main sequence stars, there are 0.25 free-floating Jupiter-mass planets, the analysis suggests.

The new result sharply contrasts an estimate published in 2011, which suggested that rogue Jupiters are almost twice as common as main sequence stars. About 90 percent of stars in the universe are main sequence stars, so if that estimate were accurate, there should be a lot of free-floating Jupiters.

"That result changed our conceptual framework of the universe just a little bit," says astronomer Michael Liu of the University of Hawaii. It challenged long-held ideas about how planets go rogue because the known methods wouldn't generate enough planets to account for all the wanderers.

The 2011 result was based on a relatively small sample of microlensing events, only 474. Since then, infrared telescope images haven't detected as many free-floating planets as expected. "Over the years, serious doubts were cast over the claims of a large population of Jupiter-mass free-floaters," Mróz says.

David Bennett, coauthor of the 2011 study, agrees that the new census failed to find evidence for a large population of Jupiter-mass rogue planets. He notes,

CONTINUE

however, that the new data do reveal four times as many Jupiter-mass failed stars called brown dwarfs than predicted in the original census. So some of the rogues that were originally classified as planets may, in fact, be failed stars.

Liu says the latest census is much more in line with theories of how planets form. Most rogues should be Earth-mass or a little heavier. Those lighter planets get tossed out of their planetary systems much easier than behemoths like Jupiter.

43

Do the results of the survey described in Passage 1 support the conclusion that there are twice as many Jupiter-mass free-floating planets as Earth-mass ones?

A) Yes, because the survey demonstrates that there are more Jupiter-mass free-floating planets than were previously assumed.

B) Yes, because the survey accurately estimates the number of free-floating planets in the galaxy.

C) No, because the survey shows that there are more Earth-mass free-floating planets than Jupiter-mass ones.

D) No, because the survey does not include direct information about Earth-mass free-floating planets.

44

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

A) Lines 1-4 ("A survey . . . Jupiter")

B) Lines 9-11 ("This . . . stars")

C) Lines 20-23 ("The survey . . . often")

D) Lines 26-30 ("Previous . . . planets")

45

According to Passage 2, Mróz and colleagues analyzed microlensing events to

A) confirm the results of Bennett and his colleagues' 2011 survey of free-floating planets.

B) discover the minimum required mass for a planet to be detected in front of a distant, background star.

C) compare the relative sizes of main sequence stars and large, free-floating planets.

D) determine how many big, free-floating planets exist in the Milky Way galaxy.

46

As used in line 78, "account for" most nearly means

A) explain.

B) comprise.

C) locate.

D) identify.

47

The sixth paragraph of Passage 2 (lines 85-92) serves as both

A) a corroboration of recent results and a suggestion of a potential flaw in the method used to arrive at them.

B) a criticism of the method used in a recent experiment and a recognition of the method's technical sophistication.

C) an acknowledgment of recent findings and an explanation for how they might reflect on previous findings.

D) a revision of a previous claim and a rebuttal of a criticism of a previous research study.

CONTINUE

48

As used in line 59, "giving up" most nearly means

A) transferring.
B) abandoning.
C) interrupting.
D) revealing.

49

Which choice best describes the relationship between the two passages?

A) The results of a study outlined in Passage 2 challenge the results of a study outlined in Passage 1.
B) The scientists discussed in Passage 2 extended the research presented in Passage 1 into a new field of study.
C) The data shown in Passage 2 support the hypothesis put forth by the research team in Passage 1.
D) The researchers of Passage 2 identified variables that the researchers of Passage 1 failed to consider.

50

On which point about free-floating Jupiter-mass planets do the passages most clearly disagree?

A) Whether there are free-floating Jupiter-mass planets
B) How many free-floating Jupiter-mass planets there are
C) Whether Jupiter-mass planets can distort and focus light
D) How similar brown dwarfs are to Jupiter-mass planets

CONTINUE

51

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

A) Lines 51-55 ("In a . . . microlensing")

B) Lines 60-62 ("Mróz . . . planet")

C) Lines 66-69 ("The new . . . sequence stars")

D) Lines 95-97 ("Those . . . Jupiter")

52

Which scientific idea is suggested in both passages?

A) Lower-mass planets are more likely to be ejected from their stars than Jupiter-mass planets are.

B) Brown dwarfs do not possess enough mass to produce their own sources of light.

C) Free-floating Jupiter-mass planets are nearly as common as planets that orbit stars.

D) Rogue planets are easily confused with Jupiter-mass failed stars by astronomers.

STOP

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

CollegeBoard SAT®

MARCH 13, 2021
INTERNATIONAL

The SAT®

Test Book

IMPORTANT REMINDERS

1

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

2

Sharing any questions with anyone is a violation of Test Security and Fairness policies and may result in your scores being canceled.

Reading Test

65 MINUTES, 52 QUESTIONS

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

DIRECTIONS

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

Questions 1-10 are based on the following passage.

This passage is adapted from James Baldwin, "This Morning, This Evening, So Soon." ©1993 by The James Baldwin Estate. Originally published in 1960.

"You are full of nightmares," Harriet tells me. She is in her dressing gown and has cream all over her face. She and my older sister, Louisa, are going out to be girls together. I suppose they have many things to talk about—they have me to talk about, certainly—and they do not want my presence. I have been given a bachelor's evening. The director of the film which has brought us such incredible and troubling riches will be along later to take me out to dinner.

I watch her face. I know that it is quite impossible for her to be as untroubled as she seems. Her self-control is mainly for my benefit—my benefit, and Paul's. Harriet comes from orderly and progressive Sweden and has reacted against all the advanced doctrines to which she has been exposed by becoming steadily and beautifully old-fashioned. We never fought in front of Paul, not even when he was a baby. Harriet does not so much believe in protecting children as she does in helping them to build a foundation on which they can build and build again, each time life's high-flying steel ball knocks down everything they have built.

Whenever I become upset, Harriet becomes very cheerful and composed. I think she began to learn how to do this over eight years ago, when I returned from my only visit to America. Now, perhaps, it has become something she could not control if she wished to. This morning, at breakfast, when I yelled at Paul, she averted Paul's tears and my own guilt by looking up and saying, "Your father is cranky this morning, isn't he?"

Paul's attention was immediately distracted from his wounds, and the unjust inflicter of those wounds, to his mother's laughter. He watched her.

"It is because he is afraid they will not like his songs in New York. Your father is an *artiste*, *mon chou*, and they are very mysterious people, *les artistes*. Millions of people are waiting for him in New York, they are begging him to come, and they will give him a *lot* of money, but he is afraid they will not like him. Tell him he is wrong."

She succeeded in rekindling Paul's excitement about places he has never seen. I was also, at once, reinvested with all my glamour. I think it is sometimes extremely difficult for Paul to realize that the face he sees on record sleeves and in the newspapers and on the screen is nothing more or less than the face of his father—who sometimes yells at him. Of course, since he is only seven—going on eight, he will be eight years old this winter—he cannot know that I am baffled, too.

"Of course, you are wrong, you are silly," he said with passion—and caused me to smile. His English is strongly accented and is not, in fact, as good as his French, for he speaks French all day at school. French is really his first language, the first he ever heard. "You are the greatest singer in France"—sounding exactly as he must sound when he makes this pronouncement to his schoolmates—"the

CONTINUE

greatest *American* singer"—this concession was so gracefully made that it was not a concession at all, it added inches to my stature, America being only a glamorous word for Paul. It is the place from which his father came, and to which he now is going, a place which very few people have ever seen. But his aunt is one of them and he looked over at her. "Mme. Dumont says so, and she says he is a *great actor, too*." Louisa nodded, smiling. "And she has seen *Les Fauves Nous Attendent*—five times!" This clinched it, of course. Mme. Dumont is our concierge and she has known Paul all his life. I suppose he will not begin to doubt anything she says until he begins to doubt everything.

He looked over at me again. "So you are wrong to be afraid."

"I was wrong to yell at you, too. I won't yell at you any more today."

"All right." He was very grave.

Louisa poured more coffee. "He's going to knock them dead in New York. You'll see."

"*Mais bien sûr*," said Paul, doubtfully. He does not quite know what "knock them dead" means, though he was sure, from her tone, that she must have been agreeing with him. He does not quite understand this aunt, whom he met for the first time two months ago, when she arrived to spend the summer with us. Her accent is entirely different from anything he has ever heard. He does not really understand why, since she is my sister and his aunt, she should be unable to speak French.

Harriet, Louisa, and I looked at each other and smiled. "Knock them dead," said Harriet, "means *d'avoir un succès fou*. But you will soon pick up all the American expressions." She looked at me and laughed. "So will I."

1

The main effect of the phrase "incredible and troubling riches" (lines 8-9) is to

A) suggest that the film director is not protecting the narrator's best interests.

B) indicate that the narrator is surprised by his own success.

C) emphasize that the narrator does not know how to spend his earnings wisely.

D) convey a sense of the narrator's mixed feelings about his career.

2

The image of the "high-flying steel ball" in line 22 serves mainly to

A) represent the sudden difficulties individuals may face in life.

B) explain why childhood is less predictable than adulthood.

C) suggest that success occurs more often than failure.

D) criticize attempts to shelter children from disappointment.

3

The narrator suggests that during the family's life together, Harriet has undergone what fundamental change?

A) Her approach to parenting has shifted as she has become more progressive.

B) Her identification with the place of her birth has intensified.

C) Her efforts to appear calm have become an unconscious habit.

D) Her concern for herself has come to exceed her attention to family matters.

CONTINUE

4

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

A) Lines 11-14 ("I know . . . Paul's")
B) Lines 14-17 ("Harriet . . . old-fashioned")
C) Lines 19-23 ("Harriet . . . built")
D) Lines 25-29 ("I think . . . wished to")

5

The narrator indicates that he experienced guilt during a family breakfast because he had

A) considered excluding his family from a trip to America.
B) become upset and hurt his son's feelings.
C) ruined the cheerful mood Harriet was in.
D) caused an argument between his son and Harriet.

6

The passage suggests that Harriet views the narrator's worries about performing in New York as

A) understandable, considering that he performs his songs in French.
B) exaggerated, considering the devotion of his audience.
C) strange, considering that he visits America often.
D) inconvenient, considering that performances are crucial to his career.

7

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

A) Lines 36-37 ("It is . . . New York")
B) Lines 37-39 ("Your . . . *artistes*")
C) Lines 39-42 ("Millions . . . like him")
D) Lines 43-44 ("She . . . seen")

8

According to the passage, Paul shows pride in his father partly by

A) defending his father to Harriet and Mme. Dumont.
B) learning about the country his father was born in.
C) boasting to schoolmates about his father's talent.
D) watching his father's films and listening to his music.

9

As used in lines 61 and 62, "concession" most nearly means

A) adjustment.
B) excuse.
C) agreement.
D) qualification.

10

In his conversation with his family, Paul brings up Mme. Dumont in order to

A) support his views on his father's ability as a performer.
B) display his knowledge of American singers and actors.
C) show that he is capable of forming opinions of his own.
D) argue against his aunt's attitude toward his father's career.

CONTINUE

Questions 11-21 are based on the following passage and supplementary material.

This passage is adapted from Ann Gibbons, "A Find in Australia Hints at Very Early Human Exit from Africa." ©2017 by American Association for the Advancement of Science.

The timing of the peopling of Australia has been contentious for decades. Many archaeologists split into two camps, favoring settlement either
Line 60,000 years ago or sometime after 50,000 years ago,
5 depending on whether they trusted the dates from certain sites. Last year, geneticists analyzing DNA from living Aborigines joined the fray, but they came up with a wide range of dates, from 50,000 to 70,000 years ago.

10 The Madjedbebe rock shelter, formerly known as Malakunanja II, has always been central to the issue. Known for its striking rock art, researchers proposed in 1989 that the shelter was the oldest human occupation in Australia, after they dated sediments
15 containing stone tools to 50,000 to 60,000 years ago using the then-experimental method of thermoluminescence. But skeptics suggested that the 1500 tools and other artifacts could have drifted downward over time in the sandy sediments or that
20 animals or termites had disrupted the layers.

University of Queensland archaeologist Chris Clarkson had long wanted to reexcavate Madjedbebe to resolve the controversy. Geochronologist Richard "Bert" Roberts, now at the University of
25 Wollongong, who did the first dates, agreed to redate the site with Wollongong geochronologist Zenobia Jacobs, using optically stimulated luminescence (OSL) dating, a higher resolution form of thermoluminescence dating.

30 With Aborigine permission, the team reexcavated the site in 2012 and 2015 with painstaking stratigraphic controls. They found hundreds of thousands of new artifacts, including "elaborate" technologies such as the world's oldest ground-edge
35 stone axes, grindstones for pulverizing seeds, and finely made stone points that may have served as spear tips. The earliest people at the site also used "huge quantities of ochre" and are the first humans shown to have used reflective mica to decorate
40 themselves or rock walls.

The team took extensive steps to rule out the migration of artifacts between layers, for example by refitting together broken stone tools found in the same layer. Jacobs dated quartz grains from various
45 layers with OSL, determining when light last struck each grain and thus when it was buried. She dated 28,500 individual grains from 56 samples, checking to be sure that the dates were in proper order, growing older from top to bottom layers. Using a
50 Bayesian statistical technique to narrow the margins of error, she concluded that the oldest human occupation was 65,000 years ago, with a range of about 60,000 to 70,000 with 95% probability. "I think we nailed it," she says.

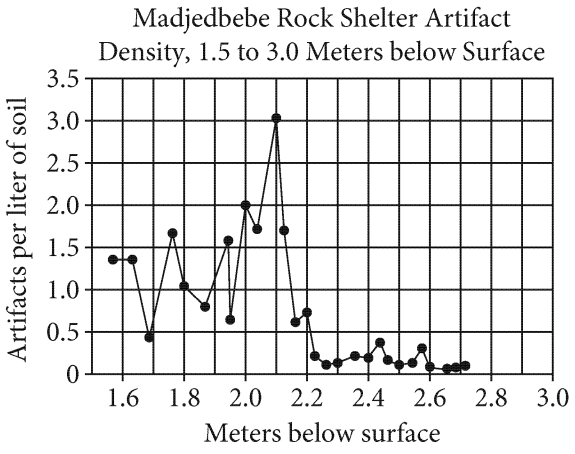
55 Other dating experts agree: "I feel really good about the dates," says geochronologist Edward Rhodes, calling the resulting chronology "highly robust."

The authors also suggest the new date of
60 65,000 years for the peopling of Australia pushes back the time when modern humans coming out of Africa mated with archaic species in Asia, such as Neandertals and Denisovans. Living Aborigines carry traces of those two species' DNA, which their
65 ancestors must have acquired by mixing somewhere in Asia before they reached Australia.

But such early mixing with Denisovans and Neandertals is at odds with genetic evidence from living Aborigines and nearby Melanesians, says
70 population geneticist David Reich. Analyses of these people's DNA "confidently" suggest that the mixing happened only 45,000 to 53,000 years ago, Reich says. "If these [new] dates are correct, they must be from a human population that was largely replaced
75 by the people who are the primary ancestors of today's Australians and New Guineans," he says.

That makes sense to archaeologist Jim O'Connell, who has favored the later chronology. This is "the only reliable [early] date," he says.

CONTINUE



Source: Data from Chris Clarkson et al., "Human Occupation of Northern Australia by 65,000 Years Ago." ©2017 by Macmillan Publishers Limited, part of Springer Nature.

11

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

A) disputed.
B) argumentative.
C) litigious.
D) impassioned.

12

As used in line 14 and line 52, "occupation" most nearly means

A) activity.
B) enterprise.
C) habitation.
D) conquest.

13

Which choice best supports the idea that Clarkson, Roberts, and Jacobs's methods allowed them to minimize the possibility that they would misidentify the age of some of the artifact fragments they found?

A) Lines 21-23 ("University . . . controversy")
B) Lines 32-37 ("They . . . tips")
C) Lines 41-44 ("The team . . . layer")
D) Lines 49-53 ("Using . . . probability")

14

According to the passage, the discovery of mica at the Madjedbebe rock shelter indicates that the first people to inhabit the site

A) used this material for artistic creations.
B) traded this substance among themselves.
C) used tools chiefly to extract this item.
D) chose the site for this resource.

15

In lines 44-49 ("Jacobs . . . layers"), the author most likely describes how Jacobs worked with grains of quartz in order to

A) illustrate the personal interest Jacobs had in proving that geochronology is an exact science.
B) indicate the sense that OSL dating is an especially labor-intensive research technique.
C) convey the meticulousness of Jacobs's approach in gathering and interpreting data.
D) highlight the rigors every scientist must undergo in building support for a novel theory.

CONTINUE

16

According to the passage, how does Jacobs feel about the results of her team's research?

A) She feels confident about the accuracy of her team's results.

B) She feels defensive about potential criticisms of her team's results.

C) She feels anxious about the disparity between previous findings and her team's results.

D) She feels curious about the unexpectedness of her team's results.

17

It can reasonably be inferred from the passage that the discrepancy between the chronology established by Clarkson, Roberts, and Jacobs and the DNA evidence from living Aborigines has which implication?

A) The discrepancy challenges the idea that some living humans share genetic traits with Neandertals and Denisovans.

B) The discrepancy indicates that multiple migrations of early humans to Australia may have occurred.

C) The discrepancy undermines researchers' confidence in the techniques they use to determine the migratory patterns of early humans.

D) The discrepancy suggests that the ancestors of living Aborigines may have arrived in Australia from New Guinea instead of Asia.

18

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

A) Lines 63-66 ("Living . . . Australia")

B) Lines 67-70 ("But such . . . Reich")

C) Lines 70-73 ("Analyses . . . Reich says")

D) Lines 73-76 ("If these . . . he says")

19

The last paragraph mainly serves to

A) suggest that the date of Australia's first settlement remains inconclusive.

B) present another researcher's plans to build on Clarkson, Roberts, and Jacobs's work.

C) offer additional archaeological evidence to support the time line suggested by the OSL dating.

D) indicate another researcher's agreement with Reich's suppositions about the chronology.

20

According to the graph, the greatest number of artifacts per liter of soil was found at approximately how many meters below the surface?

A) 2.0

B) 2.1

C) 2.2

D) 2.3

21

According to the graph, the greatest total change in artifact density was observed over which 0.1-meter interval of depth below the surface?

A) 1.6 and 1.7 meters

B) 1.7 and 1.8 meters

C) 2.0 and 2.1 meters

D) 2.1 and 2.2 meters

CONTINUE

Questions 22-31 are based on the following passage.

This passage is adapted from Patricia S. Churchland, *Braintrust: What Neuroscience Tells Us about Morality*. ©2011 by Princeton University Press.

Among male primates, cooperation may be rather limited in those social organizations where dominance hierarchies are strong and maintained by aggression. Cooperation among female primates may also be sensitive to rank, as it is in baboons. Research on the question of social tension and its effect on cooperation has been undertaken by psychologist Brian Hare.

Bonobos tend to be more easygoing than chimpanzees, arguably because their foraging territory south of the Congo River is much richer in large fruiting trees than the chimpanzee territories north of the Congo River. As Hare explains, "Overall, large patches of fruit and higher levels of high quality herbs to fall back on when fruit is unavailable reduce the costs of co-feeding and group living for bonobos relative to chimpanzees." With reduced foraging competition, there is likely to be reduced aggression, and hence a more relaxed way of life. Being more relaxed means that bonobos will be tolerant of the close presence of others during eating. Chimpanzees, by contrast, have a rather high-stress social organization with a tight male dominance hierarchy. Bonobo females within a group bond closely, especially along kin lines, and although males have a dominance hierarchy, a coalition of females can gang up on a male. A female bonobo will take food from a male, and bite one who resists, a behavior rarely seen in chimpanzees though also common in ringtail lemurs. Chimps are also less likely than bonobos to tolerate the close presence of down-rank or up-rank bystanders during feeding.

Hare wondered whether easygoing bonobos might be more successful than the more socially tense chimpanzees in solving a problem that requires cooperation of two animals. To test this, Hare and his team trained the chimps by putting two food dishes separated by 2.7 meters on a platform in a cage. To retrieve the food, the two animals had to simultaneously pull on the attached rope-ends. The chimps easily learned the task, whereupon the experiment changed, and only a single dish of food was placed on the platform, which the chimps could share if they successfully pulled the platform forward. What Hare observed was that if a chimpanzee could work with a "friend" (roughly, a chimp of the same rank), cooperation was smooth, but if he or she was paired with a nonfriend, such as a more dominant chimp, cooperation failed, even though both knew what they needed to do to get the food. In other experiments, a chimp was allowed to go and get another chimp to help in the one-dish food-pulling task. Under this condition, chimps generally picked someone both friendly to them and known to be skilled at the task.

How did the bonobos do? Even though the chimps were given more experience at the task, the naïve bonobos outperformed them. This was clearly evident when only one of the food dishes was baited, and after pulling the platform in, the two bonobos shared. Chimps were wary of the one-dish situation, either to avoid interacting with a more dominant chimp, or because the more dominant chimp could not suppress entitlement to all the food. Interestingly, comparable results had been found earlier for two species of macaques—the strict-hierarchy rhesus, known to be socially prickly, were less cooperative than the loose-hierarchy tonkean, known to be more socially easygoing.

In analyzing the results, Hare suggests that a relatively high level of cooperativity in a species may be enabled by the social system and the temperamental portfolio that supports it. Both chimps and bonobos are clever enough to know how to cooperate, and to understand the value of a cooperative interaction. But cooperation is much more constrained by the chimpanzee social system. As noted, in the wild bonobos live in a richer resource environment than chimpanzees, which may have allowed the more easygoing temperament to flourish. Arguably, the chimps' higher levels of aggression and social intolerance during feeding may in general have served them fairly well in a highly competitive food environment.

CONTINUE

22

The primary purpose of the passage is to

A) describe the foraging behaviors of two primate species.

B) refute a theory about cooperative interaction in two primate species.

C) examine the relationship between social tension and cooperation in two primate species.

D) analyze data about gender dominance hierarchies in two primate species.

23

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

A) method used to study task performance to a discussion of the significant implications of the study.

B) debate raised by previous social dominance experiments to a discussion of a study intended to resolve the debate.

C) finding based on a scientific experiment to a discussion of possible applications of the experiment's results.

D) theory about differences in observed behaviors to a discussion of an experiment testing those differences.

24

As used in line 5, "sensitive to" most nearly means

A) compassionate about.

B) responsive to.

C) disregarded by.

D) drawn to.

25

Which choice best supports the idea that an abundant supply of food may result in reduced social tension?

A) Lines 1-4 ("Among . . . aggression")

B) Lines 4-5 ("Cooperation . . . baboons")

C) Lines 9-13 ("Bonobos . . . River")

D) Lines 19-21 ("Being . . . eating")

26

The main contrast the author draws between female bonobos and female chimpanzees is in terms of their

A) interaction with males in their species.

B) willingness to forage in areas unfamiliar to their species.

C) tolerance of males of lower rank in their species.

D) aggression toward other females in their species.

27

As used in line 29, "common" most nearly means

A) unrefined.

B) popular.

C) plain.

D) typical.

CONTINUE

28

Based on the passage, Hare's reason for having the chimpanzees initially work together to retrieve food from two dishes was most likely to

A) reveal whether the chimpanzees were cooperating solely because they were of the same rank.

B) support the theory that the chimpanzees were collaborating only to retrieve the dishes of food.

C) confirm that the chimpanzees could execute a mechanical process essential to a subsequent phase of the experiment.

D) ensure that the experiment's results reflected the chimpanzees' actual abilities rather than chance occurrences.

29

Based on the description of Hare's research, a chimpanzee would be most likely to work cooperatively to retrieve a single dish of food if the chimpanzee were

A) partnered with a chimpanzee of the same social position.

B) familiar with the task's goal and the reward for completing the task.

C) paired with a more dominant and experienced chimpanzee.

D) able to observe other primates completing the task before beginning the task.

30

It can reasonably be inferred from the passage that one assumption of Hare's research is that

A) cooperation between different primate species is a natural behavior.

B) primates are limited in their ability to adapt to unfamiliar environments.

C) survival of primates is compromised by a lack of cooperation between species.

D) cooperation among primates requires a certain level of intelligence and skill.

31

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

A) Lines 70-73 ("In analyzing . . . supports it")

B) Lines 73-76 ("Both . . . interaction")

C) Lines 76-77 ("But cooperation . . . system")

D) Lines 81-84 ("Arguably . . . environment")

CONTINUE

Questions 32-41 are based on the following passages.

Passage 1 is adapted from the majority opinion by Supreme Court Justice Pierce Butler, delivered in the 1929 case *United States v. Schwimmer*, 279 U.S. 644 (1929). Passage 2 is adapted from a dissenting opinion by Justice Oliver Wendell Holmes Jr. in the same case. Hungarian refugee Rosika Schwimmer was denied United States citizenship for refusing to promise to bear arms in the country's defense, as required by the oath of allegiance. Her case went to the Supreme Court.

Passage 1

Whatever tends to lessen the willingness of citizens to discharge their duty to bear arms in the country's defense detracts from the strength and safety of the government. And their opinions and beliefs as well as their behavior indicating a disposition to hinder in the performance of that duty are subjects of inquiry under the statutory provisions governing naturalization and are of vital importance, for if all or a large number of citizens oppose such defense the 'good order and happiness' of the United States cannot long endure. And it is evident that the views of applicants for naturalization in respect of such matters may not be disregarded. The influence of conscientious objectors against the use of military force in defense of the principles of our government is apt to be more detrimental than their mere refusal to bear arms. The fact that, by reason of sex, age or other cause, they may be unfit to serve does not lessen their purpose or power to influence others. . . .

The record shows that respondent strongly desires to become a citizen. She is a linguist, lecturer, and writer; she is well educated and accustomed to discuss governments and civic affairs. Her testimony should be considered having regard to her interest and disclosed ability correctly to express herself. . . . Taken as a whole, it shows that her objection to military service rests on reasons other than mere inability because of her sex and age personally to bear arms. Her expressed willingness to be treated as the government dealt with conscientious objectors who refused to take up arms in the recent war indicates that she deemed herself to belong to that class. The fact that she is an uncompromising pacifist, with no sense of nationalism, but only a cosmic sense of belonging to the human family, justifies belief that she may be opposed to the use of military force as contemplated by our Constitution and laws. And her testimony clearly suggests that she is disposed to exert her power to influence others to such opposition.

Passage 2

The applicant seems to be a woman of superior character and intelligence, obviously more than ordinarily desirable as a citizen of the United States. It is agreed that she is qualified for citizenship except so far as the views set forth in a statement of facts 'may show that the applicant is not attached to the principles of the Constitution of the United States and well disposed to the good order and happiness of the same, and except in so far as the same may show that she cannot take the oath of allegiance without a mental reservation.' The views referred to are an extreme opinion in favor of pacifism and a statement that she would not bear arms to defend the Constitution. So far as the adequacy of her oath is concerned I hardly can see how that is affected by the statement, inasmuch as she is a woman over fifty years of age, and would not be allowed to bear arms if she wanted to. And as to the opinion the whole examination of the applicant shows that she . . . thoroughly believes in organized government and prefers that of the United States to any other in the world. Surely it cannot show lack of attachment to the principles of the Constitution that she thinks that it can be improved. . . .

. . . She is an optimist and states in strong and, I do not doubt, sincere words her belief that war will disappear and that the impending destiny of mankind is to unite in peaceful leagues. I do not share that optimism nor do I think that a philosophic view of the world would regard war as absurd. But most people who have known it regard it with horror, as a last resort, and even if not yet ready for cosmopolitan efforts, would welcome any practicable combinations that would increase the power on the side of peace. The notion that the applicant's optimistic anticipations would make her a worse citizen is sufficiently answered by her examination, which seems to me a better argument for her admission than any that I can offer. Some of her answers might excite popular prejudice, but if there

CONTINUE

is any principle of the Constitution that more imperatively calls for attachment than any other it is the principle of free thought—not free thought for those who agree with us but freedom for the thought
85 that we hate.

32

According to Passage 1, the refusal of citizens to bear arms in the country's defense will directly result in an

A) overall weakening in the security of the national government.

B) inability of citizens to defend their personal ethical beliefs.

C) increase in military attacks from hostile foreign countries.

D) escalating mistrust between different classes of citizens.

33

As used in line 8, "governing" most nearly means

A) disrupting.

B) assuming.

C) inspecting.

D) regulating.

34

Which choice from Passage 1 best supports the idea that the government has an interest in curbing any possible trend toward pacifism?

A) Lines 11-13 ("And it . . . disregarded")

B) Lines 13-17 ("The influence . . . arms")

C) Lines 26-29 ("Taken . . . arms")

D) Lines 29-32 ("Her expressed . . . class")

35

The main purpose of the last sentence of Passage 1 (lines 37-40) is to

A) hint at the unpredictability of naturalization decisions.

B) underscore the deficiencies of the application process.

C) emphasize the possible threat posed by the applicant.

D) summarize the evidence presented by the applicant.

36

In Passage 2, Holmes indicates that criticism of the US Constitution is

A) typical of those who are unfamiliar with Constitutional principles.

B) compatible with believing in the Constitution's doctrines.

C) reflective of a general cultural trend.

D) suggestive of a positive view of the world.

37

As used in line 79, "admission" most nearly means

A) disclosure.

B) concession.

C) acceptance.

D) testimony.

CONTINUE

38

The main purpose of both passages is to

A) argue that all people who apply for US citizenship must be prepared to obey US law.

B) investigate the accuracy of an individual's testimony from a previous court case.

C) determine whether an applicant for citizenship is suitable for military service.

D) evaluate the appropriateness of an individual's petition to become a US citizen.

39

Based on Passage 2, Holmes most likely would have responded to Butler's claim that Schwimmer has "no sense of nationalism" (line 34) by arguing that Schwimmer

A) believes that the government of the United States is superior to any other.

B) is confident that life in the United States will improve gradually over time.

C) displays nationalism in her deep understanding of the US Constitution.

D) would contend that her pacifism constitutes a fierce loyalty to the United States.

40

Based on Passage 1, Butler most likely would have responded to lines 54-58 ("So far . . . wanted to") in Passage 2 by stating that

A) future law may make it possible for women to bear arms in the country's defense.

B) a person of any age or sex has the right to offer opinions about the military.

C) Schwimmer is capable of persuading others to adopt her opinions.

D) Schwimmer's opposition to the use of defensive military force is unconstitutional.

41

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

A) Lines 4-11 ("And their . . . endure")

B) Lines 17-19 ("The fact . . . others")

C) Lines 23-25 ("Her testimony . . . herself")

D) Lines 33-37 ("The fact . . . laws")

CONTINUE

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

This passage is adapted from Jonathan B. Losos, *Improbable Destinies: Fate, Chance, and the Future of Evolution*. ©2017 by Jonathan B. Losos. The Rothamsted Park Grass Experiment is a collection of grass plots established in the nineteenth century to study the effects of fertilizers on plants.

Botanist Roy Snaydon saw in the Park Grass Experiment a way to experimentally test the idea that soil chemistry can drive evolutionary divergence in plants, even over very short distances and short periods of time. If this were the case, he reasoned, then it was possible that the variation seen among the Park Grass Experiment plots may partly have resulted from the adaptive divergence of members of the same species to the varying conditions on the different plots.

There was only one problem: the staff at Rothamsted looked upon the experimental plots—at that point one hundred years old—as hallowed ground. Only a few select staff members were allowed to even walk on the plots to tend them. Nobody was allowed to collect material or conduct research on them. The scientist supervising the plots and the Plots Committee were dubious about Snaydon's proposals, but his request came at the right time. The committee was considering discontinuing the experiments because they saw nothing left to learn, so what could be the harm in letting the professor do a little work on a few plots? Snaydon was called to appear before the committee and intensely grilled. Finally, approval was granted, albeit grudgingly, and they permitted Snaydon to collect a limited number of seeds.

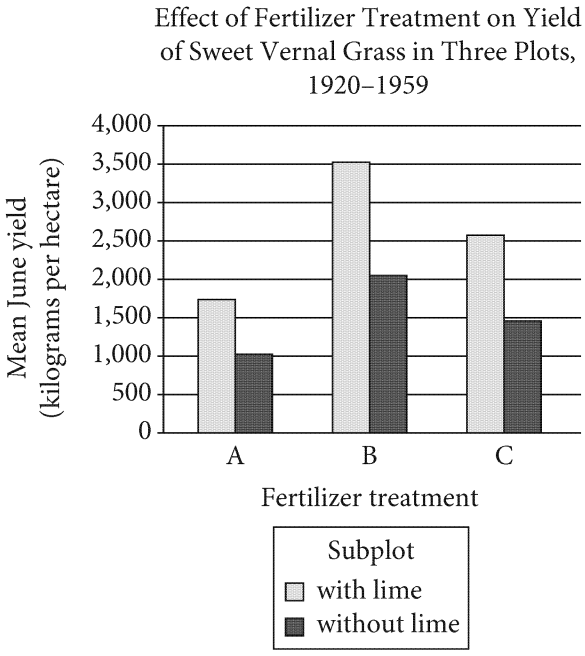
To test his idea that plants had diverged among the plots, Snaydon focused on sweet vernal grass, the plant found on the plots throughout the experimental field. He initially selected three plots that had been fertilized with different chemical mixes since the initiation of the experiment in 1856. Because lime had been applied to the southern half of each plot for half a century, the study involved six subplots varying markedly in mineral content and soil acidity. Snaydon's hypothesis was that over the past century, the grass populations had diverged evolutionarily to adapt to the specific conditions they experienced.

And diverge they had. Snaydon, quickly joined by ace graduate student Stuart Davies, found tremendous variation in the sweet vernal grass from one subplot to the next. The total weight (termed "yield") of the grass on some subplots was fifty percent higher than on others; height varied to a comparable extent. To test for genetic differences, they planted the seeds from different plots side by side. Sweet vernal grass from the different plots grown under identical conditions in a university research garden differed in a variety of traits, including the weight of the flowers, the size of the leaves, and the grass's susceptibility to mildew, demonstrating a genetic basis for differences among the subplots.

The existence of evolved genetic differences among plots did not, in itself, prove that these changes were adaptive—the changes could represent the sort of random genetic fluctuations that occur by chance in small populations. To test the adaptation hypothesis directly, Snaydon and Davies grew plants under a variety of different soil conditions. As they expected, plants grew best on soil with the same chemical composition as their natal plot. Taking this approach one step further, they took garden-reared plants and placed them back out onto the experimental plots (by this point, the scientific dividends of the work were so obvious that the Plots Committee was more liberal in the sort of work it allowed). Sure enough, plants grew much better on their home plot than on plots with different soil chemistry and vegetation characteristics. The conclusion was clear: over the course of a century, plants had adapted to the conditions they experienced on their own subplots.

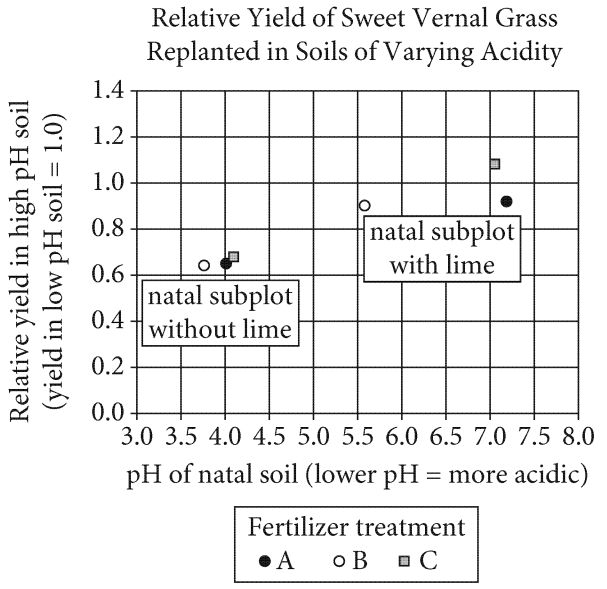
CONTINUE

Figure 1



Adapted from R. W. Snaydon and M. S. Davies, "Rapid Population Differentiation in a Mosaic Environment. II. Morphological Variation in *Anthoxanthum odoratum*." ©1972 by Society for the Study of Evolution.

Figure 2



Adapted from R. W. Snaydon, "Rapid Population Differentiation in a Mosaic Environment. I. The Response of *Anthoxanthum odoratum* Populations to Soils." ©1970 by Society for the Study of Evolution.

42

As used in line 3, "drive" most nearly means

A) handle.
B) oversee.
C) transport.
D) cause.

43

The main purpose of the second paragraph (lines 11-27) is to

A) show how the Plots Committee had assured the longevity of the Park Grass Experiment.
B) relate circumstances that posed an obstacle to the execution of Snaydon's research.
C) provide historical context about the formation of the Plots Committee.
D) summarize several flaws in the research proposal Snaydon presented.

CONTINUE

44

According to the passage, Snaydon's selection of plots for his experiment was based on the

A) type of fertilizer applied to the southern portion of each subplot and how it affected the mineral content in the soil.

B) levels of soil acidity in the plots after they were treated with fertilizers to increase the effectiveness of the lime.

C) concentrations of lime in the various subplots together with the total number of seeds found on each plot.

D) variety of chemical mixes used to fertilize the plots together with the application of lime to half of each plot.

45

As used in line 33, "initiation" most nearly means

A) commencement.

B) provocation.

C) acceptance.

D) instruction.

46

Based on the passage, which choice best helps explain why the experiments discussed in the last paragraph were necessary for confirming Snaydon's hypothesis?

A) The number of seeds that were replanted in the university research garden was too small to prove the existence of genetic differences.

B) The initial experiment conducted in the university research garden did not rule out a competing explanation for the observed variation between the plants.

C) The initial experiment conducted in the university research garden focused on too limited a number of traits to establish clear differences between the plants.

D) The soil chemistry of the plots studied in the university research garden was not identical to the soil chemistry of the Park Grass Experiment plots.

47

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

A) Lines 56-60 ("The existence . . . populations")

B) Lines 60-62 ("To test . . . conditions")

C) Lines 64-67 ("Taking . . . plots")

D) Lines 72-75 ("The conclusion . . . subplots")

48

The parenthetical remark in lines 67-70 ("by this . . . allowed") mainly serves to

A) note that Snaydon's research revived the committee's interest in genetic adaptations.

B) suggest that Snaydon's conclusions were anticipated by the scientific community.

C) specify Snaydon's contribution to a particular area of scientific inquiry.

D) indicate a reason why Snaydon was able to continue testing his hypothesis.

49

The data presented in figure 1 best support which statement about the mean June yield of sweet vernal grass in the plots Snaydon studied?

A) For all three fertilizer treatments, the mean yields were consistent across subplots that were treated with lime.

B) The mean yields in subplots without lime consistently exceeded 1,500 kilograms per hectare.

C) For all three fertilizer treatments, the mean yields of subplots treated with lime were higher than those of subplots without lime.

D) The mean yields in subplots treated with lime consistently fell short of 2,000 kilograms per hectare.

CONTINUE

50

According to figure 2, the relative yield in high pH soil of sweet vernal grass plants that had not been treated with lime in their natal subplot was within which range?

A) 0.4–0.6
B) 0.6–0.8
C) 0.8–1.0
D) 1.0–1.2

51

Based on the passage, which choice best helps account for the differences in relative yield of the various sweet vernal grass plants after they were replanted in high pH soil, as presented in figure 2?

A) Sweet vernal grass plants that had been treated with lime adapted to the high pH soil more quickly than did plants that had not been treated with lime.
B) Sweet vernal grass plants cultivated with lime were more likely to thrive in a variety of soil types than were sweet vernal grass plants without lime.
C) The high pH soil was more similar in composition to the natal soil of sweet vernal grass plants treated with lime than it was to the natal soil of sweet vernal grass plants without lime.
D) The respective fertilizer treatments were more effective in providing nourishment for sweet vernal grass plants in high pH soil than in low pH soil.

52

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

A) Lines 34-37 ("Because . . . acidity")
B) Lines 41-44 ("Snaydon . . . next")
C) Lines 47-49 ("To test . . . side")
D) Lines 70-72 ("Sure . . . characteristics")

STOP

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

CollegeBoard SAT®

APRIL 13, 2021
US SCHOOL DAY

The SAT®

Test Book

IMPORTANT REMINDERS

1

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

2

Sharing any questions with anyone is a violation of Test Security and Fairness policies and may result in your scores being canceled.

Reading Test

65 MINUTES, 52 QUESTIONS

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

DIRECTIONS

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

Questions 1-10 are based on the following passage.

This passage is adapted from *The Fortunes* by Peter Ho Davies. ©2016 by Peter Ho Davies. The passage is set in 1935. Anna, an actress, is working with Newsreel, a photographer, to create a short documentary film.

Anna speaks Cantonese—with an American accent, her father has always said—but no Mandarin or Shanghainese. Now she requires an interpreter to tell her hosts how delighted she is to visit her homeland. It's just as well the newsreel is silent, she thinks, the announcer's voice-over to be added later. Besides, didn't she do some of her best work in silent pictures?

Newsreel films her at Yu Gardens framed by a moon gate. He films her on the Nanking Road, shopping and turning heads. In the Sincere Department Store she is delighted to learn that the onomatopoeic Chinese word for the pneumatic tube system is *pung*. He films her on the Bund pointing out junks,[1] rubbing the paw of the bronze lion outside the Hong Kong and Shanghai Bank for luck. There are more cars than she expected—though she must try a rickshaw—more telephones, more streetlights. Overhead the telegraph lines make a net against the sky.

A pair of trams cross in front of her, parting like curtains. She marvels blithely at the modernity. "Why, it reminds me of Berlin. I was expecting old Cathay![2] But it looks nothing like Grauman's Theatre."

Mostly, though, there are more Chinese than she ever imagined—compradors in tang jackets, black-and-white amahs, monks in their yellow robes—crowding everywhere, more than she's ever seen. And this she keeps to herself: secretly she feels like an extra again, is glad of her chic Western wardrobe, Chanel suits, for helping her stand out.

The Mayfair Mannequin Academy of New York named her the "World's Best-Dressed Woman" in 1934. *Not bad for a laundryman's daughter*, she wrote to her father at the time, but he didn't reply.

She finds herself waiting for Newsreel to say "Action!" Pausing at the edge of the frame, her weight tipped forward, but catching herself. They laugh when she explains it to him. Yet she still wants him to tell her what to do. "Was that good?" She asks after a take, and he says, "Sure." She feels naked without stage makeup, lighting. She asks to redo a moment when she bumps into someone. "If you like." She repeats a particular gesture, a little turn of the wrist as if she's presenting the scene around her, practicing between takes and then repeating to make sure he captures it, until he looks up and over the camera and asks, "What are you doing?"

Newsreel's Eyemo camera runs for twenty seconds, fully wound, and she begins pacing her movements to his rhythms. From the taxi to the hotel lobby, twenty seconds. Greeting a fan, twenty seconds. Admiring a bolt of silk, twenty seconds. And then it's time to change the reel.

She feels as if he's winding her up like a tin toy.

CONTINUE

Finally, she leans on a rail overlooking the river, waiting for him, and when he raises up, she lifts her own Leica to take a picture of him.

"You look like a tourist," he tells her, and she frowns. On the Whangpoo the sails of junks unfurl like fans, raised as if in modesty to hide them from gaze.

She outfits herself with a new wardrobe. She sheds her Western dresses and suits for sleek qipao. The milky-eyed tailor who measures her wraps a knotted string around her waist and hips. She used to work as a seamstress at her father's laundry when she was a child, she says, and he nods when someone translates. Afterward she shows off her new gowns for the camera. "Going native," she tells Newsreel. He touches a finger to the knot of his bowtie as if it were a button.

She blends in better, at least until people address her in Mandarin. She can't recall the last time she felt invisible like this. But she fears getting lost in the crowd. She relies on Newsreel to pick her out, on the camera to make her stand out.

In later years she'll wear those dresses in movies and charge the studios an extra fee to rent her wardrobe.

[1] Flat bottomed boats
[2] Another term for China

1

Which choice best describes what happens in the passage?

A) A character's visit to her native country inspires her to investigate her ancestral history.

B) A character considers how she has had to comply with expectations in her career as an actress.

C) A character compares the customs of one country to those of another country.

D) A character's work on a project causes her to reflect on her place in a particular culture.

2

Which choice best supports the idea that Anna's ability to speak Cantonese does not help her communicate with the people she meets in China?

A) Lines 1-5 ("Anna . . . homeland")

B) Lines 5-8 (It's . . . pictures")

C) Lines 11-14 ("In the . . . *pung*")

D) Lines 53-55 ("Greeting . . . reel")

3

Based on the passage, which choice best describes Anna's initial reaction to China?

A) She is baffled because she is not familiar with the local customs.

B) She is intimidated by its expansiveness and visits only the most popular tourist destinations.

C) She is overcome with admiration for the fashion she sees there.

D) She is surprised because it is not as antiquated as she had imagined it to be.

4

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

A) Lines 14-16 ("He . . . luck")

B) Lines 22-25 ("She . . . Theatre")

C) Lines 26-29 ("Mostly . . . seen")

D) Lines 30-32 ("And . . . out")

CONTINUE

5

In line 32 and line 78, the phrase "stand out" primarily serves to

A) highlight Anna's active participation in the newsreel and her later disregard for it.

B) portray Anna as materialistic and her visit to China as an attempt to garner more fame.

C) demonstrate that Anna is unable to successfully assimilate into Chinese culture.

D) underscore the importance Anna places on feeling distinctive.

6

In context, the fifth paragraph (lines 33-36) primarily serves to

A) reveal that Anna and her father have not spoken in many years.

B) introduce a contrast between Anna's current success and her modest upbringing.

C) emphasize that Anna has received numerous accolades.

D) provide details about the trajectory of Anna's career.

7

In context, what is the primary significance of Anna's act of taking a photograph of Newsreel?

A) A response to this act propels Anna to reassess how she is presenting herself to others.

B) A dismissal of this act causes her to realize that she has less autonomy than she had previously assumed.

C) An indifference toward this act forces Anna to reconsider how she is engaging with the filming process.

D) An acceptance of this act allows Anna to become more confident in her interactions with Newsreel.

8

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

A) renew.

B) revive.

C) remember.

D) reinstate.

9

According to the passage, dressing in Chinese attire causes Anna to

A) feel that she is more anonymous.

B) become more comfortable with her surroundings.

C) have more appreciation for her father's work.

D) approach her everyday activities with more enthusiasm.

10

The passage indicates that the items Anna purchases in China later serve her as

A) a means for financial gain.

B) a symbol of her early career.

C) emblems of a lost culture.

D) nostalgic reminders of her travels.

CONTINUE

Questions 11-20 are based on the following passage and supplementary material.

This passage is adapted from Christian Jarrett, "We Have an Ingrained Anti-Profit Bias that Blinds Us to the Social Benefits of Free Markets." ©2017 by the British Psychological Society.

According to a new paper in *Journal of Personality and Social Psychology*, most of us have an instinctual anti-profit bias. We view for-profit companies and industries—upon which capitalism is based—with inherent distrust, assuming that the more profitable they are, the more harm they do to society. In fact, research shows the opposite is true: companies that make greater profits actually tend to contribute more value to society, for example in terms of their environmental responsibility and corporate philanthropy.

The authors of the new paper, led by Amit Bhattacharjee at Erasmus University, believe this anti-profit bias leads many voters and politicians to endorse anti-profit policies that are likely to lead to the very opposite outcomes for society that they want to achieve. "Erroneous anti-profit beliefs may lead to systematically worse economic policies for society, even as they help people satisfy their social and expressive needs on an individual level," they said.

Through seven separate studies involving hundreds of online participants, the researchers present evidence that the anti-profit bias arises because we think about for-profit motives in a somewhat superficial, ego-centric fashion. Because the desire for profit is seen as based on selfish intent, we extrapolate to assume that the activities of for-profit companies and industries must be bad for society, disregarding the reality that selfish intents can have positive consequences.

We also refer to our own mundane "zero sum" experiences, such as buying a car, in which the seller's profitable gain inevitably comes at our loss. We fail to consider how market forces operate on a massive scale, in which for-profit companies (competing in a free market with informed customers) need to innovate, behave fairly and develop a good reputation in order to be profitable over the long term.

For instance, in the first study, participants rated Fortune 500 companies in terms of how profitable they thought they were and how much they thought they engaged in bad business practices, such as operating at the expense of others with no concern for society. There was a clear pattern: the more profitable participants thought a company was, the more they assumed that it engaged in bad business practices. In fact, expert assessments of the firms show the opposite pattern.

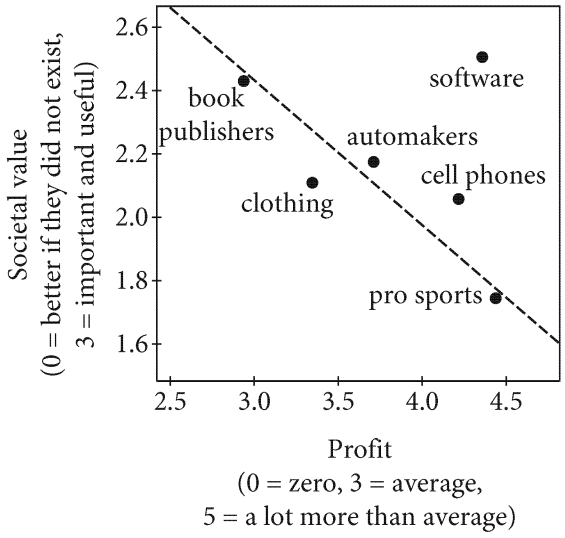
In another study, participants were presented with vignettes of different companies and either told they operated for-profit or not-for-profit. Participants rated the exact same companies, engaging in the same business activities, as more likely to cause social harm, and less likely to bring social benefit, if they were described as for-profit rather than not-for-profit.

Bhattacharjee and his team found that they could attenuate their participants' anti-profit bias if they prompted them to think about how a long-term profit motive could encourage greater product innovation and quality, better treatment of staff, and more concern for reputation. However, thinking this way doesn't seem to come naturally. Participants' baseline judgments about for-profit companies were the same as when they were actively encouraged to assume that customers face few choices and have no information about firms' reputations (which isn't the case in a free market, profit-driven economy).

The findings of an ingrained anti-profit bias generally held regardless of participants' economic knowledge or political leanings. This was a US study so it remains to be seen if the same anti-profit bias will be found in other cultures.

CONTINUE

Relation between Perceived Profit and Perceived Societal Value for Selected Industries



Adapted from Amit Bhattacharjee, Jason Dana, and Jonathan Baron, "Anti-Profit Beliefs: How People Neglect the Societal Benefits of Profit." ©2017 by the American Psychological Association.

The dashed line is a fit to the full data set (40 industries).

11

The main purpose of the passage is to

A) analyze research that claims to show that an erroneous view is less widespread than previously thought.

B) describe findings that show why many people maintain a specific illogical position even after recognizing its faults.

C) present data showing that a mistaken belief leads to negative outcomes for the people who hold it.

D) discuss studies showing that an inaccurate conception is firmly established within a particular population.

12

In context, the second paragraph (lines 12-20) mainly serves to

A) suggest a possible origin of the anti-profit bias.

B) highlight potential consequences of the anti-profit bias.

C) summarize the scholarly consensus about the anti-profit bias.

D) suggest ways of overcoming the anti-profit bias.

13

As used in line 30, "positive" most nearly means

A) certain.

B) appreciative.

C) beneficial.

D) optimistic.

14

The passage most strongly suggests that one overlooked influence on the behavior of for-profit companies is the fact that

A) increases in companies' profits typically represent increased losses by consumers.

B) it is in companies' financial interest to act in ways that people regard favorably.

C) the leaders of many companies are aware of people's anti-profit bias.

D) while companies themselves act in selfish ways, people working for those companies may not.

15

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

A) Lines 3-6 ("We view . . . society")

B) Lines 25-30 ("Because . . . consequences")

C) Lines 31-33 ("We also . . . loss")

D) Lines 33-38 ("We fail . . . term")

CONTINUE

16

As used in line 63, "naturally" most nearly means

A) commonly.
B) obviously.
C) simply.
D) intuitively.

17

It can reasonably be inferred from the passage that compared with US people who are critical of capitalism, US people who are supportive of capitalism are likely to be

A) more tolerant of socially harmful business practices by for-profit companies.
B) better at reducing their anti-profit bias when prompted to think about long-term effects.
C) equally bad at accurately evaluating for-profit companies' effects on society.
D) less willing to concede that the desire for profit is a selfish motive.

18

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

A) Lines 62-63 ("However . . . naturally")
B) Lines 63-68 ("Participants' . . . economy")
C) Lines 69-71 ("The findings . . . leanings")
D) Lines 71-73 ("This . . . cultures")

19

According to the figure, which industry did participants perceive to be the least profitable?

A) Book publishers
B) Clothing
C) Automakers
D) Pro sports

20

Based on the figure, which choice most accurately summarizes participants' views of the societal value of the pro sports industry?

A) While the industry has below-average societal value, it has more societal value than does the cell phones industry.
B) Although the industry has relatively little societal value, society would not be better if the industry ceased to exist.
C) The industry is inaccurately regarded as having little societal value.
D) The industry would have more societal value if the industry were more profitable.

CONTINUE

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

This passage is adapted from Chris Brodie, "No Use Moving the Cheese." ©2004 by Sigma Xi, the Scientific Research Society.

Superman has super-hearing. Spider-Man has an uncanny "spider-sense." But truth can be stranger than fiction. The newest superhero doesn't wear a cape or mask. It's a mouse, and it looks just like its normal brethren. Its super power is its amazing . . . nose. In a paper published in *Neuron*, collaborators at Florida State University and Yale University describe what they call "super-smeller" mice. These exceptional creatures have noses that are 1,000 to 10,000 times more sensitive than those of ordinary mice.

The superhero origin of these rodents involves the deletion, or knockout, of a gene. This technique usually generates mice that are quite sick, as nearly all mutations are harmful. Yet it doesn't seem to be true for this gene, *Kv1.3*, which encodes a protein that acts as a channel to let potassium ions (K^+) into cells. This particular ion channel is found in immunological T-cells and neurons in the hippocampus and the olfactory bulb—the part of the brain that gets information from odor receptors in the nose.

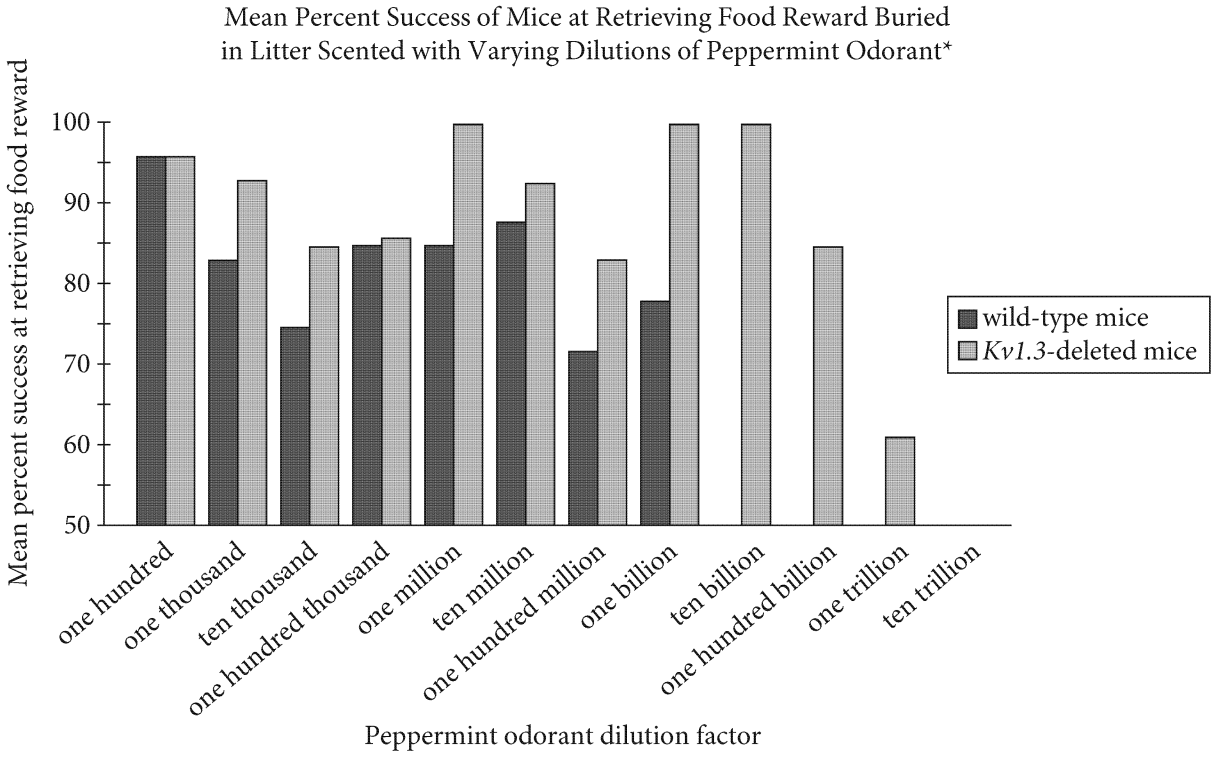
In neurons, K^+ channels such as Kv1.3 can act like governors on an engine, restricting the firing rate of the electrical spikes known as action potentials. The deletion of Kv1.3 removes this block. Using mice generated in the Yale lab of Richard Flavell, a team at Florida State led by Debra Fadool discovered that the loss of the channel caused one type of olfactory neuron, the mitral cell, to fire at lower thresholds and higher frequencies. Furthermore, the mutant cells were insensitive to chemical messages that normally rein in the flow of electrical current during an action potential. According to coauthor Leonard Kaczmarek, whose group at Yale studies the ion-channel biology of sensation, these changes resulted in greater excitability and better timing—effectively "phase locking" the output of the mitral cells, and thereby increasing the coherence of olfactory signals.

The mutation also caused structural changes in the olfactory bulb. In this part of the brain, olfactory receptor cells connect to mitral cells in clusters called glomeruli. The knockout mice had glomeruli that were about half as large—but twice as abundant—as normal. As a result, information from the nose went to twice as many "processing units" as usual. Fadool suggests this might increase the resolution of the signal—meaning that a faint odor would be more likely to be noticed above the jumble of background smells.

Mutant mice could distinguish between complex odors, such as peppermint and powdered food, with nearly 15 times the sensitivity of normal mice. They were also better at detecting subtle molecular differences between odorants, such as some (but not all) closely related alcohols. The most amazing change was a huge increase in sensitivity: Mutant mice were able to perceive an odor that was 1,000 times more dilute than what wild-type mice could smell.

The super-smeller was definitely a surprise—none of the investigators intended to create such a creature. "We had no inkling," states Kaczmarek. "We were looking for an effect in the auditory system."

CONTINUE



*Success defined as greater than 50 percent, as 50 percent could be chance

Figure adapted from D. A. Fadool et al., "Kv1.3 Channel Gene-Targeted Deletion Produces 'Super-Smeller Mice' with Altered Glomeruli, Interacting Scaffolding Proteins, and Biophysics." ©2004 by Cell Press.

21

The primary purpose of the passage is to

A) describe the discovery of a new species of mice.
B) explore the results of a genetic mutation in mice.
C) consider the roles of different genes in mice.
D) discuss a misconception about the sense of smell in mice.

22

In the first paragraph, the references to Superman and Spider-Man primarily serve to

A) emphasize the unusual nature of a research finding.
B) explore the practical implications of a recent discovery.
C) define the use of a scientific term by providing familiar examples.
D) provide a contrast between realistic and imaginary situations.

CONTINUE

23

Which choice best supports the idea that super-smeller mice can perceive distinctions in odors that are very similar to one another?

A) Lines 25-30 ("Using . . . frequencies")
B) Lines 45-49 ("Fadool suggests . . . smells")
C) Lines 50-52 ("Mutant . . . mice")
D) Lines 52-55 ("They . . . alcohols")

24

As used in line 26, "generated" most nearly means

A) energized.
B) provoked.
C) produced.
D) performed.

25

As used in line 31, "insensitive to" most nearly means

A) merciless to.
B) unemotional toward.
C) unresponsive to.
D) unconcerned with.

26

Which conclusion about the functioning of the sense of smell in mice is best supported by the passage?

A) The fewer the number of mutant cells, the more powerful the sense of smell is in mice.
B) The greater the number of olfactory receptor cells connected to mitral cells, the less sensitive the sense of smell is in mice.
C) The fewer the number of glomeruli, the less sensitive the sense of smell is in mice.
D) The larger the size of glomeruli, the more powerful the sense of smell is in mice.

27

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

A) Lines 15-17 ("Yet it . . . cells")
B) Lines 30-33 ("Furthermore . . . potential")
C) Lines 39-42 ("The mutation . . . glomeruli")
D) Lines 42-45 ("The knockout . . . usual")

28

According to the passage, the discovery of the super-smeller mice was unexpected in part because the researchers

A) did not know that the Kv1.3 gene existed before they pursued the experiment.
B) were originally investigating the relationship between the Kv1.3 gene and the mice's hearing.
C) had intended to show the Kv1.3 gene did not control the mice's sense of smell.
D) believed that normal mice possessed a more acute sense of smell than they actually had.

29

According to the figure, the mean percent success of the wild-type mice at retrieving the food reward was no greater than 50 percent for which of the following peppermint odorant dilution factors?

A) One thousand
B) Ten million
C) One billion
D) Ten billion

CONTINUE

30

According to the figure, at which peppermint odorant dilution factor did the mean percent success at retrieving the food reward remain above 90 percent for both Kv1.3-deleted mice and wild-type mice?

A) One hundred

B) One hundred thousand

C) One million

D) One hundred million

31

According to the figure, which statement best supports what the author considers the most surprising finding about the mutant mice's perception of odors compared to that of the wild-type mice, as represented in the passage?

A) Both wild-type mice and Kv1.3-deleted mice had an increase in success at retrieving the food reward when the peppermint odorant dilution factor changed from ten thousand to one hundred thousand.

B) The wild-type mice had an increase in success at retrieving the food reward when the peppermint odorant dilution factor was changed from one million to ten million, whereas the Kv1.3-deleted mice suffered a decline in success when that change was made.

C) The wild-type mice had better than 50 percent success at retrieving the food reward up to a peppermint odorant dilution factor of one billion, whereas the Kv1.3-deleted mice had better than 50 percent success at retrieving the food reward when the peppermint odorant dilution factor was greater than one billion.

D) Wild-type mice and Kv1.3-deleted mice had the same success at retrieving the food reward when the peppermint odorant was diluted by a factor of one hundred.

CONTINUE

Questions 32-42 are based on the following passage.

This passage is adapted from a speech delivered in 1961 by Albert Lutuli, "Africa and Freedom." ©1960 by The Nobel Foundation. Lutuli was awarded the Nobel Peace Prize for his role in the struggle against apartheid, a system of institutionalized racial segregation and discrimination in South Africa from 1948 to 1991, the year it was abolished.

In years gone by, some of the greatest men of our century have stood here to receive this award, men whose names and deeds have enriched the pages of human history, men whom future generations will regard as having shaped the world of our time. No one could be left unmoved at being plucked from the village of Groutville—a name many of you have never heard before and which does not even feature on many maps—to be plucked from banishment in a rural backwater, to be lifted out of the narrow confines of South Africa's internal politics and placed here in the shadow of these great figures. . . .

This award could not be for me alone, nor for just South Africa, but for Africa as a whole. Africa presently is most deeply torn with strife and most bitterly stricken with racial conflict. How strange then it is that a man of Africa should be here to receive an award given for service to the cause of peace and brotherhood between men. There has been little peace in Africa in our time. From the northernmost end of our continent, where war has raged for seven years, to the center and to the south there are battles being fought out, some with arms, some without. . . . Ours is a continent in revolution against oppression. And peace and revolution make uneasy bedfellows. There can be no peace until the forces of oppression are overthrown.

Our continent has been carved up by the great powers; alien governments have been forced upon the African people by military conquest and by economic domination; strivings for nationhood and national dignity have been beaten down by force; traditional economics and ancient customs have been disrupted, and human skills and energy have been harnessed for the advantage of our conquerors. In these times there has been no peace; there could be no brotherhood between men.

But now, the revolutionary stirrings of our continent are setting the past aside. Our people everywhere from north to south of the continent are reclaiming their land, their right to participate in government, their dignity as men, their nationhood. Thus, in the turmoil of revolution, the basis for peace and brotherhood in Africa is being restored by the resurrection of national sovereignty and independence, of equality and the dignity of man.

It should not be difficult for you here in Europe to appreciate this. Your continent passed through a longer series of revolutionary upheavals, in which your age of feudal backwardness gave way to the new age of industrialization, true nationhood, democracy, and rising living standards—the golden age for which men have striven for generations. Your age of revolution, stretching across all the years from the eighteenth century to our own, encompassed some of the bloodiest civil wars in all history. By comparison, the African revolution has swept across three quarters of the continent in less than a decade; its final completion is within sight of our own generation. Again, by comparison with Europe, our African revolution—to our credit—is proving to be orderly, quick, and comparatively bloodless. . . .

There is a paradox in the fact that Africa qualifies for such an award in its age of turmoil and revolution. How great is the paradox and how much greater the honor that an award in support of peace and the brotherhood of man should come to one who is a citizen of a country where the brotherhood of man is an illegal doctrine, outlawed, banned, censured, proscribed and prohibited; where to work, talk, or campaign for the realization in fact and deed of the brotherhood of man is hazardous, punished with banishment, or confinement without trial, or imprisonment; where effective democratic channels to peaceful settlement of the race problem have never existed these 300 years; and where white minority power rests on the most heavily armed and equipped military machine in Africa. This is South Africa.

Even here, where white rule seems determined not to change its mind for the better, the spirit of Africa's militant struggle for liberty, equality, and independence asserts itself. I, together with thousands of my countrymen, have in the course of the struggle for these ideals been harassed and imprisoned, but we are not deterred in our quest for a new age in which we shall live in peace and in brotherhood.

CONTINUE

32

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

A) an acknowledgment of the significance of an award to a discussion of the struggles to achieve the ideals that the award represents.

B) a reflection on the merits of an award to an assessment of why that award was given to a particular individual.

C) an expression of appreciation for an award to an examination of the obstacles that had to be surmounted to receive that award.

D) an affirmation of the purpose of an award to a consideration of the likely impact that the award will have on the people of a continent.

33

Lutuli's point of view in the passage as a whole can best be described as that of a

A) cautious peacemaker.

B) conventional politician.

C) resolute reformer.

D) harsh critic.

34

In the first paragraph, Lutuli's description of the village of Groutville primarily serves to

A) show why he is uniquely qualified to receive the Nobel Peace Prize on behalf of the African people.

B) emphasize the honor he feels in winning the Nobel Peace Prize as he considers his modest background.

C) account for his particular view of the upheaval Africa has experienced in his lifetime.

D) explain that he comes from a village that is typical of many villages in South Africa.

35

Based on the passage, Lutuli most likely believes the revolutions taking place in Africa are a

A) phenomenon without precedent in Africa's history.

B) necessary step in Africa's path to liberation.

C) development with unpredictable results.

D) sign of growing interest in democracy worldwide.

36

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

A) Lines 20-24 ("From . . . without")

B) Lines 24-27 ("Ours . . . overthrown")

C) Lines 28-35 ("Our continent . . . conquerors")

D) Lines 35-37 ("In these . . . between men")

37

As used in line 43, "basis" most nearly means

A) evidence.

B) origin.

C) theory.

D) foundation.

38

It can reasonably be inferred from the passage that Lutuli views Europe's fight for democracy in part as a

A) campaign with an inspiring outcome.

B) military rather than a political struggle.

C) struggle that indirectly caused the failure of Africa's economy.

D) quest with more radical objectives than those of Africa.

CONTINUE

39

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

A) Lines 47-48 ("It should . . . this")
B) Lines 48-53 ("Your . . . generations")
C) Lines 56-60 ("By comparison . . . generation")
D) Lines 60-62 ("Again . . . bloodless")

40

In comparing revolutions in Europe and Africa, Lutuli makes the assumption that

A) Europeans faced significantly different obstacles than Africans when fighting for democracy.
B) Europeans will share in the future prosperity of a democratic Africa.
C) the pursuit of democracy in Africa will give rise to the same social improvements as those achieved in Europe.
D) the leaders of Europe recognize that the revolutionary activities of the African peoples are adaptations of strategies first used in Europe.

41

Lutuli indicates that Africa's quest for democracy is, in some respects, more commendable than the quest that took place in Europe because

A) revolutionaries in parts of Africa have had to fight for their rights without appropriate weapons.
B) African patriots have been willing to sacrifice considerably more of their personal assets.
C) African reformers have had to contend with a greater variety of geographical challenges.
D) revolutionary change in Africa has occurred in less time and with less violence.

Questions 43-52 are based on the following passages.

Passage 1 is adapted from Joseph Castro, "How the Mars Moon Phobos Got Its Grooves." ©2014 by Purch. Passage 2 is adapted from Elizabeth Zubritsky, "Mars' Moon Phobos Is Slowly Falling Apart." Published in 2015 by National Aeronautics and Space Administration.

Passage 1

Billions of years ago, Mars suffered from numerous big impacts, and the resulting backwash ultimately scarred the surface of Phobos, one of the Red Planet's two tiny moons, researchers say.

In 1976, images from NASA's Viking orbiter revealed that the surface of Phobos is covered in numerous parallel, channel-like grooves. Over the years, researchers have come up with many hypotheses to explain the odd features, but the origin of the satellite's grooves is still heavily debated today.

In the new study, a pair of researchers reviewed the evidence for the major hypotheses and concluded that only one holds water: The grooves are chains of secondary impacts, the landing sites of material blasted to the Mars moon by impacts on the Red Planet.

Using new data and images from the European Space Agency's Mars Express orbiter, the scientists also mapped the grooves in much greater detail than ever before, and calculated that the amount of Mars material needed to form all of Phobos' grooves is about two orders of magnitude lower than the total ejecta from Mars' craters.

"Everything fits in with this hypothesis," said John Murray, a planetary scientist at Open University in the U.K., and lead author of the new study. "We can even trace the ejecta that produced the grooves back to [source areas] on Mars."

Some scientists have previously speculated that the grooves are fractures resulting from tidal forces, the impact that created Phobos' prominent Stickney Crater or other sources.

"It hasn't really been a generally accepted idea, or one that has gained universal approval," Murray said, adding that there are several issues with all fracture hypotheses for the origin of the grooves. For instance, the near-perfect alignment of the grooves within each family doesn't fit with other fracture fields throughout the solar system.

CONTINUE

Other hypotheses posit that the grooves on Phobos are the result of local impacts. According to one idea, the meteor that created Stickney Crater kicked up ejecta that showered Phobos, creating the grooves; a related hypothesis proposes that rolling boulders from the crater scarred Phobos. Or, the grooves may have developed when Phobos was hammered by orbiting debris, according to some researchers.

But none of these ideas can explain all of the observed characteristics and patterns of the grooves, Murray said.

Passage 2

Phobos' grooves were long thought to be fractures caused by the impact that formed Stickney crater. That collision was so powerful, it came close to shattering Phobos. However, scientists eventually determined that the grooves don't radiate outward from the crater itself but from a focal point nearby.

More recently, researchers have proposed that the grooves may instead be produced by many smaller impacts of material ejected from Mars. But new modeling by NASA's Terry Hurford and colleagues supports the view that the grooves are more like "stretch marks" that occur when Phobos gets deformed by tidal forces.

The gravitational pull between Mars and Phobos produces these tidal forces. Earth and our moon pull on each other in the same way, producing tides in the oceans and making both planet and moon slightly egg-shaped rather than perfectly round.

The same explanation was proposed for the grooves decades ago, after the Viking spacecraft sent images of Phobos to Earth. At the time, however, Phobos was thought to be more-or-less solid all the way through. When the tidal forces were calculated, the stresses were too weak to fracture a solid moon of that size.

The recent thinking, however, is that the interior of Phobos could be a rubble pile, barely holding together, surrounded by a layer of powdery regolith about 330 feet (100 meters) thick.

An interior like this can distort easily because it has very little strength and forces the outer layer to readjust. The researchers think the outer layer of Phobos behaves elastically and builds stress, but it's weak enough that these stresses can cause it to fail.

All of this means the tidal forces acting on Phobos can produce more than enough stress to fracture the surface. Stress fractures predicted by this model line up very well with the grooves seen in images of Phobos. This explanation also fits with the observation that some grooves are younger than others, which would be the case if the process that creates them is ongoing.

43

Which choice best supports the idea that the researchers in Passage 1 have identified the points of origin for the materials they believe led to the grooves on Phobos?

A) Lines 11-13 ("In the . . . water")
B) Lines 26-28 ("We can . . . Mars")
C) Lines 29-32 ("Some . . . sources")
D) Lines 41-45 ("According . . . Phobos")

44

As used in line 13, "chains" most nearly means

A) ornaments.
B) restrictions.
C) strings.
D) bonds.

45

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

A) scatter.
B) light.
C) extend.
D) yield.

CONTINUE

46

According to Hurford in Passage 2, the gravitational pull between Mars and Phobos was

A) sufficient to produce tidal forces that cracked the surface of Phobos.

B) underestimated initially because Phobos was thought to be smaller than it really is.

C) altered when Phobos endured a powerful impact that damaged its surface.

D) overlooked by scientists who believed Phobos had an interior layer of powdery regolith.

47

The primary function of the sentence in lines 66-69 ("Earth . . . round") is to

A) suggest a controversy about tidal forces on Phobos.

B) question an underlying assumption about tidal forces.

C) note an important distinction between Earth and Phobos.

D) describe a situation analogous to one found on Phobos.

48

Based on Passage 2, which finding most strongly suggests that the grooves on Phobos are unlikely to have formed in a single event?

A) Images of the various types of grooves on an egg-shaped Phobos

B) Details suggesting that the grooves on Phobos are different ages

C) Recent information about the interior composition of Phobos

D) Revised calculations of the tidal forces on Phobos

49

Which choice best describes the relationship between the two passages?

A) Passage 2 suggests an application for an idea advanced in Passage 1.

B) Passage 2 endorses a hypothesis dismissed in Passage 1.

C) Passage 2 corroborates the conclusion put forth in Passage 1.

D) Passage 2 challenges data that are presented in Passage 1.

50

Both passages indicate that Stickney Crater formed when

A) secondary impacts from Mars scarred Phobos's surface.

B) Phobos was struck by an object with substantial force.

C) debris from Mars bonded together to form Phobos.

D) the gravitational pull between Mars and Phobos created tidal forces.

CONTINUE

51

Which choice best describes how Hurford (Passage 2) would likely react to Murray's view in Passage 1 of the hypothesis that tidal forces created fractures on Phobos?

A) By pointing out that the dismissal of the fracture hypothesis is based on an understanding that is likely inaccurate.

B) By noting that images of an egg-shaped Phobos sent from the Viking spacecraft are consistent with the early model for the fracture hypothesis

C) By suggesting that numerous big impacts on Mars billions of years ago are unlikely to have produced sufficient ejecta to support the secondary-impact theory

D) By indicating that the grooves on Phobos do not appear to have been originally generated by Stickney Crater

52

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

A) Lines 54-57 ("That . . . nearby")

B) Lines 65-66 ("The gravitational . . . forces")

C) Lines 70-72 ("The same . . . Earth")

D) Lines 72-76 ("At the . . . size")

STOP

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

CollegeBoard SAT®

MAY 8, 2021
US

The SAT®

Test Book

IMPORTANT REMINDERS

1

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

2

Sharing any questions with anyone is a violation of Test Security and Fairness policies and may result in your scores being canceled.

Reading Test

65 MINUTES, 52 QUESTIONS

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

DIRECTIONS

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

Questions 1-10 are based on the following passage.

This passage is adapted from Chitra Banerjee Divakaruni, *Before We Visit the Goddess*. ©2016 by Chitra Banerjee Divakaruni. It is 1973, and Bela and Sanjay have recently moved to the United States. Bishu, Sanjay's friend and mentor since childhood, helped arrange their move.

Bela was grateful to Bishu, she really was. But she couldn't help being annoyed that Bishu felt entitled to drop in unannounced for dinner whenever he wanted.

"Ah, good, solid Bengali food, Bela," he would say with an appreciative belch once he had finished eating. "That fried fish was quite fine. But the cauliflower curry could have done with a little more coriander." She resented him, too, for continuing to advise Sanjay about his career, though Sanjay now made more money than he did. She hated how, at such times, Sanjay, though otherwise masterful (just last week he had fought with a neighbor who had parked in their spot, making him remove his car), regressed into a teenagerish deference. *Yes, Bishu-da, you're right, Bishu-da, I should be careful about what I say to my supervisor.*

This night, once he had caught his breath, Bishu said, "We have some great news for you, Bela!"

Bela looked at her husband. *Why*, she asked in wordless husband-wife code, *didn't you tell me this great news? Why do I have to hear it from a stranger?*

Bishu-da isn't a stranger, he coded back with a frown.

"You tell her, Shonu," Bishu offered regally.

A boyish grin split open Sanjay's face. "We're buying a house!"

The words swooshed around in Bela's head like wild birds. That was her secret dream: a house of her own. She had lived in a house only once, in her childhood, a magical sprawling place in Assam with giant hydrangea bushes that leaned up against the walls. Her father was still alive then; she remembered walking with him in the mango grove, gathering golden fruit from the ground. Was that why she wanted a house so badly? She hadn't told Sanjay because it was an unreasonable longing, with her earning only minimum wage, and loans, so many of them.

"Bishu-da found us an excellent deal," Sanjay said, handing her a blurry photo. "Look!"

She thought the shingle-roofed tract home was the most beautiful house she had seen. She traced, with a shaky finger, the narrow front window, the line of the roof, the wood fence. She imagined herself cooking in a kitchen with new flooring and enough shelves so her spices and dals didn't have to be piled in untidy heaps on the counter. She would sit with Sanjay at the dining table drinking tea on a Sunday morning, and look out at the backyard where she had planted gardenias.

"We can't afford it," she said flatly, though she couldn't bear to hand the photo back to him.

CONTINUE

"It isn't to live in, silly." Bishu was avuncular in his kindness. "It's an investment. We're pooling our savings for the down payment. We'll rent it out. The rent will cover the monthly mortgage. Property values increase fast in the Bay Area. In a few years we can sell it, or take out a second mortgage and buy another home."

All through dinner, the men discussed the things they'd have to do: negotiate with the realtor, who was known to Bishu, and bring down the price; get the loan—thank goodness Bishu knew an agent, because otherwise they wouldn't qualify; advertise for a tenant. The house needed new carpets; the rooms had to be painted so they could charge more rent. They could do the painting themselves, couldn't they, and save money? Their voices were excited and self-assured and conspiratorial, the way they used to be in India, when they were political leaders.

Immersed in her own plans, Bela heard only snippets. As she carried dishes back and forth from the kitchen, she glanced at the photo, which she had propped up on the counter, and which she would paste, afterward, into the album where she was accumulating—slowly, because film was expensive—Polaroids of their American life. She had seen an announcement at Lucky's a couple days back. They needed shelf stockers. She could get on a late shift, after her stint at Tiny Treasures. Save the entire amount. When she had enough, she would hand it triumphantly to Sanjay and insist that he buy out Bishu. Finally, then, she would have a house of her own.

1

The narrator indicates that Bela perceives Sanjay as

A) yielding too readily to Bishu's guidance in professional matters.

B) showing too little ambition to move forward in his profession.

C) choosing to be somewhat secretive about his plans for the house.

D) allowing Bishu to distract him from important chores at home.

2

Which choice provides the best evidence for the idea that Bela is able to quickly communicate her feelings to Sanjay?

A) Lines 11-15 ("She hated . . . deference")

B) Lines 15-17 ("*Yes, Bishu-da . . . supervisor*")

C) Lines 20-24 ("*Why*, she . . . frown")

D) Lines 25-27 ("You tell . . . house")

3

Bishu's remarks concerning Bela's cooking primarily serve to

A) highlight the extent to which Bela depends on him for advice.

B) demonstrate the freedom he feels in his friends' home.

C) suggest that he lacks refinement in his manners when eating.

D) indicate that he has fond memories of Bela's cooking in India.

4

The comparison in lines 28-29 ("The words . . . birds") has the main effect of

A) hinting at Bela's excitement at the prospect of living in the countryside.

B) conveying Bela's immediate suspicion of Bishu's motives.

C) representing Bela's anxiety that her hopes will never be realized.

D) highlighting the intensity of Bela's unexpected joy.

CONTINUE

5

It can reasonably be inferred from the passage that Bela's initial thoughts about Sanjay's announcement are prompted by her

A) memories of a cherished time in the past.

B) knowledge that her father would approve of her owning a house.

C) longing to return to the security of her childhood.

D) skepticism regarding Bishu's skills as a businessman.

6

As used in line 37, "unreasonable" most nearly means

A) excessive.

B) unrealistic.

C) moody.

D) unusual.

7

According to the passage, Bela objects to the plan of buying a house because

A) Bishu will probably want to live in the house too.

B) the house in the photograph does not resemble her childhood home.

C) she resents that Bishu made the decision without first consulting Sanjay.

D) she and Sanjay lack the necessary funds.

8

It can reasonably be inferred from the passage that Sanjay and Bishu believe their chances of purchasing a house will be helped by

A) their willingness to make repairs to the house themselves.

B) the strength of the real estate market where they live.

C) Bishu's connections within the local business community.

D) the skills both men developed as political leaders in India.

9

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

A) Lines 55-60 ("We're . . . home")

B) Lines 61-66 ("All through . . . tenant")

C) Lines 66-69 ("The house . . . money")

D) Lines 69-71 ("Their . . . leaders")

10

What is the main purpose of the last paragraph of the passage?

A) To describe how Bela's preoccupation with her thoughts keeps her from sharing the others' excitement

B) To provide a concrete example of Bela's ability to save money by limiting costly luxuries

C) To explain why Bela's resentment about Bishu's interference begins to outweigh her gratitude for his generosity

D) To outline Bela's emerging strategy for achieving her dream to live in her own house

CONTINUE

Questions 11-20 are based on the following passage.

This passage is adapted from Pope Leo XIII, *Rerum Novarum*. Originally published in 1891.

[I]t has come to pass that working men have been surrendered, isolated and helpless, to the hardheartedness of employers and the greed of unchecked competition. The mischief has been increased by rapacious usury,[1] which, although more than once condemned by the Church, is nevertheless, under a different guise, but with like injustice, still practiced by covetous and grasping men. To this must be added that the hiring of labor and the conduct of trade are concentrated in the hands of comparatively few; so that a small number of very rich men have been able to lay upon the teeming masses of the laboring poor a yoke little better than that of slavery itself.

To remedy these wrongs the socialists, working on the poor man's envy of the rich, are striving to do away with private property, and contend that individual possessions should become the common property of all, to be administered by the State or by municipal bodies. They hold that by thus transferring property from private individuals to the community, the present mischievous state of things will be set to rights, inasmuch as each citizen will then get his fair share of whatever there is to enjoy. But their contentions are so clearly powerless to end the controversy that were they carried into effect the working man himself would be among the first to suffer. They are, moreover, emphatically unjust, for they would rob the lawful possessor, distort the functions of the State, and create utter confusion in the community.

It is surely undeniable that, when a man engages in remunerative labor, the impelling reason and motive of his work is to obtain property, and thereafter to hold it as his very own. If one man hires out to another his strength or skill, he does so for the purpose of receiving in return what is necessary for the satisfaction of his needs; he therefore expressly intends to acquire a right full and real, not only to the remuneration, but also to the disposal of such remuneration, just as he pleases. Thus, if he lives sparingly, saves money, and, for greater security, invests his savings in land, the land, in such case, is only his wages under another form; and, consequently, a working man's little estate thus purchased should be as completely at his full disposal as are the wages he receives for his labor. But it is precisely in such power of disposal that ownership obtains, whether the property consist of land or chattels. Socialists, therefore, by endeavoring to transfer the possessions of individuals to the community at large, strike at the interests of every wage-earner, since they would deprive him of the liberty of disposing of his wages, and thereby of all hope and possibility of increasing his resources and of bettering his condition in life.

What is of far greater moment, however, is the fact that the remedy they propose is manifestly against justice. For, every man has by nature the right to possess property as his own. This is one of the chief points of distinction between man and the animal creation, for the brute has no power of self direction. . . . It is the mind, or reason, which is the predominant element in us who are human creatures; it is this which renders a human being human, and distinguishes him essentially from the brute. And on this very account—that man alone among the animal creation is endowed with reason—it must be within his right to possess things not merely for temporary and momentary use, as other living things do, but to have and to hold them in stable and permanent possession; he must have not only things that perish in the use, but those also which, though they have been reduced into use, continue for further use in after time.

[1] The lending of money at an excessively high interest rate

CONTINUE

11

Based on the passage, Leo XIII would be most likely to agree that the economic conditions of his era attest to which basic relationship?

A) Modifications to the laws regulating the economy heighten tensions between employers and workers.

B) Social inequality worsens as the economy increasingly comes under the control of a select group of businesspeople.

C) Competition between businesses in a particular sector of the economy influences the morale of the workers in that sector.

D) Measures meant to protect workers from economic exploitation have the unintended effect of encouraging such exploitation.

12

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

A) Lines 1-4 ("It has . . . competition")

B) Lines 4-8 ("The . . . men")

C) Lines 8-14 ("To this . . . itself")

D) Lines 15-20 ("To remedy . . . bodies")

13

As used in line 19, "common" most nearly means

A) shared.

B) inferior.

C) typical.

D) frequent.

14

According to Leo XIII, the desire to acquire property prompts individuals to

A) feel envious of others' possessions.

B) seek work from an employer.

C) view work as more dignified than they otherwise would

D) resist sources of short-lived gratification.

15

In line 45, the phrase "little estate" most directly refers to the

A) land or other property owned by a wage earner.

B) status of a wage earner within the community.

C) neighborhoods where wage earners typically live.

D) standard amount of pay that a wage earner receives.

CONTINUE

16

It can reasonably be inferred from the passage that Leo XIII views socialism as being threatening because it

A) discourages disempowered groups from seeking greater recognition in society.

B) contributes to widespread discontent over the pace of societal change.

C) decreases the individual's willingness to make sacrifices benefiting society as a whole.

D) endangers certain conventions and institutions that are indispensable to society.

17

According to Leo XIII, what is one essential aspect of the concept of private property?

A) The ease with which land holdings can be exchanged for other forms of property

B) The belief that people can amass a great deal of property through living frugally

C) The freedom of property holders to determine what to do with their property

D) The likelihood that those who purchase property will profit from its resale

18

Leo XIII implies that those who wish to abolish the ownership of private property fail to recognize that such ownership is beneficial in that it

A) promotes a single set of values among the wealthy and the working class alike.

B) provides members of the working class a means to improve their circumstances.

C) induces workers to feel content with the compensation they receive for their labor.

D) helps to ensure that the various social classes live in harmony with one another.

19

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

A) Lines 20-24 ("They . . . enjoy")

B) Lines 25-28 ("But their . . . suffer")

C) Lines 32-35 ("It is . . . own")

D) Lines 50-56 ("Socialists . . . life")

20

In the last paragraph, the discussion of "animal creation" serves mainly to

A) assert a central difference between humans and animals.

B) underscore humans' responsibilities toward animals.

C) consider humans' right to keep animals as property.

D) draw attention to the basic needs of humans and animals.

CONTINUE

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

This passage is adapted from Matthew Savoca, "The Oceans Are Full of Plastic, but Why Do Seabirds Eat It?" ©2016 by The Conversation US, Inc.

Pioneering research by Dr. Thomas Grubb Jr. in the early 1970s showed that tube-nosed seabirds use their powerful sense of smell, or olfaction, to find food effectively, even when heavy fog obscures their vision. Two decades later, Dr. Gabrielle Nevitt and colleagues found that certain species of tube-nosed seabirds are attracted to dimethyl sulfide (DMS), a natural scented sulfur compound. DMS comes from marine algae, which produce a related chemical called DMSP inside their cells. When those cells are damaged—for example, when algae die, or when marine grazers like krill eat it—DMSP breaks down, producing DMS. The smell of DMS alerts seabirds that food is nearby—not the algae, but the krill that are consuming the algae.

Dr. Nevitt and I wondered whether these seabirds were being tricked into consuming marine plastic debris because of the way it smelled. To test this idea, my coauthors and I created a database collecting every study we could find that recorded plastic ingestion by tube-nosed seabirds over the past 50 years. This database contained information from over 20,000 birds of more than 70 species. It showed that species of birds that use DMS as a foraging cue eat plastic nearly six times as frequently as species that are not attracted to the smell of DMS while foraging.

To further test our theory, we needed to analyze how marine plastic debris smells. To do so, I took beads of the three most common types of floating plastic—polypropylene and low- and high-density polyethylene—and sewed them inside custom mesh bags, which we attached to two buoys off of California's central coast. We hypothesized that algae would coat the plastic at sea, a process known as biofouling, and produce DMS.

After the plastic had been immersed for about a month at sea, I retrieved it and brought it to a lab that is not usually a stop for marine scientists: the Robert Mondavi Institute for Food and Wine Science at UC Davis. There we used a gas chromatograph, specifically built to detect sulfur odors in food products, to measure the chemical signature of our experimental marine debris. Sulfur compounds have a very distinct odor; to humans they smell like rotten eggs or decaying seaweed on the beach, but to some species of seabirds DMS smells delicious!

Sure enough, every sample of plastic we collected was coated with algae and had substantial amounts of DMS associated with it. We found levels of DMS that were higher than normal background concentrations in the environment, and well above levels that tube-nosed seabirds can detect and use to find food. These results provide the first evidence that, in addition to looking like food, plastic debris may also confuse seabirds that hunt by smell.

Our findings have important implications. First, they suggest that plastic debris may be a more insidious threat to marine life than we previously believed. If plastic looks and smells like food, it is more likely to be mistaken for prey than if it just looks like food.

Second, we found through data analysis that small, secretive burrow-nesting seabirds, such as prions, storm petrels, and shearwaters, are more likely to confuse plastic for food than their more charismatic, surface-nesting relatives such as albatrosses. This difference matters because populations of hard-to-observe burrow-nesting seabirds are more difficult to count than surface-nesting species, so they often are not surveyed as closely. Therefore, we recommend increased monitoring of these less charismatic species that may be at greater risk of plastic ingestion.

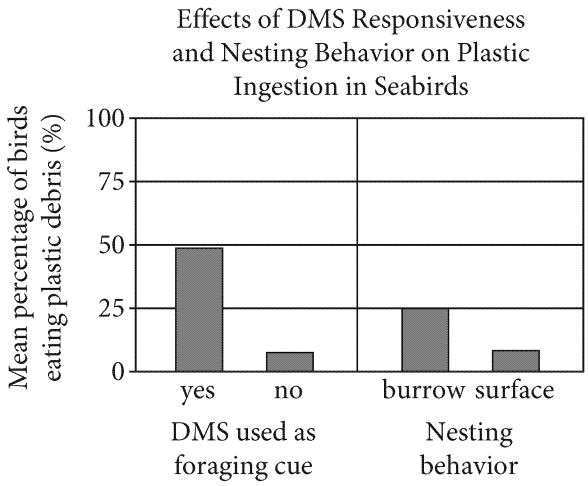
Figure 1

Mean DMS Concentrations in Plastic Debris after Immersion at Sea

	Mean DMS concentration (micrograms DMS per gram plastic)		
	High-density polyethylene	Low-density polyethylene	Polypropylene
Buoy location 1	13.45	11.76	4.99
Buoy location 2	3.16	6.05	14.13
Overall	8.31	8.90	9.56

CONTINUE

Figure 2



Figures adapted from Matthew S. Savoca et al., "Marine Plastic Debris Emits a Keystone Infochemical for Olfactory Foraging Seabirds." ©2016 by Matthew S. Savoca et al.

21

According to the passage, the ability to detect DMS is useful to seabirds because DMS

A) suggests the presence of large amounts of plastic debris.

B) facilitates seabirds' ability to navigate in heavy fog.

C) indicates that concentrations of algae are especially high.

D) signals to seabirds that populations of krill are nearby.

22

As used in line 22, "contained" most nearly means

A) included.

B) controlled.

C) limited.

D) accommodated.

23

It can reasonably be inferred from the passage that prior to the studies conducted by the author and Nevitt, research on tube-nosed seabirds must have identified the

A) minimum DMS level that tube-nosed seabirds can smell.

B) minimum DMS level that can result from biofouling.

C) maximum amount of algae that can coat a plastic surface.

D) maximum amount of plastic that can be safely consumed by a tube-nosed seabird.

24

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

A) Lines 41-44 ("There . . . debris")

B) Lines 48-50 ("Sure . . . with it")

C) Lines 50-53 ("We found . . . food")

D) Lines 54-56 ("These . . . by smell")

25

According to the author, the research he did with Nevitt is valuable because the results indicate that

A) seabirds only recently acquired the ability to identify food through the use of olfaction as a foraging cue.

B) the scientific community may have underestimated the danger plastic poses to seabirds.

C) some populations of surface-nesting seabirds are declining.

D) the process by which plastic becomes biofouled may be reversible with the right treatment.

CONTINUE

26

Which choice best supports the conclusion that a factor other than the presence of DMS can mislead seabirds into consuming plastic?

A) Lines 60-62 ("If . . . food")
B) Lines 63-68 ("Second . . . albatrosses")
C) Lines 68-72 ("This . . . closely")
D) Lines 72-74 ("Therefore . . . ingestion")

27

The author's discussion of burrow-nesting seabirds in the last paragraph primarily serves to

A) answer a question raised earlier in the passage about why seabirds consume debris.
B) present contributions from other scientists doing similar research on seabirds.
C) describe a new design for future research into the feeding habits of seabirds.
D) support a claim that certain types of seabirds should be observed with more scrutiny.

28

As used in line 71, "surveyed" most nearly means

A) judged.
B) polled.
C) tracked.
D) explored.

29

Which statement about the data presented in figure 1 is best supported by the passage?

A) Concentrations of DMS on the polypropylene debris would have been highest at the end of the one-month period in both buoy locations.
B) Surface-nesting seabirds would likely have spent more time foraging near buoy location 2 than they would have spent foraging near buoy location 1.
C) The sulfur odor of the polypropylene debris at buoy location 1 would have been stronger than the sulfur odor of the low-density polyethylene debris at that location.
D) DMS-sensitive seabirds foraging near buoy location 2 would have been more likely to seek out the polypropylene debris than the high-density polyethylene debris at that location.

30

According to figure 2, what is the approximate mean percentage of seabirds found eating plastic debris that use DMS as a foraging cue?

A) 0%
B) 25%
C) 50%
D) 75%

31

According to figure 1, which buoy location and type of plastic had the highest concentration of DMS?

A) Buoy location 1; high-density polyethylene
B) Buoy location 2; low-density polyethylene
C) Buoy location 1; polypropylene
D) Buoy location 2; polypropylene

CONTINUE

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

This passage is adapted from David Rotman, "It Pays to Be Smart." ©2017 by MIT Technology Review.

Our economy is increasingly ruled by a few dominant firms. We see them everywhere, from established giants Amazon, Facebook, Google, Apple, and Walmart to fast-growing newcomers like Airbnb, Tesla, and Uber. There have always been large companies and outright monopolies, but there's something distinctive about this new generation of what some economists call superstar companies. They appear across a broad range of business sectors and have gained their power at least in part by adeptly anticipating and using digital technologies that foster conditions where a few winners essentially take all.

According to recent research by economists at Harvard and MIT, the share of sales by superstar companies—which the authors define as the four largest firms in a given industry—has gone up sharply in all the sectors they looked at, from transportation to services to finance. The trend toward superstar firms is accelerating, says Lawrence Katz, a Harvard economist and coauthor of the study. It has become more uniform across industries and developed economies during the past decade or so. These companies' dominance is particularly strong in markets undergoing rapid technological change. Katz says that's probably because of the wide disparity in how well companies take advantage of new advances. In other words, you have to be the smartest company in your field or you might as well not bother.

In itself, that might not be bad. But the authors identified a deeply troubling result of an economy where just a few top-tier companies dominate. One of the economic truths of much of the 20th century was that the portion of the country's overall income that went to labor was constant; as the economy grew, workers got a proportionate share of that growing pie. But labor's share of the national income has been shrinking over the past few decades. This is true in many countries, and the decline speeded up in the United States in the 2000s.

The trend puzzles economists. Some suggest it reflects the rise of cheap robots that can do the jobs of human workers, but the data isn't convincing. Instead, Katz and his coauthors blame the emergence of the superstar companies. As these companies grow and become more efficient and more adept at using digital technologies, they need fewer workers relative to their soaring revenues. The fact that these labor-frugal firms have so much of the market share in their sectors means labor gets a smaller portion of the nation's overall income.

The rise of the superstar companies also might help explain another disturbing economic trend. Despite the proliferation of impressive new advances in software, digital devices, and artificial intelligence over the last decade and the great profits generated by Silicon Valley, economic growth in the United States and other developed countries has been sluggish. In particular, an economic measure called total factor productivity,[1] which is meant to reflect innovation, has been dismal. How can overall growth be so lackluster while the high-tech sector is booming?

Economists with the Organization for Economic Cooperation and Development (OECD) think they have found the answer. It turns out that productivity at the top companies in various sectors—what the OECD economists call the frontier firms—is growing robustly. These are the companies making the best use of the Internet, software, and other technologies to streamline their operations and create new market opportunities. But most companies aren't actually harnessing new technologies very effectively. And the relatively poor productivity of these laggards, says Australian OECD economist Dan Andrews, is dragging down the overall economy.

[1] Portion of output that's not explained by the amount of inputs used in production

CONTINUE

Figure 1

Change in Total Factor Productivity since 2001, Manufacturing Sector

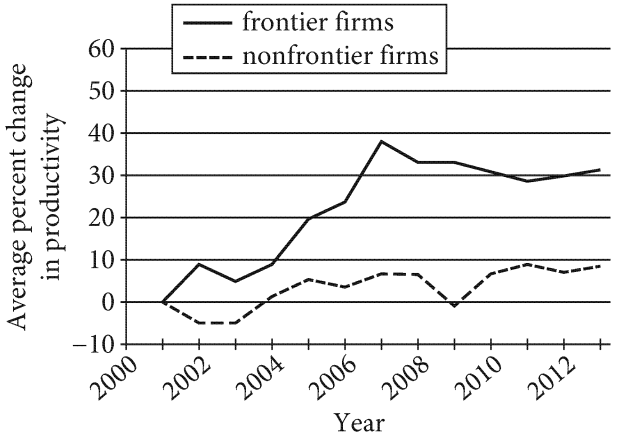
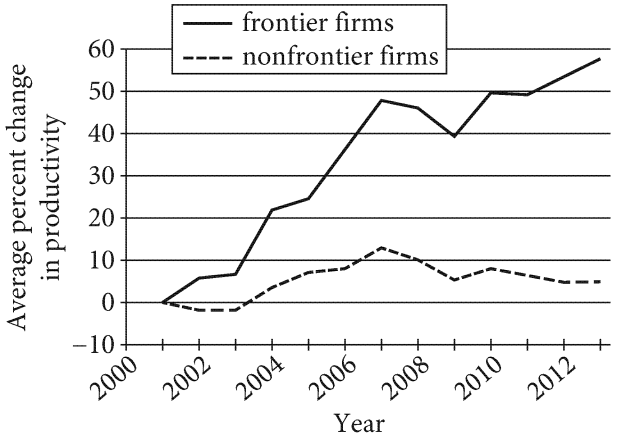


Figure 2

Change in Total Factor Productivity since 2001, Business Services Sector



Figures adapted from Dan Andrews, Chiara Criscuolo, and Peter N. Gal, "The Best versus the Rest: The Global Productivity Slowdown, Divergence across Firms and the Role of Public Policy." ©2016 by OECD.

32

A central idea in the passage is that successful sectors of the modern economy

A) include only companies that are willing to use innovative technologies.

B) have experienced a shift toward the centralization of power by a few companies.

C) are forecasted to experience faster labor growth than other sectors.

D) have access to greater resources than other sectors.

33

The author of the passage develops his argument primarily by

A) analyzing the effect of technological advances on future market trends.

B) examining the process by which one company became a leader in its industry.

C) comparing historical national labor data to that of present national labor data.

D) presenting research concerning the rise of a subset of companies.

34

Which choice best supports the conclusion that in certain industries, companies have little chance of succeeding if they cannot obtain the market control held by superstar companies?

A) Lines 5-8 ("There . . . companies")

B) Lines 14-19 ("According . . . finance")

C) Lines 28-30 ("In other . . . bother")

D) Lines 73-77 ("But . . . economy")

CONTINUE

35

The passage most directly suggests that in recent years, companies that have been less successful than superstar companies have tended to

A) fail to capitalize on emerging technologies that may provide a competitive economic advantage.

B) neglect to hire the most skilled professionals in their industries.

C) focus on developing groundbreaking technologies that may benefit only their respective markets.

D) vie with a smaller pool of competitors for market share.

36

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

A) Lines 1-5 ("Our . . . Uber")

B) Lines 9-13 ("They . . . all")

C) Lines 24-26 ("These . . . change")

D) Lines 49-52 ("The fact . . . income")

37

As used in line 12, "conditions" most nearly means

A) restrictions.

B) circumstances.

C) demands.

D) qualifications.

38

As used in line 32, "deeply" most nearly means

A) broadly.

B) thoughtfully.

C) obscurely.

D) profoundly.

39

In context, the last two paragraphs (lines 53-77) serve mainly to

A) examine why technological advances outpace economic growth.

B) demonstrate how workforce requirements affect employment rates.

C) illustrate why company productivity increases yearly earnings.

D) clarify how efficient planning leads to new market possibilities.

40

Which claim about the manufacturing and business services sectors is best supported by the figures?

A) By 2004, the average percent change in total factor productivity for frontier firms in business services was greater than that for frontier firms in manufacturing.

B) By 2013, the total factor productivity for nonfrontier firms in both business services and manufacturing reflected growth resulting from expansion into new areas of commerce.

C) The average percent change in total factor productivity for nonfrontier firms in business services increased overall from 2001 to 2013, while that for nonfrontier firms in manufacturing decreased overall during that period.

D) Fluctuations in the average percent change in total factor productivity for frontier firms in business services from 2001 to 2013 were consistent with those for frontier firms in manufacturing during that period.

CONTINUE

41

Taken together, the figures best support which conclusion about total factor productivity from 2001 to 2013?

A) Nonfrontier firms in the business services sector were more profitable during this period than nonfrontier firms in the manufacturing sector due to their productivity.

B) Productivity increases in the business services sector in this period corresponded to productivity decreases in the manufacturing sector.

C) The disparity in productivity between frontier and nonfrontier firms in the manufacturing sector and in the business services sector generally increased over this period.

D) The manufacturing sector was more productive because it tended to adapt more readily to technological advances in this period than the business services sector did.

42

According to figure 1, in approximately which year was the average percent change in total factor productivity since 2001 greatest for frontier firms?

A) 2003

B) 2007

C) 2010

D) 2013

Questions 43-52 are based on the following passages.

Passage 1 is adapted from Morten E. Allentoft, "Recovering Samples for Ancient DNA Research—Guidelines for the Field Archaeologist." ©2013 by Antiquity Publications Ltd. Passage 2 is adapted from Sam Kean, "Ancient DNA." ©2015 by Chemical Heritage Foundation.

Passage 1

Working with ancient and degraded DNA is not without challenges. Most serious perhaps is the risk of contamination with contemporary DNA, which
Line can easily "swamp" the small amount of authentic
5 DNA in an ancient sample. This fact became painfully clear in the earlier years of ancient DNA research, when a number of high profile publications seemingly presented evidence of DNA from samples of extreme age—including 80-million-year-old
10 dinosaur bones and greater than 120-million-year-old insects. We are now aware that these results reflected modern contaminants, in part because the rate of *post mortem* fragmentation of DNA excludes the existence of DNA that old. In response to these
15 claims, a set of ancient DNA "rules" was established to minimise the risk of contamination and to provide some means for downstream authentication of the results and, since then, numerous studies have identified and assessed contamination problems in
20 ancient samples.

In essence, however, most of these rules represent "symptomatic treatment." If a sample is contaminated with modern DNA before entering the laboratory, for example during excavation, it can be
25 difficult to remove the contamination, and it can be impossible to distinguish between authentic ancient DNA and contaminants. This latter problem is particularly pertinent if the target DNA and the contaminant DNA are from the same species, as is
30 often the case when research is conducted on ancient human material.

In the era of high-throughput sequencing, statistical tools based on DNA damage signatures are now available to assess the overall authenticity of
35 "bulk" ancient DNA data. Considerable time and resources, however, are expended before the contamination can be identified, and if a sample has been contaminated decades or centuries ago it may result in contaminant DNA that displays degradation
40 damage patterns similar to that of true ancient DNA. Although strict laboratory exercises are often

CONTINUE

combined with bioinformatic analyses to respectively remove and identify DNA contamination, it would be extremely beneficial if the risk of contamination could be lowered in the first place.

Passage 2

Studying ancient DNA (aDNA) is a lot like playing Whac-A-Mole: stamp out one problem and another will pop up and take its place. Contamination, corruption, chromosomal shredding—it's a miracle scientists can even find aDNA in specimens, much less glean information from it. But a few recent breakthroughs have greatly expanded our ability to read aDNA and have already opened whole new vistas of evolution.

DNA disappears after cells die for a few reasons. All healthy cells have enzymes that shred DNA to recycle it, and unfortunately those enzymes keep right on shredding after death. Water and oxygen in the environment also react with DNA's backbone and degrade it further. I'd say these processes reduce DNA to confetti, but that doesn't do justice to just how thorough the destruction is. It's more like confetti making its own even tinier confetti, which in turn makes its own confetti. After a few thousand years a multibillion-base-pair genome might be reduced to scraps a few dozen letters long—a 100-million-fold reduction.

The best aDNA comes from samples unearthed in tundras or caves. Recent advances in computing power have also allowed scientists to assemble sequences from even minute scraps of DNA. The oldest recovered genome so far came from a horse's leg bone buried in Canada's Yukon Territory for 700,000 years; with the right sample and ever-better software to analyze it, scientists think they can push that back to one million years.

Finding the right sample solves only one problem, though. In most ancient tissues 99% of the DNA present comes from contamination by invading fungi and bacteria. So scientists have to deploy chemical snares, like "RNA bait." If searching for human DNA, researchers would prepare the bait by manufacturing millions of strips of human RNA (DNA's chemical cousin), albeit with one modification: these RNA strips have chemical Velcro attached to one end. When mixed into a sample, this RNA gloms onto the human DNA and only the human DNA. Scientists then pour in tiny metallic beads that—here's the key—also have chemical Velcro attached, locking the beads and the RNA/DNA strips together. Finally, a magnet holds onto the beads as the un-Velcroed microbial DNA washes away, leaving behind pristine samples. While this technique is expensive—developing the RNA bait can cost $300,000—new methods promise to drop that price to roughly $50.

43

In Passage 1, the main purpose of the second paragraph (lines 21-31) is to

A) explain in greater detail the nature of newly established procedures mentioned in the preceding paragraph.

B) assert that a solution presented in the preceding paragraph is inadequate for addressing the full scope of a problem.

C) emphasize the necessity of using different research technologies depending on the species to which the ancient DNA belongs.

D) describe the different kinds of contaminants that researchers working with ancient DNA have discovered through recent studies.

44

It can reasonably be inferred that the attitude of the author of Passage 1 toward the technology that has now become available for identifying and removing DNA contaminants is

A) somewhat cautious, because the technology remains costly to use but does not guarantee accurate assessment of DNA.

B) clearly dismissive, because the technology is narrowly limited in the types of DNA samples it can analyze.

C) genuinely hopeful, because the technology resolves ongoing challenges but does not interfere with the study of DNA.

D) openly appreciative, because the technology makes the work of analyzing ancient DNA considerably more straightforward.

CONTINUE

45

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

A) Lines 5-11 ("This . . . insects")
B) Lines 11-14 ("We are . . . old")
C) Lines 32-35 ("In the . . . data")
D) Lines 35-40 ("Considerable . . . DNA")

46

As used in line 41, "strict" most nearly means

A) absolute.
B) grim.
C) narrow.
D) rigorous.

47

It can most reasonably be inferred from Passage 2 that DNA shredded by enzymes is

A) most beneficial to scientists when the degree of shredding is high.
B) protected from further destruction after cells die.
C) used as material to support living functions in healthy cells.
D) preserved by water and oxygen in healthy cells.

48

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

A) Lines 56-58 ("All . . . death")
B) Lines 58-60 ("Water . . . further")
C) Lines 60-62 ("I'd say . . . destruction is")
D) Lines 64-67 ("After . . . reduction")

49

When the author of Passage 2 says that "scientists think they can push that back" (lines 75-76), he most likely means that scientists believe that a

A) certain limitation might become more pronounced.
B) particular boundary might be extended.
C) scientific theory might be refuted.
D) chronological sequence might be restructured.

50

Regarding scientific research involving aDNA, both passages imply that

A) even the smallest quantities of recovered aDNA contain traces of contamination.
B) the analysis of aDNA has led to a greater understanding of RNA.
C) evaluating traces of aDNA is generally problematic.
D) the usefulness of aDNA analysis is somewhat exaggerated.

CONTINUE

51

Given the discussion of the RNA bait technique in the last paragraph of Passage 2, would applying that technique be useful in the circumstances considered in Passage 1, lines 27-31 ("This latter . . . material")?

A) No, because the RNA bait technique is used to isolate DNA of one species from contaminant DNA of other species.

B) No, because the RNA bait technique can only be used on samples found in tundras or caves.

C) Yes, because the RNA bait technique can reveal the age of multiple types of DNA relatively precisely.

D) Yes, because the RNA bait technique provides an effective means of differentiating between genuine aDNA and contaminant DNA.

52

Which choice best states the relationship between the two passages?

A) Both passages consider a proposed approach for solving a problem, but Passage 2 argues more forcefully against implementing that approach.

B) Both passages examine the difficulties in a line of research, but Passage 2 gives more detail about how scientists are addressing those difficulties.

C) Both passages present hypotheses that are untested, but Passage 2 provides more evidence in support of its hypothesis.

D) Both passages raise concerns about the validity of research findings, but Passage 2 more effectively articulates the logic underlying the concerns it expresses.

STOP

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

CollegeBoard SAT®

MAY 8, 2021
INTERNATIONAL

The SAT®

Test Book

IMPORTANT REMINDERS

1

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

2

Sharing any questions with anyone is a violation of Test Security and Fairness policies and may result in your scores being canceled.

Reading Test

65 MINUTES, 52 QUESTIONS

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

DIRECTIONS

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

Questions 1-10 are based on the following passage.

This passage is adapted from Robertson Davies, *What's Bred in the Bone*. ©1985 by Robertson Davies. Frank Cornish is a young boy in Canada during World War I.

Frank's life was not at all dark; he was not clever at school, but he attracted Miss McGladdery's attention by the seriousness with which he applied himself in the weekly half-hour that was given to Art. Miss McGladdery taught Art, as she taught everything, and she instructed all three classes at once in the mysteries of drawing a pyramid and shading one side of it so that it appeared to have a third dimension—or as she put it the shaded side "went back" and the unshaded side "stuck out". A pyramid and a circle which shading made into a ball, and, as the culmination of Art, an apple. Shading was done by scuffling down one side of the object with the flat of the pencil's point. But Frank did not think that was good enough; he had learned a craft at home in which shading was done with tiny parallel lines, achieved with great patience, and even by cross-hatching.

"If you take the time to do all that tick-tack-toe on your apple you won't be finished by four, and you'll have to stay in till it's done," said Miss McGladdery. So he did "stay in" with half a dozen other culprits who had work to finish before they were released for the weekend, and when he showed Miss McGladdery his apple at half past four she admitted reluctantly that it was "all right", for she did not want to encourage the boy to be "fancy" and try to go beyond what the class demanded and what she herself knew. Frank could draw, which was something not required in Art, and Miss McGladdery had come upon a caricature of herself done in the back of his arithmetic workbook. Miss McGladdery, who was a fair-minded woman, except about religion and politics, and had no vanity, admitted to herself that it was good, so she said nothing about it. Frank was an oddity, and, like a true Scot, Miss McGladdery had a place in her approval for "a chiel o' pairts", so long as he did not go too far.

Almost every Saturday Frank could escape into a world of imagination by going to the matinee at the McRory Opera House, where movies were shown. He got in for nothing, because the girl at the ticket office recognized him, and as he pushed his ten-cent piece across the little counter she winked and quietly pushed it back again.

Then inside, and into his favourite seat, which was on the aisle at the back; he did not crowd into the front rows, as did the other children. Riches unfolded. An episode—locally pronounced "esipode"—of a serial, in which, every week, a noble cowboy was brought to the point of a horrible death by remorseless villains who sought to rob him of the equally noble girl he loved. Of course, it all came out right at the end of Esipode Twelve, and then another great adventure was announced for the weeks to follow. After the serial, a hilarious comedy, sometimes about the Keystone Komedy Kops, who were as incapable of dealing with disaster as the girl in the serial.

CONTINUE

Frank had an eye for the movies that took in more than the action; he saw backgrounds, landscapes (many of them painted, if you looked carefully), and angles; he even saw light. It was to his grandfather, the Senator, that he owed this extension of his understanding, for the Senator was an amateur photographer. His techniques were not sophisticated in terms of the Great War period when Frank was so often his companion; he worked with a large box-camera and a tripod. With this load he trudged happily around Blairlogie, taking pictures of the town, and such of its more picturesque citizens as he could persuade to stand or sit still for the necessary number of seconds, and he drove out to the lumber camps from which his growing fortune flowed, and took pictures of the men at work, or standing by giant trees lying on their sides. He took pictures in his mills. He took pictures of young Blairlogie men who were going off to war, with their rifles and kit, and gave copies to their families. The Senator never thought of himself as an artist, but he had an eye for a picture and he was an enthusiastic pursuer of all the many sorts of light the Canadian seasons afford. He talked to Frank about it as if the boy were of his own age. His senatorial and grandpaternal aloofness quite disappeared on these expeditions in search of what he called "sun-pictures".

"It's all a question of the light, Frank," he said repeatedly; "the light does it all." And he explained that all that painstaking shading in Art was related to light—something which certainly had never occurred to Miss McGladdery.

1

Which statement about Frank's attitude toward drawing can most reasonably be inferred from the passage?

A) He believes that his creativity will earn him special recognition from others.

B) He is committed to his work regardless of the diligence it requires.

C) He accepts the fact that while he is talented, he must still strive to improve.

D) He pursues his interest in art because it gives him a rare chance to excel.

2

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

A) Lines 1-4 ("Frank's . . . to Art")

B) Lines 5-10 ("Miss . . . stuck out")

C) Lines 12-14 ("Shading . . . point")

D) Lines 14-18 ("But Frank . . . cross-hatching")

3

Which choice best describes the passage?

A) A lasting effect of a meaningful interaction between two characters is analyzed.

B) The influence of a character's early experiences with art on his later life is examined.

C) A character's early experiences with art at school and outside of school are described.

D) The perspective of a young character is contrasted with those of two adult characters.

4

The passage suggests which similarity between Frank's grandfather and Miss McGladdery?

A) Though they attempt to instruct Frank about art, they sense that Frank is reluctant to heed their advice.

B) Though they conduct themselves modestly, they privately take great pride in their accomplishments.

C) Though they enjoy teaching, they ultimately prefer their own artistic pursuits to helping others.

D) Though they engage in artistic activities, these activities do not define their identities as professionals.

CONTINUE

5

The author's use of the phrase "Riches unfolded" (lines 48-49) has the main effect of

A) emphasizing the complexity of the movies' plot lines and characters.

B) conveying Frank's delight in the movies shown at the theater.

C) contrasting Frank's reaction to the movies with that of the other children.

D) suggesting the care taken by the theater's staff in selecting the movies.

6

As used in line 54, "right" most nearly means

A) favorably.

B) precisely.

C) reasonably.

D) normally.

7

The sentence in lines 60-63 ("Frank . . . light") primarily serves to

A) suggest that the movies shown at the theater are not of high quality.

B) identify a way to distinguish landscapes from other movie backgrounds.

C) convey that Frank applies his understanding of artistic elements to other activities.

D) establish a contrast between Frank's perspective and the narrator's perspective.

8

Based on the passage, a love of photography transforms Frank's grandfather's personality in which way?

A) He becomes less impatient with members of his community.

B) He becomes more enthusiastic about the war effort.

C) He interacts with Frank on a more personal level.

D) He takes a more generous view of Miss McGladdery.

9

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

A) Lines 63-66 ("It was . . . photographer")

B) Lines 66-69 ("His techniques . . . tripod")

C) Lines 77-79 ("He took . . . families")

D) Lines 84-86 ("His senatorial . . . sun-pictures")

10

The last paragraph mainly serves to

A) underscore a contrast between Frank's grandfather and Miss McGladdery.

B) highlight the importance of art to Frank and his grandfather.

C) reveal Frank's grandfather's dissatisfaction with Miss McGladdery's teaching.

D) convey Frank's admiration for his grandfather's expertise.

CONTINUE

Questions 11-20 are based on the following passages.

Passage 1 is adapted from a speech delivered by Paul Robeson, "For Freedom and Peace." ©1978 by Brunner/Mazel, Inc. Originally published in 1949. Passage 2 is adapted from a speech delivered in 1949 by Jackie Robinson, "Testimony before the House Un-American Activities Committee." Robeson, an actor and singer, discusses remarks he made at a peace conference in Paris during a time of high tension between the United States and the communist Soviet Union, also called Russia. Robinson, a prominent athlete, was called before the House of Representatives to respond to Robeson's remarks.

Passage 1

. . . I love [the] Soviet people more than any other nation, because of their suffering and sacrifices for us, the Negro people, the progressive people, the people of the future in this world.

At the Paris Peace Conference I said it was unthinkable that the Negro people of America or elsewhere in the world could be drawn into war with the Soviet Union. I repeat it with hundred-fold emphasis. THEY WILL NOT. . . .

I am born and bred in this America of ours. I want to love it. I love a part of it. But it's up to the rest of America when I shall love it with the same intensity that I love the Negro people from whom I spring,—in the way that I love progressives in the Caribbean, the black and Indian peoples of South and Central America, the peoples of China and Southeast Asia, yes suffering people the world over,—and in the way that I deeply and intensely love the Soviet Union. That burden of proof rests upon America.

Now these peoples of the Soviet Union, of the new Eastern Democracies, of progressive Western Europe, and the representatives of the Chinese people whom I met in Prague and Moscow, were in great part Communists. They were the first to die for our freedom and for the freedom of all mankind. So I'm not afraid of Communists; no, far from that. I will defend them as they defended us, the Negro people. . . .

But to fulfill our responsibilities as Americans, we must unite, especially we Negro people. We must know our strength. We are the decisive force. . . . That's why they fear us. And if we unite in all our might, this world can fast be changed. Let us create that unity now. And this important, historic role of the Negro people our white allies here must fully comprehend. This means increasing understanding of the Negro, his tremendous struggle, his great contributions, his potential for leadership at all levels in the common task of liberation. It means courage to stand by our side whatever the consequences, as we the Negro people fulfill our historic duty in Freedom's struggle.

Passage 2

I've been asked to express my views on Paul Robeson's statement in Paris to the effect that American Negroes would refuse to fight in any war against Russia because we love Russia so much. I haven't any comment to make on that statement except that if Mr. Robeson actually made it, it sounds very silly to me. But he has a right to his personal views, and if he wants to sound silly when he expresses them in public, that's his business and not mine. He's still a famous ex-athlete and a great singer and actor.

I understand that there are some few Negroes who are members of the Communist Party, and in the event of war with Russia they'd probably act just as any other Communist would. So would members of other minority and majority groups. There are some colored pacifists, and they'd act just like pacifists of any color. And most Negroes—and Italians and Irish and Jews and Swedes and Slavs and other Americans—would act just as all these groups did in the last war. They'd do their best to keep their country out of war; if unsuccessful, they'd do their best to help their country win the war—against Russia or any other enemy that threatened us.

This isn't said as any defense of the Negro's loyalty, because any loyalty that needs defense can't amount to much in the long run. And no one has ever questioned my race's loyalty except a few people who don't amount to very much.

What I'm trying to get across is that the American public is off on the wrong foot when it begins to think of radicalism in terms of any special minority group. It is thinking of this sort that gets people scared because one Negro, speaking to a Communist group in Paris, threatens an organized boycott by 15,000,000 members of his race.

CONTINUE

I can't speak for any 15,000,000 people any more than any other one person can, but I know that I've got too much invested for my wife and child and myself in the future of this country, and I and other Americans of many races and faiths have too much invested in our country's welfare, for any of us to throw it away. . . .

But that doesn't mean that we're going to stop fighting race discrimination in this country until we've got it licked. It means that we're going to fight it all the harder because our stake in the future is so big.

11

In Passage 1, the speaker indicates that he loves the Soviet people because they

A) are in the same situation as that of black people.

B) make no distinctions between white people and black people.

C) work to advance the interests of black people.

D) need the assistance of black people.

12

Based on Passage 1, the speaker would most likely agree with which statement about the relationship between a nation and its citizens?

A) A nation depends more on its citizens than its citizens depend on the nation.

B) A nation has the right to require that its citizens fight in its defence.

C) A nation should first and foremost protect its citizens from outside dangers.

D) A nation must earn the devotion of citizens through its treatment of them.

13

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

A) Lines 1-4 ("I love . . . world")

B) Lines 5-9 ("At the . . . NOT")

C) Lines 10-14 ("I am . . . spring")

D) Lines 30-32 ("But to . . . strength")

14

The speaker of Passage 1 uses the phrases "historic role" (line 35) and "historic duty" (line 42) most likely to

A) highlight the accomplishments of earlier generations of black leaders.

B) suggest that black people play a unique part in advancing a cause for all humanity.

C) underscore how long black people have been struggling for equality.

D) emphasize the previous demonstrations of the Soviet Union's commitment to ending the oppression of black people anywhere it occurs.

15

Which choice best supports the idea that the speaker of Passage 2 would agree that a person's political opinions do not necessarily detract from that person's accomplishments?

A) Lines 44-47 ("I've been . . . much")

B) Lines 47-50 ("I haven't . . . to me")

C) Lines 53-54 ("He's still . . . actor")

D) Lines 55-58 ("I understand . . . would")

CONTINUE

16

In lines 82 and 85, the speaker's use of the word "invested" mainly serves to

A) convey the speaker's sense that he and other Americans have a personal interest in seeing the United States flourish.

B) emphasize the speaker's point that his responsibilities to his family supersede his responsibilities to his country.

C) foreshadow the speaker's claim that racial discrimination is incompatible with essential American values.

D) reveal the speaker's concern about the potential for communist activity to negatively affect the American economy.

17

The speaker of Passage 1 would most likely regard black people in the United States who acted in the way described in lines 64-67, Passage 2 ("They'd . . . us") as having

A) failed to understand the great contributions that black people in the United States have made to political progress.

B) misrepresented their willingness to suffer negative consequences for their political beliefs.

C) exploited their historic role in humanity's liberation for personal gain.

D) betrayed people who defended them in favor of a country that oppresses them.

18

Based on the passages, the two speakers would most likely agree with which point about the United States?

A) Its future depends in part on the elimination of racial discrimination.

B) Its attitude toward racial discrimination has gradually been changing.

C) Its history of racial discrimination has no parallel in other nations.

D) Its rejection of communism is a product of its legacy of racial discrimination.

19

One way in which the speaker of Passage 2 responds to the claim made by the speaker of Passage 1 regarding the attitude of black people in the United States toward war with the Soviet Union is by

A) citing several examples of black people in the United States who hold views contrary to those of the speaker of Passage 1.

B) arguing that the speaker of Passage 1 has exaggerated the views of black people in the United States for rhetorical effect.

C) implying that the speaker of Passage 1 cannot know or represent the views of black people in the United States in general.

D) suggesting that black people in the United States have already demonstrated their attitude toward the Soviet Union in ways ignored by the speaker of Passage 1.

CONTINUE

20

An important difference in how the speakers of the two passages present themselves is that the speaker of Passage 1

A) expresses his deep affinity for the Soviet Union, while the speaker of Passage 2 primarily defines himself in opposition to the ideology of the Soviet Union.

B) aligns himself with a worldwide community of people with similar aims, while the speaker of Passage 2 emphasizes his commitment to the United States.

C) identifies himself as a patriot who hopes to see his country correct its faults, while the speaker of Passage 2 presents himself as defending his country against any criticism.

D) suggests that he speaks for all oppressed peoples, while the speaker of Passage 2 describes himself as speaking only for black people in the United States.

Questions 21-30 are based on the following passage.

This passage is adapted from Elizabeth Pennisi, "How Birds Got Their Beaks." ©2015 by American Association for the Advancement of Science.

Agile beaks of all shapes and sizes, from the gulping gape of a pelican to the needle nose of a hummingbird, have enabled the 10,000 avian species to thrive from the Arctic to the tropics, build intricate nests, and eat many different foods.

Now, researchers may have identified genes that transformed an ancestral snout into a bird's bill. By manipulating the genes' proteins, they have seemingly turned back the evolutionary clock, producing snouts in developing chicken embryos that resemble those of alligators today. "We're trying to explain evolution through developmental studies," says Harvard University evolutionary biologist Arhat Abzhanov, who, with his colleagues, describes the work in *Evolution*.

Their conclusions are at odds with an earlier study. But even those who disagree with the result say Abzhanov and Bhart-Anjan Bhullar, now a post-doctoral fellow at the University of Chicago, have demonstrated a powerful approach: pinning down how anatomy changes using fossils, then trying to recapitulate the changes in the lab by tinkering with genetic signals. "The value of this paper is their ability to blend paleontology with evolutionary developmental biology," says Richard Schneider at the University of California, San Francisco (UCSF), who has linked beak evolution to different genes.

In ancestral reptiles, a pair of small bones makes up the tip of the snout. In today's birds, those premaxillary bones are long, narrow, and fused, producing the upper bill. The ancient bird *Archaeopteryx* reveals an intermediate step. Its premaxillary bones were not very expanded, but in later avian species the bones are progressively more fused. Other work had also implicated the premaxillary bones in beak evolution.

So Bhullar searched for earlier studies of genetic pathways that control development of these bones. Work in mice and chickens had implicated two sets of signals. A gene called Fibroblast growth factor 8 (*Fgf8*) becomes active in the front part of the face as it takes shape in 3-day-old chick embryos; later, just before bones form, a gene called *WNT* helps drive the proliferation of cells in the middle of the face,

CONTINUE

where it may prompt expansion of the premaxillary bones. In mammals, lizards, turtles, and alligators, in contrast, activity of the *WNT* gene is highest on the sides of the embryonic face.

To explore these genes' role, Bhullar and Abzhanov treated bird embryos with inhibitors of the WNT and Fgf8 proteins. When the two signals were curbed, the premaxillary bones became round and never fused, as in birds' dinosaur relatives, instead of growing long and pointy.

To the pair's surprise, a palatal bone, which makes up the roof of the mouth, also changed dramatically. In many vertebrates, this bone is flat and fused to surrounding bones. But in birds, it's reduced and disconnected, which frees the top part of the bill to move upward, expanding birds' gape. In the treated chick embryos, the palate looked more like it does in other vertebrates: flat and seemingly reconnected to jaw bones. The studies suggest that *Fgf8* and *WNT* signaling changes allowed skulls of ancient birds "to evolve in a whole new direction" and form a beak, Abzhanov says.

Not everyone agrees. In 2014, UCSF's Nathan Young and Ralph Marcucio, working with Schneider, carried out extensive skull measurements on a variety of embryonic vertebrates and determined the point during development at which the bird face begins to diverge from those of other vertebrates. The work and later experiments supported a 2009 idea proposed by Marcucio that the activity of another gene, *SHH* (for sonic hedgehog), was critical for forming the beak. Unlike *Fgf8*, he says, it's active in the right place and right time in bird embryos.

Marcucio, a developmental biologist, also worries that the changes in facial structure observed by the Harvard team may stem from unintended cell death caused by the inhibitors they used. "Adding the fossil record to this work is really an important step, but I think they are just looking at the wrong pathway," he says. Abzhanov and Bhullar counter that *Fgf8* and *SHH* are often coexpressed and may work together.

21

The primary purpose of the passage is to

A) present research that validates earlier studies about the evolution of beaks in a particular species of bird.

B) suggest that alligators were the ancestor of several species of birds.

C) discuss a study that provides an explanation of how a bird's beak has evolved from an ancestral snout.

D) critique the approach a research team used to study the development of beak formation in chicken embryos.

22

According to the passage, the ancient bird *Archaeopteryx* is significant to the evolution of beaks in birds because, based on the fossil record, the facial structure of *Archaeopteryx*

A) provides evidence of the existence of an evolutionary step between a snout and a beak.

B) possesses physical characteristics directly linking them to present-day alligators.

C) identifies them as one of the oldest birds to have had a beak.

D) reveals them to be one of the earliest birds to have fused facial bones.

23

What evidence in the passage best supports the hypothesis that the presence of WNT and Fgf8 proteins during embryonic development is necessary for the formation of beaks?

A) Lines 37-38 ("So Bhullar . . . these bones")

B) Lines 46-48 ("In mammals . . . face")

C) Lines 49-51 ("To explore . . . proteins")

D) Lines 51-54 ("When . . . pointy")

CONTINUE

24

As used in line 52, "curbed" most nearly means

A) evaded.
B) suppressed.
C) anchored.
D) contained.

25

As used in lines 32, "step" most nearly means

A) stage.
B) procedure.
C) distance.
D) movement.

26

According to the passage, the earlier studies that Bhullar consulted were important primarily because they

A) confirmed when beak formation in an embryonic bird typically begins.
B) identified particular genes that could initiate beak formation in birds.
C) proved that beak formation in birds was a response to external conditions.
D) pinpointed the primary gene that activates the development of a bird's beak.

27

The passage shifts focus in the eighth paragraph (lines 67-77) from a consideration of Bhullar and Abzhanov's research to a

A) sketch of an experiment to confirm that research.
B) discussion of a possible challenge to that research.
C) defense of the ultimate usefulness of that research.
D) summary of a study disproving that research.

28

Based on the passage, Marcucio's response to which of the following questions would most likely differ from Abzhanov's?

A) Is there evidence that birds are related to alligators?
B) How are bird beaks different from alligator snouts?
C) What triggered the anatomical change from snouts to beaks?
D) When did the evolution of contemporary bird beaks begin?

29

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

A) Line 67 ("Not . . . agrees")
B) Lines 67-72 ("In 2014 . . . other vertebrates")
C) Lines 72-76 ("The work . . . beak")
D) Lines 78-81 ("Marcucio . . . used")

30

The last paragraph mainly functions to

A) offer an alternative interpretation of Abzhanov and Bhullar's evidence as described in the passage.
B) preview upcoming research that may support the findings in the study analyzed in the passage.
C) imply that the sponsors of the study analyzed in the passage might have influenced its results.
D) challenge the underlying intentions of the researchers described in the passage.

CONTINUE

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

This passage is adapted from Robert Cialdini, *Pre-Suasion: A Revolutionary Way to Influence and Persuade*. ©2016 by Robert Cialdini.

Suppose you've started an online furniture store that specializes in various types of sofas. Some are attractive to customers because of their comfort and others because of their price. Is there anything you can think to do that would incline visitors to your website to focus on the feature of comfort and, consequently, to prefer to make a sofa purchase that prioritized it over cost?

You've no need to labor long for an answer, because two marketing professors, Naomi Mandel and Eric Johnson, have provided one in a set of studies using just such an online furniture site. When I interviewed Mandel regarding why she decided on this particular set of issues to explore, she said her choice had to do with two big, unresolved matters within the field of marketing—one relatively recent and one long-standing. The new topic at the time was e-commerce. When she began the research project in the late 1990s, the impact of virtual stores such as Amazon and eBay was only beginning to be seen. But how to optimize success within this form of exchange had not been addressed systematically. So she and Johnson opted for a virtual store site as the context for their study.

The other matter that had piqued Mandel's interest is one that has vexed merchandisers forever: how to avoid losing business to a poorer-quality rival whose only competitive advantage is lower cost. That is why Mandel chose to pit higher-quality furniture lines against less expensive, inferior ones in her study. "It's a traditional problem that the business-savvy students in our marketing courses raise all the time," she said. "We always instruct them not to get caught up in a price war against an inferior product, because they'll lose. We tell them to make quality the battleground instead, because that's a fight they'll most likely win.

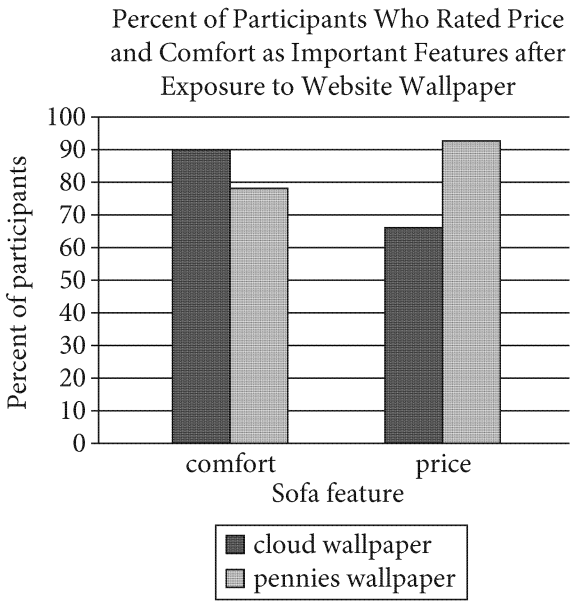
"Fortunately for me," she continued, "the best of the students in those classes have never been satisfied with that general advice. They'd say, 'Yeah, but how?' and I never really had a good answer for them, which gave me a great question to pursue for my research project."

Fortunately for *us*, after analyzing their results, Mandel and Johnson were in a position to deliver a stunningly simple answer to the "Yeah, but how?" question. In an article, they described how they were able to draw website visitors' attention to the goal of comfort merely by placing *fluffy clouds* on the background wallpaper of the site's landing page. That maneuver led those visitors to assign elevated levels of importance to comfort when asked what they were looking for in a sofa. Those same visitors also became more likely to search the site for information about the comfort features of the sofas in stock and, most notably, to choose a more comfortable (and more costly) sofa as their preferred purchase.

To make sure their results were due to the landing page wallpaper and not to some general human preference for comfort, Mandel and Johnson reversed their procedure for other visitors, who saw wallpaper that pulled their attention to the goal of economy by depicting pennies instead of clouds. These visitors assigned greater levels of importance to price, searched the site primarily for cost information, and preferred an inexpensive sofa. Remarkably, despite having their importance ratings, search behavior, and buying preferences all altered by the landing page wallpaper, when questioned afterward, most participants refused to believe that the depicted clouds or pennies had affected them in any way.

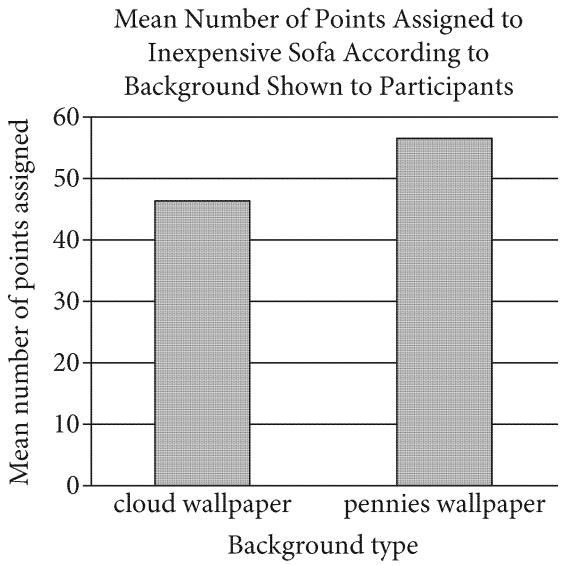
CONTINUE

Figure 1



Participants were able to rate both price and comfort as important features.

Figure 2



Source: Data from Naomi Mandel and Eric J. Johnson, "When Web Pages Influence Choice: Effects of Visual Primes on Experts and Novices." ©2002 by Journal of Consumer Research, Inc.

Participants had to assign a total of 100 points between the inexpensive sofa and a comfortable, more expensive sofa. The difference in the amounts allocated to the sofas indicates the extent to which participants preferred one over the other.

31

The main purpose of the first paragraph is to

A) offer cultural background that explains the need for further studies of online customer behavior.

B) present a hypothetical situation that frames a discussion of research into a particular marketing problem.

C) suggest the practical application of a scientific discovery that has been overlooked by many business managers.

D) detail the factors that make the challenges faced by online marketers distinct from those presented in traditional marketing.

CONTINUE

32

As used in line 33, "raise" most nearly means

A) broach.
B) nurture.
C) elevate.
D) construct.

33

What is the main function of the fourth paragraph (lines 38-43)?

A) It provides a solution to the problem raised in the previous paragraph.
B) It challenges the validity of the conclusion presented in the previous paragraph.
C) It explains the inspiration for the study outlined in the following paragraphs.
D) It undermines the credibility of the results related in the following paragraphs.

34

The main effect of the phrase "stunningly simple" (line 46) is to

A) indicate the author's disapproval of the experiment's lack of complexity.
B) express the author's confusion about the researchers' initial inability to answer the students' questions.
C) convey the author's admiration of the experiment's straightforward results.
D) illustrate the author's appreciation of the students' insights.

35

It can reasonably be inferred from the passage that Mandel and Johnson strengthened their conclusions by

A) anticipating a potential criticism of their experimental design.
B) recruiting subjects from a variety of economic backgrounds.
C) incorporating the input of business students in the interpretation of the results.
D) demonstrating the results' applicability outside the context of online marketing.

36

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

A) Lines 17-21 ("The new . . . seen")
B) Lines 31-33 ("It's . . . said")
C) Lines 50-53 ("That . . . sofa")
D) Lines 58-63 ("To make . . . clouds")

37

The passage best supports the idea that customers likely make decisions about purchases based on

A) messages that are communicated below the level of conscious perception.
B) careful research into the overall quality of a particular product.
C) economic factors that influence individual spending budgets.
D) marketing campaigns that call attention to the best features of new merchandise.

CONTINUE

38

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

A) Lines 44-47 ("Fortunately . . . questions")
B) Lines 47-50 ("In an . . . page")
C) Lines 53-57 ("Those . . . purchase")
D) Lines 67-72 ("Remarkably . . . way")

39

Which choice offers data reflecting the statement made in lines 64-66 ("These . . . sofa")?

A) The bar representing pennies wallpaper in the comfort category in figure 1
B) The bar representing cloud wallpaper in the price category in figure 1
C) The bar representing cloud wallpaper in figure 2
D) The bar representing pennies wallpaper in figure 2

40

According to figure 1, price was rated as important to those exposed to pennies wallpaper by approximately

A) 66% of participants.
B) 78% of participants.
C) 85% of participants.
D) 94% of participants.

41

Which choice best summarizes the information presented in the two figures?

A) Figure 1 focuses on how exposure to different wallpapers affects perception of comfort and price, whereas figure 2 focuses on how exposure to different wallpapers affects the assessment of a particular product.
B) Figure 1 focuses on how exposure to different wallpapers changed the participants' understanding of comfort and price over time, whereas figure 2 focuses exclusively on the participants' understanding during a particular time.
C) Figure 1 focuses on a comparison between the importance of comfort and price, whereas figure 2 focuses exclusively on the growing importance of price to consumers.
D) Figure 1 focuses on the reactions of a large number of participants to the exposure to different wallpapers, whereas figure 2 focuses on the reactions of a small number of participants to the exposure to the same wallpaper.

CONTINUE

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

This passage is adapted from Chris D. Thomas, *Inheritors of the Earth: How Nature Is Thriving in an Age of Extinction*. ©2017 by Chris D. Thomas.

California enjoys a Mediterranean-style climate, with cool and relatively moist winters and dry, hot summers, so it is not surprising that the European yellow star-thistle *Centaurea solstitialis* and its relative the sulphur star-thistle *Centaurea sulphurea* established wild populations there. The yellow star-thistle, in particular, has become so successful that it is regarded as a noxious weed—despite the fact that its spiky golden-yellow flowers supply nectar to butterflies and bees and it mainly grows on disturbed ground where native wildflowers are rare. In any event, there is no getting rid of it now.

Long established in California, there have been plenty of generations available for the two plants to evolve in isolation from their Spanish ancestors—the sulphur star-thistle was introduced to California around 1923, allowing the Spanish and Californian populations to develop in isolation for up to eighty-six generations. But could they actually have become that different after such a short period of time? No one would really have expected this to be the case, and University of Montana researchers Daniel Montesinos, Gilberto Santiago and Ray Callaway were no exceptions—ecologists and evolutionary biologists have been brought up on the 'knowledge' that it takes a very long time for new species to form. In fact, they were not thinking about it at all. The main goal of their experiment was to obtain 'pure' seeds of each population and species to use in the rest of their research. However, just to amuse himself, Montesinos, who is now at the Universidade de Coimbra in Portugal, in his own words *'playfully decided'* to transfer pollen from Spanish to Californian plants *'just to see what happened'*.

The results were very surprising. Californian sulphur star-thistles produced 44 per cent fewer seeds per flower when they were fertilized using Spanish pollen than when they were supplied with Californian pollen. Over the period since the plants were introduced to California, the compatibility of the Spanish with the Californian sulphur star-thistle has declined. Isolation in the yellow star-thistle is even greater, at around 52 per cent reduction in fertility. However, this is over a larger number of generations. The yellow star-thistle was first found growing in California in 1824, but its journey was an indirect one, via Chile, so the chances are that the Spanish and Californian yellow star-thistles last interbred 350 or so generations ago. Nonetheless, this is still exceptionally fast. The Californian and Spanish star-thistles seem to be losing the ability to mate with one another. They are on the path towards becoming separate species.

Because closely related species can sometimes mate with one another and produce hybrid offspring, the benchmark for Californian plants to be regarded as different species is not a full 100 per cent reduction in fertility. Knowing this, Montesinos and his colleagues decided to find out what the fertility might be when you cross different wild star-thistle species with one another. They tried to fertilize yellow star-thistles with the pollen of sulphur star-thistles, and also with the pollen of yet another related species. The answer was a 65–88 per cent reduction in the number of seeds produced when crosses were made using pollen from different species. This suggests that the Californian plants, at 44 per cent and 52 per cent reduction in fertility, are probably not yet fully-fledged species, but are well on the way towards it, a mere 86 to 350 years after they separated from their Spanish ancestors. If they continue to diverge at the same rate, then they might well be quite distinct 'human-created' species within a few more centuries.

CONTINUE

Figure 1

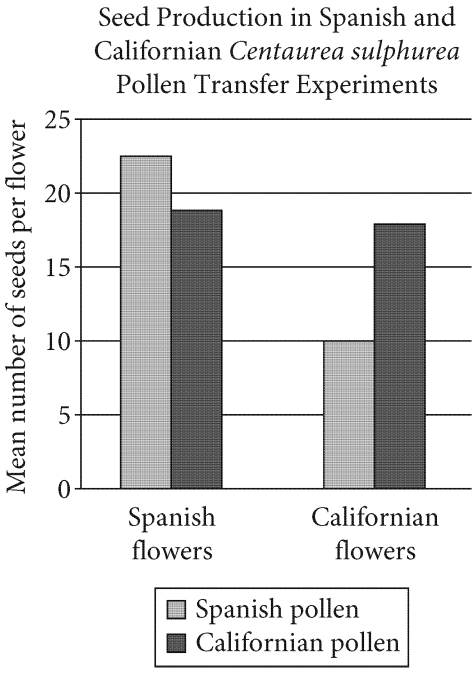
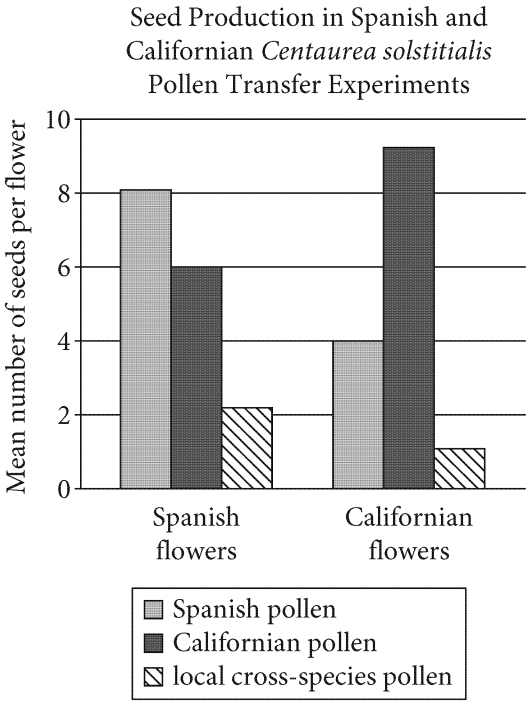


Figure 2



Figures adapted from Daniel Montesinos, Gilberto Santiago, and Ragan M. Callaway, "Neo-Allopatry and Rapid Reproductive Isolation." ©2012 by The University of Chicago.

42

It can reasonably be inferred from the passage that the experiment was ultimately prompted by

A) professional competitiveness along with a particular fascination with star thistles.

B) personal curiosity about star thistles in addition to a clear scientific objective.

C) a desire to corroborate an earlier study on star thistles rather than to gain new insights.

D) an interest in studying other plants related to star thistles rather than an interest in star thistles themselves.

CONTINUE

43

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

A) Lines 21-24 ("No one . . . exceptions")
B) Lines 27-35 ("In fact . . . *happened*")
C) Lines 36-40 ("The results . . . pollen")
D) Lines 43-50 ("Isolation . . . ago")

44

Which choice best supports the conclusion that attitudes toward nonnative star thistle may overlook the plant's positive effects on the environment?

A) Lines 1-6 ("California . . . there")
B) Lines 6-11 ("The yellow . . . rare")
C) Lines 51-53 ("The Californian . . . another")
D) Lines 59-65 ("Knowing . . . species")

45

In placing the word "knowledge" (line 26) in quotation marks, the author most likely suggests that

A) scientific concepts are often more specialized than are concepts in other disciplines.
B) what constitutes valid evidence varies widely across scientific fields.
C) scientific theories are easily misunderstood by nonscientists.
D) an idea assumed by scientists to be true may not be applicable in some contexts.

46

As used in line 48, "indirect" most nearly means

A) misleading.
B) roundabout.
C) restrained.
D) implicit.

47

The sentence in lines 50-51 ("Nonetheless . . . fast") mainly serves to

A) summarize the data provided in the paragraph.
B) interpret the findings of the experiment described in the paragraph.
C) contextualize information presented in the preceding sentence.
D) illustrate the idea developed in the preceding sentence.

48

According to the passage, what is the relationship between the Spanish and the Californian populations of yellow star thistles?

A) They are now recognized as different but closely related species.
B) They are currently of the same species but appear to be diverging into distinct species.
C) The Californian population is a hybrid offspring of the Spanish yellow star thistle and is native to California.
D) The Spanish population has low fertility rates compared to the Californian population of the yellow star thistle.

49

Based on the passage, if hypothetical fertility data on two cross-pollinated plants that seem to be of the same species show an 80% reduction in seed production, which choice is a reasonable conclusion?

A) The plants may no longer be of the same species.
B) The plants are probably of the same species but inhabit different local regions.
C) The offspring of the plants will have 100% reduction in fertility.
D) The offspring of the plants are hybrid.

CONTINUE

50

Which statement is best supported by the data in figure 1?

A) Spanish pollen produced approximately the same number of seeds in Californian flowers as it did in Spanish flowers.

B) Californian pollen produced fewer seeds in both Spanish and Californian flowers than did Spanish pollen.

C) Spanish pollen produced more seeds in Californian flowers than did Californian pollen.

D) Californian pollen produced a slightly higher number of seeds in Spanish flowers than it did in Californian flowers.

51

According to figure 1, the greatest mean number of seeds per flower was produced with which combination of pollen and flowers?

A) Spanish pollen and Californian flowers

B) Californian pollen and Spanish flowers

C) Spanish pollen and Spanish flowers

D) Californian pollen and Californian flowers

52

According to figure 2, in which combination was the mean number of seeds per flower lowest for both Spanish and Californian flowers?

A) Spanish pollen in Spanish flowers and Californian pollen in Californian flowers

B) Californian pollen in Spanish flowers and local cross-species pollen in Californian flowers

C) Californian pollen in both Spanish and Californian flowers

D) Local cross-species pollen in both Spanish and Californian flowers

STOP

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

CollegeBoard SAT®

AUGUST 28, 2021
US

The SAT®

Test Book

IMPORTANT REMINDERS

1

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

2

Sharing any questions with anyone is a violation of Test Security and Fairness policies and may result in your scores being canceled.

Reading Test

65 MINUTES, 52 QUESTIONS

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

DIRECTIONS

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

Questions 1-10 are based on the following passage.

This passage is adapted from Seth Kantner, *Ordinary Wolves*. ©2004 by Seth Kantner. The narrator, a teenaged boy, lives in remote northern Alaska.

Spring was my favorite time of year, and it took extra energy to stay in a bad mood. The sun came home to the Arctic and shone tirelessly on the shimmering world of snow. Midwinter diminished into memory and the Darkness of next winter seemed inconceivable. Warm smells rose from the black soil of exposed cutbanks; birds shrieked and carelessly tossed leftover seeds down out of the birches. It was a season of adventure calling from the melting-out mountains, of geese honking after a continent-crossing journey, of caribou herds parading thousands long on their way north to the calving grounds, sap running and every arctic plant set to burst into frenzied procreation. Spring was the land smiling, and I couldn't imagine my life without that smile.

But I was sixteen and stunningly lonesome. My siblings Iris and Jerry were gone. Iris's last correspondence-school course lay behind her. She waited only for paperwork to be officially free. The Rural Student Vocational Program had sent a plane ticket for her to travel to Fairbanks, to apprentice for two weeks, as a teacher. A year ago Jerry had moved there; he lived with a girlfriend named Callie. To me it seemed ironically unfair—since I was eight and first read about Frank, the elder Hardy Boy, *I* had wanted a girlfriend named Callie. Jerry had probably found the only one in Alaska.

For weeks the April sun lengthened and then Iris returned—transformed—a joyous goddess with black hair curled in a "permanent" that apparently wasn't, but would last long enough. Her cheeks were flushed, her eyes a happier blue than ever, with three-hundred-and-sixty-seven-dollar contact lenses focusing them. For the first time in more than a decade she could see needles on the spruce. I greeted her the way I had greeted sixteen, with a practiced impassive shrug and a safe smile. Her face glowed with jubilation and the wonder of the Outside; mine was dark and hard with snow tan and a grip on leaking uncertainty.

"Fairbanks has eight-story skyscrapers at the university," she exclaimed.

We were out near the middle of the river chipping a new water hole in the ice. The water in the old one near shore had grown brown with tundra water eddying up from the mouth of Jesus Creek. The ice froze all the way down to the sand in places and we hoped we weren't working over one of those places. A moose stood in the willows, below the dog yard, breaking down branches, chewing the tips, leaving carnage. Iris wore an aqua nylon jacket she'd bought in Fairbanks and she looked as pretty as Dawna Wolfglove.

CONTINUE

"One night we borrowed a master key from a junior. We sneaked up on the roof and dropped the ice cubes out of our root beers. Down on the concrete. My friend Robin found a five-dollar bill in the elevator."

I rested while my father Abe shoveled the loose ice out of the four-foot-deep hole. The moose plodded out on the river, crossing toward the far shore. Two more moose stood over there on the bank, long-legged, big ears up, and watchful.

"Oh," she saw my expression, "a master key opens any door at the university."

"Yeah? What's an ice *cube*?"

"They make ice in freezers, to put in soda pop, Cutuk. They sell it, too, in bags."

Store-bought *ice*? I remembered the sweet powerful taste of pop. Tommy Feathers had stopped for coffee when he was hunting wolverine. He tossed a bulged red and white can on the chopping block. "You'll have tat one springtime," he joked. We had sat around inside waiting for it to thaw. We could have bought pops in Takunak but according to Abe, pop cost money, wasted aluminum, and was bad for our teeth. Nothing for something. Why not drink water? Now Iris was describing the high school friends and fun we'd always worried we missed out on, and I wondered why I hadn't bought myself a few Cokes.

Abe clattered the shovel around the ice walls of the water hole. He flung a last shovelful. "Go 'head." Under his heavy mustache he had the faint curl to his lip that a person wouldn't notice unless they knew him well. I wasn't sure if his aversion was to the tall buildings, ice cubes, or this change in Iris.

I picked up the *tuuq* and checked for fresh rock nicks in the sharpened steel bar bolted to the end of the pole. I drove it down into the dark ice at the bottom of the hole, superstitious and reckless, promising if the chisel punched through it meant luck, meant I would never give up on the land, on my dog team, on a life where water came from holes in the ice. The chips remained powder dry in the shaft.

1

The main purpose of the first paragraph is to

A) demonstrate the appeal of a season by making a series of comparisons.

B) evoke a vivid impression of a particular setting with striking sensory imagery.

C) describe the ways in which certain aspects of daily life alter throughout the year.

D) emphasize the symbolic importance of the dangers present in the natural world.

2

As used in line 4, "diminished" most nearly means

A) decreased.

B) slackened.

C) lowered.

D) receded.

3

A main idea emphasized in the passage is the

A) tension between two radically different ways of life.

B) contrasting cultural ideals of the past and the present.

C) inevitability of a rift between children and parents.

D) necessity of preserving the beauty of the wilderness.

CONTINUE

4

It can reasonably be inferred from the passage that spending time in Fairbanks changed Iris by making her noticeably more

A) radiant and optimistic in her general outlook on life.

B) serious and determined when focusing on her studies.

C) perceptive and honest when comparing herself to others.

D) dreamy and distracted when contemplating her future.

5

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

A) Lines 18-20 ("Iris's . . . free")

B) Lines 21-23 ("The Rural . . . teacher")

C) Lines 32-35 ("Her cheeks . . . them")

D) Lines 52-54 ("Iris . . . Wolfglove")

6

The descriptions in lines 38-41 ("Her face . . . uncertainty") have the main effect of

A) highlighting differences between the siblings' feelings about the future.

B) reinforcing the worry that the narrator feels about his sister's immaturity.

C) predicting challenges that the narrator will face as Iris readjusts to her home.

D) identifying the source of the narrator's difficulties in earning his father's approval.

7

In the context of the passage, the sentence "Store-bought *ice*?" (line 70) primarily serves to

A) convey the tone of resentment the narrator adopts toward Iris's preference for novel adventures.

B) highlight a contrast between what people outside the narrator's community do and what the narrator is used to.

C) depict an object that had importance to the narrator and his siblings in their childhood.

D) provide an example of the strange but intriguing events experienced by the narrator.

8

It can reasonably be inferred from the passage that the narrator views his present circumstances with

A) determination, because his upbringing has given him the confidence to survive challenging conditions.

B) contentment, because he realizes that life outside of his hometown is too unfamiliar to appeal to him.

C) impatience, because he is eager for opportunities to surpass his siblings' accomplishments.

D) dissatisfaction, because his siblings have had experiences that he wishes for himself.

CONTINUE

9

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

A) Lines 23-25 ("A year . . . Callie")
B) Lines 29-32 ("For weeks . . . enough")
C) Lines 79-82 ("Now . . . Cokes")
D) Lines 91-96 ("I drove . . . ice")

10

The narrator indicates that a faint curl to his father's lip (lines 85-86) generally reflects Abe's feelings of

A) disapproval of something heard or seen.
B) concern about a challenging problem.
C) defensiveness over a perceived criticism.
D) amusement regarding a personal interaction.

CONTINUE

Questions 11-21 are based on the following passage and supplementary material.

This passage is adapted from "Paying Do-Gooders Makes Them Less Persuasive." ©2016 by Association for Psychological Science.

People who receive a financial incentive to raise money for a charity they care about are actually less effective in soliciting donations, even when potential donors have no idea that incentives were involved, according to new findings. The research suggests that incentives may have this effect because they result in the fundraisers coming off as less sincere to the people they're trying to persuade.

"We show that incentives make persuaders less effective at communicating sincere concern for a charitable cause, which means the incentive is having harmful effects on the very activity it was designed to improve," says psychological scientist and study author Alixandra Barasch of the Stern School of Business at New York University. "This is important because it helps us understand the costs and benefits of incentives in the context of philanthropy."

Although financial incentives can provide motivation to perform a task well, Barasch and colleagues Jonathan Z. Berman (London Business School) and Deborah A. Small (the Wharton School at the University of Pennsylvania) wondered whether paying people to advocate for a cause that they were already motivated to support might have unintended negative consequences.

In one study, the researchers recruited 36 "persuaders" at a community event intended to raise money for an organization supporting medical research and awareness. The persuaders were asked to make a video pitch for the organization, doing their best to persuade potential donors to contribute. Some of the persuaders were offered a personal incentive: For every $10 donated in response to their video, they would receive $1.

Later, 243 participants were randomly assigned to watch one of the video pitches. In addition to the standard $10 participation fee, they received an extra $3 that they could keep for themselves or donate to the cause promoted in the video.

The data showed that participants donated less of their extra cash in response to pitches from persuaders who had received an incentive compared to pitches from persuaders who hadn't been incentivized. This occurred despite the fact that the participants had no idea that the persuaders might have received incentives.

A second study, in which college students made video pitches for community-service organizations, showed similar results. Again, persuaders who received an incentive were less effective in soliciting donations; moreover, participants rated the videos of incentivized persuaders as less sincere.

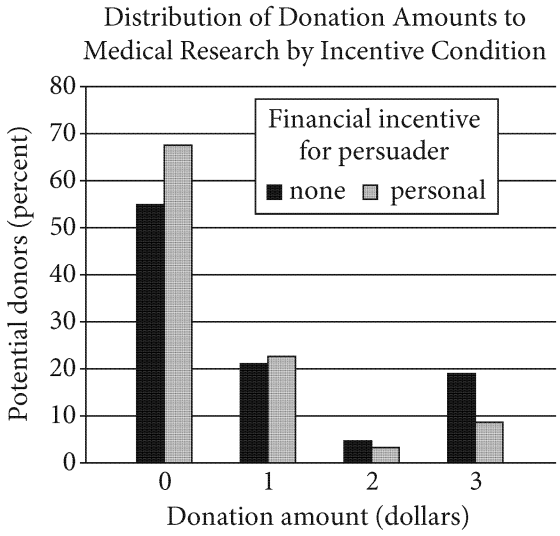
The researchers hypothesized that the inherent conflict between benefits to others, or altruism, and benefits to the self might inhibit persuaders from behaving in a sincere manner. Additional data from a follow-up study supported this idea: Persuaders who were given a charitable incentive—any money raised from their pitch would be matched by the researchers—seemed to be just as effective in raising funds as those who received no incentive. In this case, the incentive didn't benefit the persuaders personally, and so it didn't inhibit them from being sincere.

Together, the findings underscore the notion that incentives compromise persuaders' ability to convey sincerity. Barasch and colleagues are currently planning follow-up studies to examine the cues—both verbal and nonverbal—that might convey sincerity.

Even if incentives do have a negative effect on sincerity, the researchers note that there may be other reasons to use incentives in the context of fundraising campaigns:

"Incentives may engage people who would otherwise not help at all, and they may help recruit better talent within a competitive landscape," says Barasch.

CONTINUE



Adapted from Alixandra Barasch, Jonathan Z. Berman, and Deborah A. Small, "When Payment Undermines the Pitch: On the Persuasiveness of Pure Motives in Fund-Raising." ©2016 by Alixandra Barasch, Jonathan Z. Berman, and Deborah A. Small.

11

One important function of the second paragraph (lines 9-17) is to

A) establish the implications of the findings detailed in the passage.

B) characterize the study's conclusions identified in the passage as controversial.

C) clarify how the methods discussed in the passage build on previous research.

D) explain how the lead researcher described in the passage formulated her hypothesis.

12

As used in line 12, "designed" most nearly means

A) measured.

B) illustrated.

C) intended.

D) coordinated.

13

The main purpose of the passage is to

A) explain scientific investigations into why incentives function differently in the context of fund-raising than in other contexts.

B) present experiments that establish the role that incentives play in enhancing fund-raising efforts.

C) describe studies designed to settle an ongoing debate about which kinds of incentives best motivate people to serve as advocates.

D) discuss research that suggests that incentives can negatively affect people's success in advocating for a charitable cause.

14

Based on the passage, one likely reason Barasch's team recruited persuaders at a medical research fund-raiser was that the team assumed that attendees of the event

A) had varying levels of expertise concerning medical research.

B) were predisposed to care about the importance of raising money for medical research.

C) had personal contacts with a history of donating to charitable causes.

D) were sufficiently outgoing to advocate effectively for a charitable cause.

15

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

A) Lines 9-15 ("We show . . . University")

B) Lines 18-25 ("Although . . . consequences")

C) Lines 26-29 ("In one . . . awareness")

D) Lines 29-31 ("The persuaders . . . contribute")

CONTINUE

16

Based on the passage, which condition must have been met in order for the findings of the second study to have validated those of the first study?

A) The financial incentive used in the second study was the same as that used in the first study.

B) The video pitches used in the second study were each of the same length as those in the first study.

C) The persuaders were able to negotiate the amount of money they received for each successful donation.

D) The participants were unaware that some persuaders were being compensated for their efforts.

17

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

A) Lines 32-34 ("Some . . . receive $1")

B) Lines 36-39 ("In addition . . . video")

C) Lines 44-46 ("This . . . incentives")

D) Lines 47-49 ("A second . . . results")

18

The sentence in lines 61-64 ("in this . . . sincere") mainly serves to

A) clarify the design of the study discussed in the paragraph.

B) explain a finding presented earlier in the paragraph.

C) contradict an assumption made by the researchers earlier in the passage.

D) provide the basis for the research team's plans for additional studies.

19

As used in line 66, "compromise" most nearly means

A) impair.

B) expose.

C) settle.

D) concede.

20

According to the graph, the smallest percentage of potential donors donated

A) $0.

B) $1.

C) $2.

D) $3.

21

Which statement about the ability of the persuaders to raise funds is supported by the graph?

A) Persuaders who were given a personal incentive were consistently more effective in soliciting donations than persuaders who were not given a personal incentive.

B) Persuaders who were given a personal incentive got fewer donations than those who were not given an incentive, but the donations they did get were of higher value.

C) Each group of persuaders convinced more than 20% of potential donors to give $3.

D) Neither group of persuaders was able to convince a majority of potential donors to donate.

CONTINUE

Questions 22-31 are based on the following passage and supplementary material.

This passage and accompanying figure are adapted from Robin Dunbar, *Human Evolution: Our Brains and Behavior*. ©2016 by Robin Dunbar.

In relatively open habitats, the body of a quadrupedal animal absorbs more sunlight than a bipedal one because standing upright means that only the top of the head and the shoulders are exposed to the sun, especially during the middle period of the day when the sun is overhead and at its hottest. A quadruped will thus overheat more quickly than a biped. The brain has very narrow tolerances temperature-wise: raising the temperature of the brain by more than 1°C may result in heatstroke and, within a relatively short period of time, brain cells may start to die. By minimizing the amount of radiant heat absorbed by the body from the sun during the middle of the day, a bipedal animal might be able to remain active longer when the sun is at its hottest.

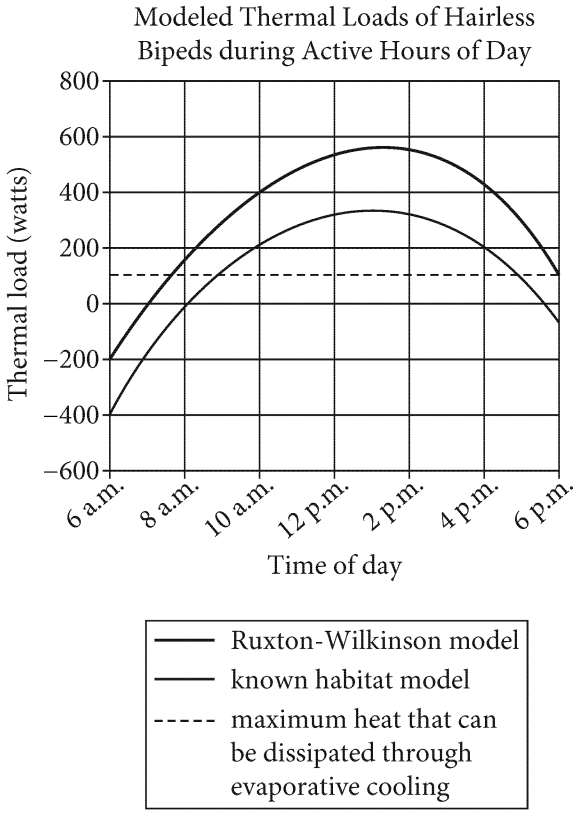
Modern humans have two features that are not only unique among the primates but also seem to be directly related to this heat-load problem, namely the loss of fur over most of the body (other than the head and, to a much lesser extent, shoulders—the areas of the body most exposed to the sun at midday) and a greatly increased capacity for sweating (we have many times the number of eccrine sweat glands in the skin than all other primates except for baboons, the only other terrestrial open country species). Physiological models developed by Peter Wheeler suggest that reduced exposure to direct sunlight combined with evaporative cooling through sweating would have enabled a naked bipedal hominin both to remain active longer than a quadrupedal one and/or to travel twice as far on a litre of water. The key point here is that sweat evaporating off fur just cools the tips of the hair and not the skin underneath; to benefit from evaporative cooling of sweat, the animal has to be naked.

Wheeler's thermal load model has recently been challenged. The biologists Graeme Ruxton and David Wilkinson pointed out that walking itself generates heat, and this internally created heat needs to be added to that produced by sunlight striking the body. With this additional internal source of heat, they argued, bipedalism gives only a small advantage, and the main gain would come from hair loss and sweating. A hairy australopithecine[1] (whether bipedal or quadrupedal) would have been unable to survive in open habitats because the combined thermal load would have been more than it could dissipate; even a hairless animal would be unable to lose heat fast enough to offset overheating when active during the middle of the day. Under the Ruxton-Wilkinson model, heat load would exceed the heat that could be dissipated from roughly 7:30 a.m. until 6 p.m. This implies that, on their own, the thermal benefits would not have been sufficient to favour the evolution of bipedalism. However, if bipedalism had evolved for some other reason, then hairlessness might still have developed for cooling. Although they offer no suggestions as to why bipedalism might have evolved, the Ruxton-Wilkinson correction needs to be taken seriously, since it potentially undermines a widely accepted explanation for the benefits of bipedalism.

As it happens, both the original Wheeler and the Ruxton-Wilkinson versions of this model make an unrealistic assumption that no one seems to have noticed: they assume a maximum air temperature at ground level of 40°C, a value that is certainly appropriate at sea level but is far too high for any of the habitats actually occupied by australopithecines—most of which were at altitudes above 1,000 meters, where maximum temperatures will typically be much lower. These lower temperatures would have significantly reduced the thermal load, especially during the middle of the day.

[1] an extinct group of early hominin species ancestral to modern humans

CONTINUE



22

The main purpose of the passage is to

A) present hypotheses about the origin of bipedalism and argue that bipedalism's thermal benefits have been neglected by those hypotheses.

B) describe conflicting models of the thermal benefits of bipedalism and offer a way to resolve the differences between those models.

C) discuss attempts to assess the thermal benefits of bipedalism and point out an overlooked consideration relevant to those attempts.

D) summarize the thermal benefits of bipedalism and highlight an additional factor that underscores the importance of those benefits.

23

It can reasonably be inferred from the passage that the extent to which bipedalism would be thermally beneficial for an animal depends partly on the

A) typical size of the animal's habitat.

B) normal brain temperature of the animal.

C) length of time the animal can remain active without drinking.

D) amount of direct sunlight the animal's environment receives.

24

As used in line 8, "narrow" most nearly means

A) limited.

B) cramped.

C) petty.

D) exclusive.

25

The author mentions the habitat of baboons in line 26 ("the only . . . species") most likely to

A) question the conventional view of a region.

B) illustrate the predominance of a characteristic.

C) emphasize a consequence of a behavior.

D) suggest a potential explanation for a trait.

26

Which choice best states the different meanings of "developed" as used in lines 27 and 58, respectively?

A) Put forth; emerged

B) Elaborated on; enlarged

C) Matured; occurred

D) Transformed; strengthened

CONTINUE

27

Information in the passage best supports which statement about sweating in humans and baboons?

A) Although humans and baboons both can cool themselves through sweating, humans must consume more water than baboons must consume to get the same cooling benefit.

B) Although humans and baboons both have abundant eccrine sweat glands, humans can receive a greater cooling benefit from sweating than can baboons.

C) Although humans and baboons both sweat more than do other primates, they also generate more heat when walking than do other primates.

D) Although humans and baboons both possess eccrine sweat glands, those found in humans can secrete proportionally more sweat than can those found in baboons.

28

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

A) Lines 27-32 ("Physiological . . . water")

B) Lines 32-36 ("The key . . . naked")

C) Lines 37-38 ("Wheeler's . . . challenged")

D) Lines 42-45 ("With . . . sweating")

29

Which choice best supports the idea that the author believes that bipedal hominins could have been active during some of the period when Ruxton and Wilkinson claimed that hominins would overheat?

A) Lines 51-54 ("Under . . . 6 p.m.")

B) Lines 56-58 ("However . . . cooling")

C) Lines 59-63 ("Although . . . of bipedalism")

D) Lines 73-75 ("These . . . the day")

30

As depicted in the graph, the known habitat model predicts that the thermal load of a hairless biped would be 200 watts at which times?

A) 6 a.m. and 6 p.m.

B) 8 a.m. and 5 p.m.

C) 10 a.m. and 4 p.m.

D) 12 p.m. and 2 p.m.

31

According to the passage, Ruxton and Wilkinson identified which problem with Wheeler's model?

A) Wheeler's model misrepresented the thermal load experienced by bipedal hominins because it assumed a maximum air temperature that was unrealistically low.

B) Wheeler's model exaggerated the portion of thermal load attributable to hominin activity because it did not allow for the possibility that hominins rested during the hottest part of the day.

C) Wheeler's model undervalued the thermal benefits experienced by bipedal hominins because it did not incorporate benefits from hair loss and sweating.

D) Wheeler's model overestimated the thermal benefits of bipedalism to hominins because it failed to account for the increase in thermal load caused by activity.

CONTINUE

Questions 32-41 are based on the following passage.

This passage is adapted from a speech delivered in 1976 by Eleanor Holmes Norton, "In Pursuit of Equality in Academe: New Themes and Dissonant Chords." ©1976 by the American Association for Higher Education and Jossey-Bass Inc. Norton, a civil rights activist, was elected to the US Congress in 1990 as a representative of the District of Columbia.

Historians may differ as to when to date the beginnings of the American obsession with equality, but the antislavery controversy of the Missouri Compromise surely marks a point when slavery, and thus equality, became truly national concerns tied to the destiny of the nation itself. At least since 1820, then, I think it fair to say that Americans have been locked in an unparalleled and unceasing struggle with themselves over the meaning and the virtue of equality.

For no other people has equality required such sustained attention for so long a time. Nowhere else in the world has the struggle over this single question been so intense, so dynamic, so costly. Over a period of 150 years it included not only the perplexing and omnipresent struggle of black men and women. For mounted on the same canvas are the collages of others, including the women's suffrage movement, the women's equality movement of today, and the largely successful struggle of European immigrants for inclusion on terms of equality and mobility. The very diversity of the actors who have played out equality themes in America has contributed to the preoccupation of Americans with this subject.

The American experience with equality has been both tortured and exhilarating. At the most promising end of the scale, successive waves of poor immigrants—most entering as illiterate peasants—found spectacular economic success in one or two generations, a phenomenal mobility unprecedented in world history. Somewhere in between are white women who, with the right to vote, won a new sense of themselves after a long struggle. While their transformation in equality terms is incomplete and disappointing, no one can doubt what the past fifty years have done to make the American women more equal, both in her home and in her transformed role as member of the workforce. . . . [T]he national experience with black people has been a unique tragedy, characterized first by sustained oppression and then by slow progress. Still, the past two decades have raised uncommon hopes and produced unprecedented gains. At the very least, black people have come up from psychological depths to which it would seem impossible to return.

Because Americans have had more diverse and concentrated experience with the dynamics of equality than any other people in the world, they have had the opportunity to disproportionately influence the very meaning of the word.

Examples of American leadership on matters of equality, leadership often carved out of painful experience, are legion. The choice of Martin Luther King, Jr., for world recognition as recipient of the Nobel Peace Prize in 1964 did not come because of his leadership of an indigenous freedom movement in the United States. King's world status derives from the same process that made world and not merely national leaders of Gandhi and Lenin. All staged essentially national movements with such universal force and applicability that they moved men and women across the face of the earth. King made the idea of racial equality plainer to millions than it had ever been before, just as Gandhi moved peasants everywhere to demand freedom from colonialism.

One could cite other examples of American pace-setting in defining equality. For example, the women's movement appears better developed in this country than in most others. Although France has a new cabinet post for the *condition féminine*, the country's notions of feminism are underdeveloped and there is no strong activist movement. Russian and other East European women have won significant access to male jobs but very little change in sex roles. By contrast, American women, with historically better developed concepts of equality to work with, are pursuing change in magnificent proportions from carefully circumscribed issues such as equal employment and universal child care to weighty philosophical issues whose resolution could virtually redefine womanhood and remake entire areas of human experience.

CONTINUE

32

To advance her claims about the development of equality in the United States, Norton most extensively uses

A) generalizations about the circumstances of particular groups of Americans.
B) comparisons of American political leaders with leaders from other countries.
C) predictions about the rising political power of previously marginalized Americans.
D) quotations from prominent Americans associated with equality movements.

33

In the first paragraph, Norton refers to controversy surrounding the Missouri Compromise primarily to

A) introduce a historical event that the rest of the passage will explore in detail.
B) allude to a debate among historians that is relevant in nonacademic circles.
C) provide an example of an injustice condemned by the international community.
D) demonstrate the long-standing prominence of a particular issue in American public life.

34

The use of parallel phrases in line 14 ("so intense . . . costly") primarily serves to

A) emphasize how an underrepresented group had difficulty documenting its history.
B) underscore the profound ramifications of a social phenomenon.
C) allude symbolically to the dramatic strategies employed by activists fighting for equality.
D) stress the urgency of a warning in the hope that listeners will take it seriously.

35

In the passage, Norton most strongly suggests that Americans in general value efforts to improve equality because it

A) was a prominent idea in many leaders' philosophical platforms.
B) has strong political roots that still influence government decisions.
C) resonates with many different communities.
D) motivated the founding of the country itself.

36

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

A) Lines 6-10 ("At least . . . equality")
B) Lines 14-16 ("Over . . . women")
C) Lines 21-24 ("The very . . . subject")
D) Lines 25-26 ("The American . . . exhilarating")

37

The passage indicates that for African Americans the period from the 1950s to the 1970s differed from earlier eras because of a new

A) sense of optimism about change.
B) feeling of unity across social groups.
C) appreciation of outstanding leaders.
D) desire to pursue legislative reforms.

CONTINUE

38

The central claim in the fifth paragraph (lines 51-65) is that

A) an activist should follow the policies established for social reform by Gandhi and Lenin.

B) every nation needs its own figurehead in its efforts toward racial and economic equality.

C) Martin Luther King, Jr., had an unparalleled ability to mobilize people with his vision of a just world.

D) a national movement can embody an ideal with international appeal.

39

The passage most strongly suggests that American women are better positioned to promote gender equality than are women in certain other countries because

A) equality in other countries is framed as an economic issue rather than a political one.

B) other countries impose equality on citizens rather than allow it to grow organically.

C) the United States has a rich tradition of equality on which women can draw.

D) activist movements in the United States have strong government support.

40

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

A) Lines 66-69 ("One . . . others")

B) Lines 69-72 ("Although . . . movement")

C) Lines 72-75 ("Russian . . . roles")

D) Lines 75-82 ("By contrast . . . experience")

41

As used in line 61 and line 64, "moved" most nearly means

A) relocated.

B) inspired.

C) proposed.

D) directed.

CONTINUE

Questions 42-52 are based on the following passages.

Passage 1 is adapted from Chris Cesare, "Rosetta Sniffs Oxygen around Comet 67P." ©2015 by Macmillan Publishers Limited, part of Springer Nature. Passage 2 is adapted from Ashley Yeager, "Oxygen on Comet 67P Might Not Be Ancient After All." ©2017 by Society for Science & the Public.

Passage 1

Scientists have detected molecules of oxygen in the hazy halo of comet 67P/Churyumov–Gerasimenko—an unexpected discovery that may challenge theories about the formation of the Solar System. The detection, made by an instrument on board the European Space Agency's Rosetta spacecraft, was reported in *Nature*.

"As soon as we got close enough to the comet, we actually found it right away," says André Bieler, a physicist at the University of Michigan in Ann Arbor and lead author of the paper. Bieler says that he was surprised by both the presence and abundance of molecular oxygen (O_2) because it is usually quick to react with other chemicals.

From September 2014 to March 2015, as 67P made its way closer to the Sun, Bieler and his colleagues used a mass spectrometer on Rosetta to sniff the molecules swirling around the comet and identify their chemical composition. They found on average that O_2 makes up 3.8% of the cloud relative to the most abundant substance, water.

It was not immediately clear where the oxygen came from. The team discovered that water and oxygen were often found together—an indication that similar processes released both molecules. But Bieler and his colleagues ruled out many scenarios in which oxygen arises as a by-product when energetic particles such as photons and electrons split apart water.

Instead, the researchers argue that the oxygen is a remnant from when 67P formed billions of years ago, a process that may have trapped the gas in small grains of ice and rock that coalesced to create the comet's solid core.

But many models of the early Solar System rule this out because most oxygen tends to pair off with hydrogen. Given this affinity, it is tricky to adjust models of the early Solar System to allow for the survival of gaseous O_2, says Mike A'Hearn, an astronomer at the University of Maryland in College Park. But he adds that it may be possible with the right chemical abundances and temperature conditions.

Bieler acknowledges that more experiments will be needed to determine what the detection of oxygen really means. "We think this result is of interest beyond the cometary community because it forces us to rethink all of these models," he says.

Passage 2

"Molecular oxygen is very hard to find out there in the universe," says Caltech chemical engineer Konstantinos Giapis. When the Rosetta spacecraft detected oxygen around comet 67P, astronomers argued it must be primordial, trapped in water ice as the comet formed roughly 4.6 billion years ago. Intrigued by the result, Giapis and Caltech colleague Yunxi Yao wanted to see if an alternative way to create O_2 existed. Drawing on their work with fast-moving charged particles and materials such as silicon, they performed experiments that showed that charged water particles could slam into rust or sand grains and generate O_2.

Something similar could happen on comet 67P, they suggest. As the sun evaporates water from the comet's surface, ultraviolet light could strip an electron from the water, giving it a positive charge. Then, fast-moving particles in the solar wind could shoot the ionized water back toward the comet's surface, where it could collide with rust or sand particles. Atoms of oxygen from the water could pair with atoms of oxygen from the rust or sand, creating O_2.

The idea is plausible, says Paul Goldsmith, an astrophysicist at NASA's Jet Propulsion Laboratory in Pasadena, California. He helped discover O_2 in the Orion nebula and says the reaction might happen in places where young stars are forming and in other regions of space.

Rosetta mission scientist Kathrin Altwegg of the University of Bern in Switzerland calls the result interesting, but is skeptical it can explain comet 67P's oxygen abundance. As the comet gets closer to the sun, a protective bubble develops around 67P, data from the mission showed; that bubble would prevent solar wind particles or other ionized particles from

CONTINUE

reaching the comet's surface, Altwegg says. Also, the ratio of oxygen to un-ionized water also stays constant over time. It should be more variable if this chemical reaction were generating oxygen on the comet, she says.

Goldsmith, however, suggests researchers keep an open mind and design missions with instruments to test whether this newly detected reaction does, in fact, generate oxygen in space.

42

As used in line 44, "acknowledges" most nearly means

A) certifies.
B) defends.
C) yields.
D) recognizes.

43

Passage 2 most strongly suggests that Giapis and Yao speculate that the molecular oxygen surrounding comet 67P formed well after the comet did because

A) sand particles on the comet's surface could only have accumulated after ice and rock coalesced to create the comet's core.
B) a reaction that generates oxygen could occur as comet 67P nears the Sun.
C) primordial oxygen is still trapped in water ice at the comet's core.
D) the abundance of oxygen in the comet's cloud is far greater than the abundance of the water found with it.

44

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

A) Lines 51-55 ("When . . . ago")
B) Lines 55-57 ("Intrigued . . . existed")
C) Lines 62-66 ("Something . . . charge")
D) Lines 72-74 ("The idea . . . California")

45

Over the course of Passage 1, the author's main focus shifts from

A) describing the aims of a space agency's mission to detailing the results of that mission.
B) presenting a scientific finding to discussing how scientists attempted to account for that finding.
C) citing a widely held assumption to identifying evidence that undermines that assumption.
D) introducing a scientific hypothesis to describing an experiment designed to test that hypothesis.

46

In Passage 2, the author's use of the words "shoot" (line 67) and "collide" (line 68) has the main effect of

A) underscoring the damage to the comet's surface caused by the solar wind.
B) conveying the idea that speed and force contribute to the process that generates O_2.
C) highlighting a contrast between the reaction of ionized water to rust and the reaction of ionized water to sand.
D) creating a vivid sense of how Giapis and Yao's experiments unfolded.

CONTINUE

47

According to Altwegg in Passage 2, the protective bubble that forms around comet 67P would prevent the

A) formation of fast-moving particles in the solar wind.

B) evaporation of water from the comet's surface.

C) ionization of water by ultraviolet light.

D) contact of ionized water with rust or sand particles.

48

Which hypothetical discovery about another comet would provide the strongest support for the conclusion that the process described by Giapis and Yao (Passage 2) had occurred on that comet?

A) The abundance of molecular oxygen surrounding the comet was similar to the abundance of molecular oxygen on comet 67P.

B) Powerful solar wind occurred in the region where the comet was located.

C) The ratio of molecular oxygen relative to water molecules in the comet was shown to have fluctuated significantly over time.

D) Newly designed instruments revealed that the comet had high concentrations of rust and sand particles.

49

Based on Passage 1, which choice best helps to explain Giapis's remark in lines 49-50 of Passage 2 ("Molecular . . . universe")?

A) Molecular oxygen is hard to find in space because instruments are not typically sensitive enough to detect its presence.

B) Molecular oxygen in space is difficult to retrieve because it is buried deep within the cores of comets and other bodies.

C) Molecular oxygen is not often found in space because energetic particles rarely split apart water molecules.

D) Molecular oxygen in space is rare because oxygen atoms usually react with other substances rather than combining with each other.

50

Based on Passage 1, Bieler's team would likely view the explanation provided by Giapis and Yao in Passage 2 for the presence of molecular oxygen on comet 67P as

A) unexpected, because their work relied on an understanding that the splitting apart of water molecules could not plausibly account for the phenomenon.

B) flawed, because it assumes that oxygen makes up a larger proportion of the substances in the comet's atmosphere than it actually does.

C) nuanced, because it determines the relative chemical abundances necessary for the formation of molecular oxygen on comet 67P.

D) groundbreaking, because it provides the most persuasive model of the early solar system to date.

CONTINUE

51

Which choice from Passage 1 provides the best evidence for the answer to the previous question?

A) Lines 19-21 ("They . . . water")

B) Lines 25-29 ("But Bieler . . . water")

C) Lines 35-37 ("But many . . . hydrogen")

D) Lines 41-43 ("But he . . . conditions")

52

Based on Passage 2, Giapis and Yao would be most likely to disagree with which claim made by Bieler in Passage 1?

A) Existing models of the early solar system will need to be modified to account for the presence of O_2 on comet 67P.

B) The discovery of O_2 on comet 67P is relevant to scientists whose research does not focus on comets specifically.

C) Concentrations of O_2 on comet 67P were relatively easy to detect once the team's equipment was close to the comet.

D) The discovery of water molecules in close proximity to oxygen molecules on comet 67P is significant.

STOP

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

CollegeBoard SAT®

AUGUST 28, 2021
INTERNATIONAL

The SAT®

Test Book

IMPORTANT REMINDERS

1

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

2

Sharing any questions with anyone is a violation of Test Security and Fairness policies and may result in your scores being canceled.

Reading Test

65 MINUTES, 52 QUESTIONS

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

DIRECTIONS

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

Questions 1-10 are based on the following passage.

This passage is adapted from Carolina De Robertis, *Perla*. ©2012 by Carolina De Robertis. The narrator is in her last year of high school in Argentina.

My mother was given to sudden sprints of creativity. When she was young, she'd wanted to be an artist—she had not yet told me the whole story, but I'd seen the single frightening canvas in the attic.

I had never seen her take an interest in plants before, beyond providing general instructions to the gardener. The geraniums were different: they were not to be delegated to a mere professional. She repotted them herself. The operation took three days. She commandeered the backyard and transformed it into a flower factory, crowded with pots and plants and large bags of fertile soil. She enlisted my help, and we squatted in the backyard together, surrounded by the red and orange flowers (she had, I noticed, overwhelmingly chosen red), arranging roots in their elegant containers.

It was February, the ripe height of summer, and the sun cascaded over us in slow, humid waves. Mamá wore long gardening gloves over her manicured hands, and her fingers pressed soil into place with fastidiousness and even passion. She had bought me gloves too, but I refused to wear them.

"You'll get so dirty, Perla."

"I want to get dirty."

"Ay, Perla," she said, shaking her head. She said no more but beamed with irritation. After all, my refusal disturbed the plan for how the geranium days should go, mother and daughter tending flowers and don't they look picture perfect in their matching gloves? Such interesting gardening gloves, with their violet fleur-de-lis, what a find! For half an hour she would not talk to me, but then she thawed, so engrossed in the execution of her project that she forgot my transgression, or perhaps for fear that I might abandon the project altogether.

She needn't have worried. I didn't want to leave. I had protested this chore, but only mildly; it was a rare chance to spend time with my mother without the pressure of speaking to one another. We could crouch side by side, our attention on the plants, and I could taste the scent of her perfume and feel the rhythm of her breaths without having to find anything to say. We often struggled to find things to say to each other, beyond the essential *good morning* and *here's your breakfast* and *what time will you be home?* and *good night*, as though we were both foreigners who'd stumbled into this house from utterly different faraway lands, and had only just learned the rudiments of each other's languages. At that time, I still wanted to learn my mother's language (though I would not have told her that), if only to better understand her, and to increase the chances of her understanding me. There was so much I longed to tell her as I squatted beside her with my hands full of dirt, but I also feared that, if I started, other matters might leap out that were not meant to be spoken. Better not to risk the opening.

CONTINUE

Better not to attempt too much speech with my mother, especially on such flagrantly hot days on which it was impossible to rest your eyes on anything but geraniums and geraniums.

They were hardy little plants. The blooms themselves were bright and simple, relatively unassuming, but when gathered in such plentiful crowds they seemed to acquire an almost hypnotic power. The roots were much darker than the petals, and more twisted than the stems, a hidden half that exposed itself to my curious fingers in the journey from pot to pot. Strange, the body of a plant, with limbs never meant to be exposed to the sun. Every once in a while, over the course of our three days, Mamá hummed. The melody meandered, it was nothing I recognized, but it soothed me. At night, I would close my eyes for sleep and see a great geranium with its root bared in all its gnarled intricacy until my hands arrived full of soil to cover it back up.

When all the flowers were ready in their decorated pots, Mamá spent a fourth day distributing them through the house, moving a wooden stand here and now there, there and now here, now this pot with the shell motif, now the other pot with the Spanish tile, until at last every geranium had moved into the house and she collapsed onto the sofa in exhausted triumph. Flowers lurked at every turn.

1

Which statement best describes what happens in the passage?

A) Two characters attempt to carry out a plan that is eventually derailed by their disagreements.

B) Two characters work cooperatively to complete a task in spite of some tension between them.

C) One character is able to resolve a dispute with another character by providing assistance for several days.

D) One character reluctantly helps another character with a project and ultimately regrets the decision.

2

Based on the passage, Perla most likely views her mother's decision to repot the geraniums as

A) significant, because Perla's mother rarely undertakes new projects.

B) amusing, because Perla's mother has previously expressed a dislike of gardening.

C) unsurprising, because the decision is consistent with an aspect of Perla's mother's personality.

D) ill-conceived, because Perla's mother has miscalculated the level of effort required to implement the decision.

3

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

A) Lines 1-2 ("My mother . . . creativity")

B) Lines 5-7 ("I had . . . gardener")

C) Lines 7-8 ("The geraniums . . . professional")

D) Lines 10-12 ("She . . . soil")

4

The sentence in lines 43-49 ("We often . . . languages") mainly serves to

A) suggest that it is unlikely that Perla and her mother will ever be able to communicate effectively.

B) compare Perla's relationship with her mother to other relationships she has had in the past.

C) imply that Perla has not taken sufficient time to learn about her mother's background.

D) demonstrate the emotional distance that Perla feels from her mother even when they converse.

CONTINUE

5

Which statement about Perla's relationship with her mother is most strongly suggested by the passage?

A) Perla feels hurt by her mother's criticisms of her values and decisions.

B) Perla's mother believes that Perla is unwilling to try to understand her.

C) Perla's mother believes that her relationship with Perla is satisfactory.

D) Perla struggles to reconcile competing emotions about her mother.

6

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

A) Lines 53-57 ("There . . . spoken")

B) Lines 57-61 ("Better . . . geraniums")

C) Lines 70-73 ("Every . . . soothed me")

D) Lines 73-77 ("At night . . . back up")

7

As used in line 32, "thawed" most nearly means

A) defrosted.

B) dissolved.

C) relented.

D) agreed.

8

As used in line 60, "rest" most nearly means

A) close.

B) count.

C) settle.

D) recline.

9

The passage indicates that the red clusters of newly potted geranium flowers appear

A) elegantly festive.

B) oddly compelling.

C) distractingly chaotic.

D) abjectly nondescript.

10

According to the passage, when Mamá brings the geraniums into the house, she is

A) frustrated about having to arrange the pots by herself.

B) pleased with how much the plants brighten the house.

C) meticulous about the final placement of the plants.

D) eager for praise about her hard work with the plants.

CONTINUE

Questions 11-20 are based on the following passage and supplementary material.

This passage and accompanying figure 2 are adapted from Benjamin K. Bergen, *Louder Than Words: The New Science of How the Mind Makes Meaning*. ©2012 by Benjamin K. Bergen. In the passage, "speakers" refers to people whose first language is the language being discussed.

Recently, people have started to ask whether it's possible that the direction you read and write affects how you understand language. For instance, suppose I tell you that yesterday I was in the park, and I saw a guy in a purple track suit jog past me. Which way did you see him jogging in your mind's eye? In general, there's a lot of experimental evidence showing that you're more likely to have seen him going from your left to your right than any other direction. This has led some researchers to hypothesize that people have a universal bias to simulate events as going from left to right. And that idea would certainly seem to be corroborated by work on people's mental representations of events, which have shown a similar bias in English, Italian, and other European languages. But there's a problem. All these languages are written from left to right. So there's a confound here—we don't know whether English speakers and Italian speakers mentally represent events going from left to right because there's a universal bias for left-to-right motion or because learning to read and write a language from left to right leads you to think about motion this way.

The way to tease these two possible explanations apart is to ask what happens when you tell a speaker of Arabic or Hebrew (who writes from right to left) about the jogger. Will she see him go from left to right in her mind's eye, or right to left? If thinking of motion as going from left to right is a cognitive universal that's pervasive across our species, then the Arabic or Hebrew speaker should act like an English speaker. But if the direction of your writing system accounts for how you think of lateral motion, then the Arabic or Hebrew speaker should have a mental representation of lateral motion that's a mirror image of what English speakers see.

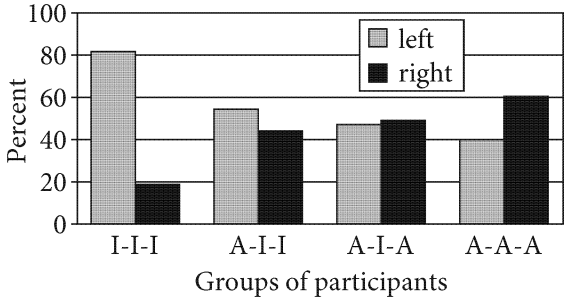
A pair of European researchers took this question on, in several ways. They asked speakers of Italian (which is written from left to right) and Arabic (which, again, is written from right to left) to listen to sentences about actions, like *The girl pushes the boy.* The Italian and Arabic speakers then had to either (in a first experiment) draw the event described in the sentence or (in a second experiment) look at a picture and decide if it depicted the event in the sentence. In the first experiment, the researchers measured whether the participants were more likely to draw the subject of the sentence (the girl in the sentence above) on the right or the left; in the second experiment, they recorded how fast people responded when the subject was depicted on the right or the left.

The results seem to show that people who are used to reading and writing in a certain direction tend to understand language about horizontal motion as going in the same direction. But we should tread cautiously here—other cultural practices could potentially correlate with writing direction, which could muddy the explanatory waters. For instance, it could be that visual depictions of events that Italians see in comic books, cartoons, or movies tend to cast motion from left to right, but the ones made for Arabic speakers are more likely to go from right to left. No rigorous studies that I know of have been done of the direction in which events are depicted in film across cultures. But differences in how people mentally represent events could in principle be due to how events are depicted, and not to writing direction per se. And to make things even more complicated, it's even possible that people creating comic books and other artifacts depict horizontal events in different directions in different cultures because of their language's writing direction. This would introduce another link in the causal chain.

CONTINUE

Figure 1

Percentage of Drawings by Four Groups of Participants with the Sentence Subject Positioned on the Left or Right Side



Groups

I-I-I: Speakers of Italian as a first language studying in Italy and responding in Italian

A-I-I: Speakers of Arabic as a first language studying in Italy and responding in Italian

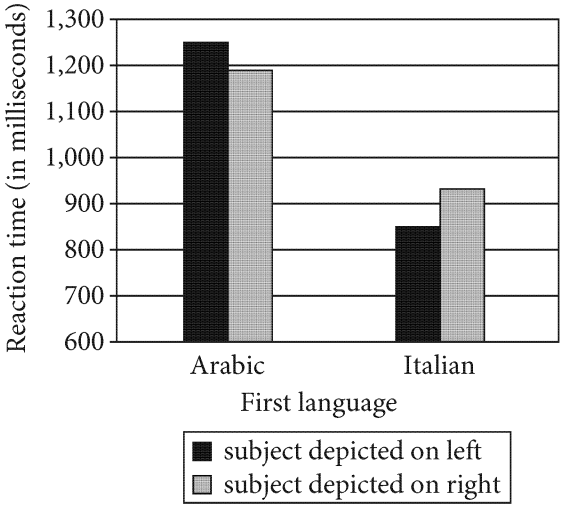
A-I-A: Speakers of Arabic as a first language studying in Italy and responding in Arabic

A-A-A: Speakers of Arabic as a first language studying in their home country and responding in Arabic

Adapted from Anne Maass and Aurore Russo, "Directional Bias in the Mental Representation of Spatial Events: Nature or Culture?" ©2003 by American Psychological Society.

Figure 2

Mean Time for Speakers of Arabic or Italian as a First Language to Determine Whether a Picture Matches the Event in a Sentence



In both conditions, the participants performed the task in Italian.

11

As used in line 13, "work on" most nearly means

A) investigations into.

B) production of.

C) struggle over.

D) functions regarding.

CONTINUE

12

It can reasonably be inferred from the passage that one weakness of the research performed before the study the author discusses is that it

A) ignored evidence gathered by other scientists who were exploring similar questions.

B) failed to highlight experimental results that did not directly support a favored hypothesis.

C) disregarded the fact that certain groups of people cannot easily conceptualize motion.

D) overlooked the possibility of an untested variable contributing to an outcome.

13

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

A) Lines 12-16 ("And that . . . languages")

B) Lines 17-23 ("So there's . . . way")

C) Lines 24-27 ("The way . . . jogger")

D) Lines 28-32 ("If thinking . . . speaker")

14

As used in line 11, "simulate" most nearly means

A) falsify.

B) exaggerate.

C) disguise.

D) picture.

15

Which choice best supports the idea that when listening to someone describing a flock of birds flying over an open field, a speaker of English as a first language would be likely to imagine the birds moving from left to right?

A) Lines 37-38 ("A pair . . . ways")

B) Lines 53-56 ("The results . . . direction")

C) Lines 66-69 ("But differences . . . per se")

D) Lines 69-73 ("And to . . . direction")

16

Based on the passage, what sentence other than "*The girl pushes the boy*" (line 41) would most likely have been used in the study?

A) The dog chases the ball.

B) The rain starts to fall.

C) The girl raises her hand.

D) The man turns on the light.

17

Which possible theory regarding a potential "causal chain" (line 74) can most reasonably be inferred from the passage?

A) People are influenced in their mental representation of events by the writing direction of language, and this in turn determines the types of art cultures produce.

B) Writing direction of language influences how graphic artists depict horizontal motion, which in turn influences how people mentally represent events.

C) Graphic artists from different cultures do not depict horizontal motion in the same way, but readers tend to ignore those differences in their mental representations.

D) Writing direction of language is an important factor in how readers mentally represent horizontal motion, and this factor is taken into account by graphic artists creating comic books.

CONTINUE

18

According to figure 1, which group showed the greatest difference in the percentage of drawings produced in which the subject was positioned on the left relative to those in which the subject was positioned on the right?

A) Speakers of Italian as a first language studying in Italy and responding in Italian

B) Speakers of Arabic as a first language studying in Italy and responding in Italian

C) Speakers of Arabic as a first language studying in Italy and responding in Arabic

D) Speakers of Arabic as a first language studying in their home country and responding in Arabic

19

What question is not discussed in the passage but can be answered with data presented in figure 1?

A) Did the differences in the likelihood of drawing the subject of the sentence on the left between speakers of Arabic as a first language and speakers of Italian as a first language become more pronounced over time?

B) Did people used to reading language from left to right respond differently to the drawing than people used to reading language from right to left?

C) Were speakers of Arabic as a first language more or less likely to draw the subject of the sentence on the left than speakers of Italian as a first language were?

D) Did speakers of Arabic as a first language studying in Italy draw the subject of the sentence on the left more often than speakers of Arabic as a first language studying in their home country did?

20

According to figure 2, when the subject was depicted on the right, the reaction time of speakers of Arabic as a first language was closest to

A) 850 milliseconds.

B) 920 milliseconds.

C) 1,200 milliseconds.

D) 1,250 milliseconds.

CONTINUE

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

This passage is adapted from Patrick Monahan. "How 3D Printing Unraveled the *Dracula* Orchid's Disguise." ©2016 by American Association for the Advancement of Science. 3D printing is a manufacturing process that uses computers to produce three-dimensional objects.

Instead of enticing their pollinators with nectar like other flowering plants, many orchids attract them with masterful disguises that mimic food, rivals, or even mates. The misled insects then carry pollen from one flower to another, unintentionally helping the orchids reproduce. Now—using models from a 3D printer—researchers have shown how one such orchid tricks fungus-loving flies by mimicking the sight and smell of their favorite mushrooms.

Flowers come in a dizzying array of colors, shapes, and smells. With these multifaceted advertisements, it's hard to pin down exactly what parts of a flower are actually attracting pollinators. One way scientists break down this complexity into more manageable pieces is by using artificial flowers: By adding different odors to artificial flowers that look and feel the same, for example, scientists can see how a pollinator reacts to smell alone. Such fake flowers are usually made of simple materials such as construction paper, cotton balls, or test tubes with cotton wicks. "We'd just walk through a dollar store and see what we could use," says Tobias Policha, a plant ecologist at the University of Oregon, Eugene, and lead author of the study.

But for *Dracula lafleuri*, a complex, showy flower found in the cloud forest of Ecuador, Policha needed something more durable, and more realistic. These orchids—which have a single petal that resembles the fungi that live nearby—attract flies that typically congregate around, and sometimes breed on, the mushrooms. It's hard to mimic that look with construction paper, which would disintegrate quickly in the wet forest anyway. So Policha and colleagues worked with artist Melinda Barnadas to develop a technique for creating artificial *Dracula* orchids. After a long process of casting, 3D-scanning, and digitally refining, Barnadas and the team 3D printed gypsum molds from which they could create silicone orchids in whatever color patterns they wanted. This gave them unparalleled flexibility in making their counterfeit flowers.

The team hung the artificial flowers next to actual *Dracula* orchids in the cloud forest. They modified both the fakes and the real flowers, changing the colors and patterns, and adding or removing scents. They even made several "Frankenstein" flowers, pieced together from artificial and natural flower parts. Then they watched to see which blossoms got more attention from the flies.

It turns out that the orchids need both the right look and the right smell to pull off their swindle. The artificial flowers—even those that were perfect mimics—attracted fewer flies than the real blooms. Only when the researchers applied scents from natural orchids were just as many flies attracted to the mimics as to the real flowers, the team reports. Still, the fakes aren't perfect, Policha says. Flies landed less often on these printed blossoms than on real flowers—they'd fly close, but veer away at the last second.

The orchid's labellum—the center petal that looks conspicuously like a mushroom—is key to its disguise. A real flower with a fake labellum attracted flies no better than an orchid made entirely of silicone. This petal is also where the orchid's mushroom smell is concentrated, a scent the researchers attribute mostly to a type of alcohol that can also be found in 80% of mushrooms living nearby.

But the showy, white-and-maroon-speckled sepal[1] plays a role, too. Researchers tested different color patterns, and found that flies were convinced only by orchids with spots. These flies tend to hang out on mushrooms in huge numbers—so Policha says that these flies might see the maroon dots as a fly party.

[1] Sepals are leaflike structures.

CONTINUE

Figure 1

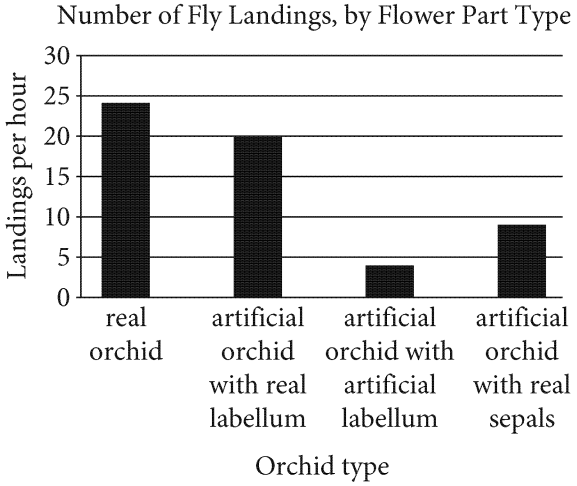
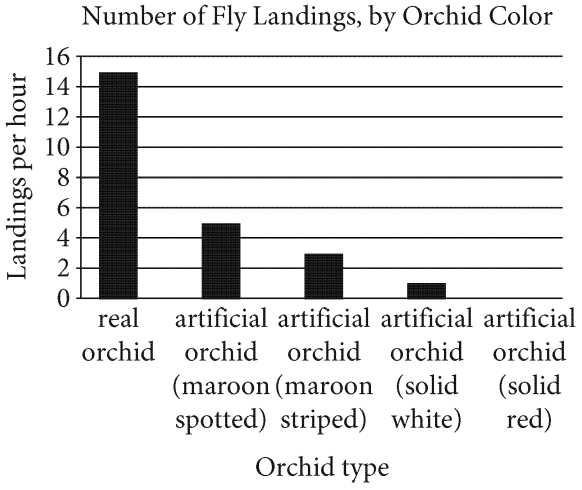


Figure 2



Figures adapted from Tobias Policha et al., "Disentangling Visual and Olfactory Signals in Mushroom-Mimicking *Dracula* Orchids Using Realistic Three-Dimensional Printed Flowers." ©2016 by Tobias Policha et al.

21

The main purpose of the passage is to

A) describe a study making use of an innovative technology and discuss its findings.

B) explain a new manufacturing process and explore its potential applications.

C) present a hypothesis about insect behavior and cite evidence from a relevant experiment.

D) consider a newly identified flower species and recount its discovery.

22

According to the passage, some species of orchids differ from other flower species in that they

A) exhibit dramatic variation in color and shape.

B) release powerful odors to attract insects.

C) lure pollinators without the use of nectar.

D) inhabit a relatively narrow geographic range.

23

The passage suggests that, compared with real flowers, artificial flowers are useful to researchers because they are

A) less vulnerable to contamination due to environmental influences.

B) less likely to produce random effects on insect behavior in different climates.

C) more consistent in their overall attractiveness to different species of insects.

D) more helpful in isolating the effects of particular floral features on pollinators.

24

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

A) Lines 10-11 ("Flowers . . . smells")

B) Lines 13-15 ("One . . . flowers")

C) Lines 18-21 ("Such . . . wicks")

D) Lines 25-27 ("But . . . realistic")

CONTINUE

25

The passage implies that in considering the suitability of paper flowers for their study, Policha and colleagues took which factor into consideration?

A) The need to obtain enough material for the construction of paper flowers
B) The likelihood that paper flowers would face adverse environmental conditions
C) The possibility that paper flowers might serve to repel insects
D) The difficulty of adding different scents to paper flowers

26

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

A) Lines 31-33 ("It's . . . anyway")
B) Lines 36-39 ("After . . . wanted")
C) Lines 43-45 ("They . . . scents")
D) Lines 48-49 ("Then . . . flies")

27

When the author uses the phrase "unparalleled flexibility" (line 40) in regard to 3D-printing techniques, he most likely means that 3D printers

A) provide scientists with a wide range of unusual materials to work with.
B) are especially useful to scientists in creating subtle bending forms.
C) allow scientists to modify artificial flowers over the course of an experiment.
D) enable scientists to construct artificial flowers with great precision and variety.

28

Which choice provides the best evidence for the conclusion that flies can distinguish between real and silicone orchids?

A) Lines 46-48 ("They . . . parts")
B) Lines 57-60 ("Flies . . . second")
C) Lines 65-69 ("This . . . nearby")
D) Lines 71-73 ("Researchers . . . spots")

29

The data presented in figure 1 most clearly support which statement from the passage?

A) Lines 27-31 ("These . . . mushrooms")
B) Lines 42-43 ("The team . . . forest")
C) Lines 54-56 ("Only . . . reports")
D) Lines 61-63 ("The orchid's . . . disguise")

30

Based on the data represented in figure 2, which statement about fly landing patterns is accurate?

A) Flies were more likely to land on maroon-striped artificial orchids than on maroon-spotted artificial orchids.
B) Flies were more likely to land on any type of artificial orchid than on real orchids.
C) Flies were less likely to land on solid white artificial orchids than on solid red artificial orchids.
D) Flies were less likely to land on solid white artificial orchids than on maroon-spotted artificial orchids.

31

As used in line 49, "attention" most nearly means

A) civility.
B) contemplation.
C) interest.
D) diligence.

CONTINUE

Questions 32-42 are based on the following passages.

Passage 1 is adapted from a speech delivered in 1848 by Elizabeth Cady Stanton at the Seneca Falls Convention. Passage 2 is adapted from a speech delivered in 1893 by Frances E. W. Harper, "Woman's Political Future." In Passage 1, Stanton speaks on behalf of women's rights activists. Harper was an author and civil rights activist. At the times Stanton and Harper spoke, women had not yet secured the right to vote in the United States.

Passage 1

We have no objection to discuss the question of equality [of men and women], for we feel that the weight of argument lies wholly with us, but we wish the question of equality kept distinct from the question of rights, for the proof of the one does not determine the truth of the other. All white men in this country have the same rights however they may differ in mind, body or estate.[1] The right is ours. The question now is, how shall we get possession of what rightfully belongs to us. We should not feel so sorely grieved if no man who had not attained the full stature of a Webster, Clay, Van Buren, or Gerrit Smith[2] could claim the right of the elective franchise [right to vote]. But to have the rights of . . . idiots . . . and silly boys fully recognized, while we ourselves are thrust out from all the rights that belong to citizens, it is too grossly insulting to the dignity of woman to be longer quietly submitted to. The right is ours. Have it, we must. Use it, we will. The pens, the tongues, the fortunes, the indomitable wills of many women are already pledged to secure this right. The great truth, that no just government can be formed without the consent of the governed, we shall echo and re-echo in the ears of the unjust judge, until by continual coming we shall weary him.

But, say some, would you have woman vote? What, refined, delicate woman at the polls, mingling in such scenes of violence and vulgarity? Most certainly. Where there is so much to be feared for the pure, the innocent, the noble, the mother surely should be there to watch and guard her sons, who must encounter such stormy dangerous scenes at the tender age of twenty-one. Much is said of woman's influence, might not her presence do much towards softening down this violence, refining this vulgarity? Depend upon it, the places that by their impure atmosphere, are unfit for women, cannot but be dangerous to her sires and sons.

1 At the time, citizenship rights in the United States were largely restricted to white people.

2 Political figures in the United States during the nineteenth century

Passage 2

Today women hold in their hands influence and opportunity, and with these they have already opened doors which have been closed to others. By opening doors of labor woman has become a rival claimant for at least some of the wealth monopolized by her stronger brother. In the home she is the priestess, in society the queen, in literature she is a power, in legislative halls law-makers have responded to her appeals, and for her sake have humanized and liberalized their laws. The press has felt the impress of her hand. In the pews of the church she constitutes the majority; the pulpit has welcomed her, and in the school she has the blessed privilege of teaching children and youth. To her is apparently coming the added responsibility of political power; and what she now possesses should only be the means of preparing her to use the coming power for the glory of God and the good of mankind; for power without righteousness is one of the most dangerous forces in the world.

Political life in our country has plowed in muddy channels, and needs the infusion of clearer and cleaner waters. I am not sure that women are naturally so much better than men that they will clear the stream by the virtue of their womanhood; it is not through sex but through character that the best influence of women upon the life of the nation must be exerted.

I do not believe in unrestricted and universal suffrage for either men or women. . . . I do not believe that the most ignorant and brutal man is better prepared to add value to the strength and durability of the government than the most cultured, upright, and intelligent woman. I do not think that willful ignorance should swamp earnest intelligence at the ballot-box, nor that educated wickedness, violence, and fraud should cancel the votes of honest men. . . . The ballot in the hands of woman means power added to influence. How well she will use that power I can not foretell. Great evils stare us in the

CONTINUE

face that need to be throttled by the combined power of an upright manhood and an enlightened womanhood; and I know that no nation can gain its full measure of enlightenment and happiness if one-half of it is free and the other half is fettered.

32

In Passage 1, Stanton stresses which aspect of the right to vote in the United States?

A) It is often considered the most important right that citizens possess.

B) It has gradually been granted to more of the population than it was originally.

C) It belongs to all citizens, regardless of their individual characteristics.

D) It is a source of national pride for both male and female citizens.

33

In line 24, the phrase "echo and re-echo" has the main effect of

A) condemning politicians for their repeated refusals to listen to advocates for women's right to vote.

B) characterizing advocates for women's right to vote as tireless in pursuit of their goal.

C) alluding to the beneficial effects that will result from extending the right to vote to women.

D) stressing that the public is becoming increasingly vocal in its support for women's right to vote.

34

Over the course of Passage 2, the main focus shifts from the

A) social advantages women derive from their current status to the additional social advantages they will have after gaining the right to vote.

B) role of women in the national culture to the ways the culture may change if women gain the right to vote.

C) social influence women presently wield to the political authority they could wield upon gaining the right to vote.

D) negative effects of delaying woman suffrage to the positive effects that will result if women gain the right to vote.

35

In Passage 2, Harper most strongly implies that negative consequences will result if women engage in which behavior in the future?

A) Using their newfound political power to amass wealth that is comparable to the wealth possessed by men

B) Attempting to exercise undue influence over the voting decisions of others

C) Advocating for the right to vote to be extended to individuals who do not possess it

D) Casting votes that are not informed by consideration of whether those votes would benefit society as a whole

36

As used in line 67, "universal" most nearly mean

A) all-inclusive.

B) inescapable.

C) well-rounded.

D) collective.

CONTINUE

37

Based on Passage 2, Harper would most likely agree that denying women the right to vote may have the undesirable effect of

A) discouraging civic-minded individuals from engaging in activism.

B) undermining the well-being of all citizens, regardless of gender.

C) exacerbating political uncertainty at a crucial time in national history.

D) intensifying tensions over the role personal morality should play in politics.

38

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

A) Lines 59-61 ("Political . . . waters")

B) Lines 61-66 ("I am . . . exerted")

C) Lines 76-78 ("The ballot . . . foretell")

D) Lines 78-83 ("Great . . . fettered")

39

Which choice best identifies a difference in how Stanton (Passage 1) and Harper (Passage 2) view the prospects for woman suffrage?

A) Stanton suspects that it may take many years for women to attain suffrage, while Harper predicts that they will attain it in the near future.

B) Stanton feels that women can attain suffrage through their own efforts, while Harper believes that they can do so only with the shared efforts of men.

C) Stanton worries that women may never attain voting rights comparable to those possessed by men, while Harper is confident that women will attain full suffrage.

D) Stanton believes that woman suffrage can be attained only through active political struggle, while Harper regards woman suffrage as virtually inevitable.

40

Based on Passage 1, how would Stanton most likely respond to Harper's assertion in lines 68-72 ("I do not believe that . . . woman")?

A) She would agree that campaigning for the right to vote is the most effective way for women to demonstrate their capacity to make intelligent political decisions.

B) She would dismiss concerns that woman suffrage could have the unintended effect of eroding certain social privileges that women currently possess.

C) She would assert that not only is it unwise to deny responsible women the right to vote when irresponsible men may exercise it, but it is also fundamentally unjust.

D) She would express hope that woman suffrage will influence men to approach the act of voting with greater dignity and self-control than they currently display.

41

Which choice in Passage 1 provides the best evidence for the answer to the previous question?

A) Lines 14-18 ("But to . . . submitted to")

B) Lines 22-25 ("The great . . . him")

C) Lines 26-29 ("But, say . . . certainly")

D) Lines 29-33 ("Where . . . twenty-one")

42

Based on the passages, both Stanton and Harper regard political culture in the United States as being characterized by

A) preferential treatment of wealthy individuals.

B) extreme and objectionable behavior.

C) feigned concern for women's well-being.

D) indifference about the nation's future.

CONTINUE

Questions 43-52 are based on the following passage.

This passage is adapted from Charles Menzel, "Solving Ecological Problems." ©2012 by The University of Chicago. Macaques are a widespread genus of monkeys.

It is possible that macaques (and other animals) organize their searches for food partly by the spatial proximity of food items to environmental structures. I call this the "structure-guided" search method. The class of structures the animal inspects might vary depending on where the animal has discovered an initial food item. For example, if a macaque finds a piece of highly preferred food within a streambed, it might restrict its subsequent search to locations within the same streambed. Alternatively, if it finds a new type of highly preferred food next to a fern, then it might inspect other ferns in preference to rocks, trees, or logs. In the natural habitat of macaques, foods can be associated spatially with visible borders such as stream edges or forest edges, or with discrete structures such as trees of a particular species.

Alternatively, macaques and other primates might organize their searches by distance from the food location. According to what I have labeled the "spatial gradients" search method, available space is homogeneous and unstructured. It is an undifferentiated area around a reinforcer. The animal allocates its search effort to concentric rings around a food item according to some decreasing function of the distance from the item. After finding food, the animal might slow down, turn more quickly, and inspect any location that lies within a reasonable distance of an initial find, regardless of the position of visible environmental structures. For example, after a crow encounters an eggshell on the beach, it will search in a meandering walk up to about two meters from the site of its original find. Other birds, fish, and insects also show increased turning and area-restricted search after finding a resource.

To test whether macaques use the structure-guided method, I studied the searching behavior of captive-born long-tailed macaques in an 880-square-meter outdoor enclosure at the Bokengut field station, University of Zürich. The enclosure contained tree trunks, grass fields, rock fields, elevated walkways, and visual barriers. Food was hidden in the macaques' enclosure according to one of several different types of rules. If macaques used the structure-guided method, they were expected to extrapolate their search within dimensions of environmental structure that in their natural environment would normally be correlated with the distribution of food, such as along visible borders, within visible surface areas, within particular height levels, and within discrete visible objects of the same type.

I found that if a macaque detected a single visible pile of food next to a continuous visible border, such as a border between a grass field and a sand field or between a sand field and a stone field, the animal restricted much of its subsequent manual inspections to other locations along the same border. Significantly, the animals searched along visible borders and found hidden food from the very first trial in the experiment, thus indicating that they were not relying on slow, gradual learning within the experiment to solve novel problems of this general type. If an animal found food next to a single discrete visible object (e.g., a log, a stone, or a vertical pole) it might walk several meters to another object of the same general type and inspect it manually. Again, the monkeys extended their search from a single baited object to other, similar-looking objects from the very first trial in their experiment. Moreover, if the macaques found a favored food, banana, next to a single object of type A (e.g., a yellow stone), and found a less favored food, carrot, next to a single object of type B (e.g., a low post), they inspected other locations of type A more often than they inspected other locations of type B. Macaques also found hidden food items much more quickly when the items were hidden according to a "natural" rule, along a visible border or next to visible matching objects, than when they were hidden according to a relatively "unnatural" rule—that is, at regular intervals of one meter or three meters along an arbitrarily oriented, invisible straight line. Further tests showed that the macaques extended their search within visible surface areas, within specific height levels, and in directions associated with a change in food visibility. These results are in strong agreement with the structure-guided hypothesis.

CONTINUE

43

Which choice best states the central claim of the passage?

A) Macaques circle predefined areas carefully and methodically in order to locate highly preferred foods.

B) Macaques improve the success rate of their search for food in proximity to natural landmarks over time.

C) Macaques concentrate on finding food near environmental structures similar to ones that have yielded food in the past.

D) Macaques restrict their search for food to particular geographical areas that contain the greatest amount of highly preferred produce.

44

Which choice best states the relationship between the first paragraph (lines 1-16) and the second paragraph (lines 17-35) of the passage?

A) The second paragraph offers empirical support for the theory outlined in the first paragraph.

B) The second paragraph proposes a different explanation than the proposition presented in the first paragraph.

C) The second paragraph provides a series of research results that question the assumptions of the first paragraph.

D) The second paragraph describes in detail the nature of the environments briefly alluded to in the first paragraph.

45

The author uses the phrase "highly preferred" in lines 8 and 11 primarily to

A) clarify the method macaques use when establishing habitats.

B) emphasize similarities between the behavior of macaques and that of other animals.

C) specify the circumstances in which a particular macaque behavior can be expected.

D) indicate how macaques process certain visible features of their habitats.

46

The main purpose of the third paragraph (lines 36-52) is to

A) explain the rationale for the design of an experiment.

B) present evidence in support of a scientific explanation.

C) outline the details of a future research study.

D) compare two ways of approaching a scientific puzzle.

47

It can reasonably be inferred from the passage that the outdoor enclosure was suitable for the author's experiment because it

A) had been utilized successfully for prior research.

B) offered areas in which food was easy to locate.

C) contained a variety of natural structures.

D) attracted both macaques and other mammals.

48

Based on the second paragraph (lines 17-35), spatial gradients searches can best be described as

A) distracted.

B) orderly.

C) cautious.

D) urgent.

CONTINUE

49

Which choice represents an aspect of the author's experiment that was fundamental to reaching his conclusions?

A) The different foods used as bait in the experiment needed to tempt macaques to different degrees.

B) The macaques needed to be exposed to the enclosure prior to the experiment.

C) A researcher collecting data in the experiment needed prior experience observing macaques in the wild.

D) The environments used in the experiment needed to be able to support the nutritional needs of multiple macaques.

50

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

A) Lines 1-3 ("It is . . . structures")

B) Lines 13-16 ("In the . . . species")

C) Lines 42-44 ("Food . . . rules")

D) Lines 70-76 ("Moreover . . . locations of type B")

51

According to the passage, the efficiency with which macaques locate food is improved if the food is located

A) near an object similar in color to the food.

B) next to a discernible natural boundary.

C) at predictable distances in an environment.

D) close to the center of a visual barrier.

52

As used in line 88, "strong" most nearly means

A) near total.

B) severe.

C) highly effective.

D) aggressive.

STOP

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

CollegeBoard SAT®

OCTOBER 2, 2021
US

The SAT®

Test Book

IMPORTANT REMINDERS

1

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

2

Sharing any questions with anyone is a violation of Test Security and Fairness policies and may result in your scores being canceled.

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. 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."

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 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 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 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 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.

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 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 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 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 dinner."

CONTINUE

"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."

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 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 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, 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. 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

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.

2

One purpose of lines 32-35 ("Later . . . hospital") is to

A) demonstrate Ifi's increasing appreciation of nature.

B) contrast Ifi's past with the present situation.

C) provide a glimpse into Ifi and Job's future life together.

D) hint at Ifi's growing uneasiness about her husband.

3

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.

4

The description of the snowflakes' "defiance" in line 39 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.

CONTINUE

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 (line 54), 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 55 ("He gave . . . look"), which choice provides the best evidence for the answer to the previous question?

A) Lines 61-62 ("They . . . fence")

B) Lines 72-74 ("At first . . . snow")

C) Lines 77-78 ("When . . . well")

D) Lines 83-85 ("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 45-46 ("She would . . . Aunty")

B) Lines 47-48 ("Instead . . . cousins")

C) Lines 57-58 ("Darling . . . quarrels")

D) Lines 59-60 ("Okie . . . home")

10

The description of Ifi's eyes as "large and bright" (line 83) 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.

CONTINUE

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 example, as a woman lawyer or a woman judge 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 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 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 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 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 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 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 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

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 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 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 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 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 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 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].

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 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

CONTINUE

90 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 3-6 ("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

As used in line 85, "simply" most nearly means

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

15

In the context of Sotomayor's speech, the sentences in lines 89-94, 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.

16

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.

CONTINUE

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 61-64)?

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 34-36 ("That . . . before us")

CONTINUE

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.

CONTINUE

Figure 1

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

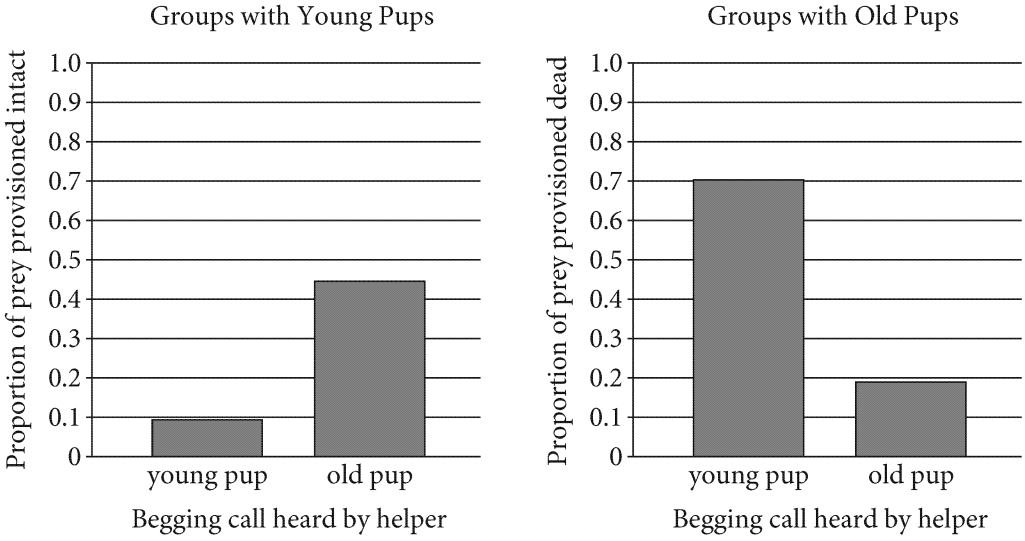
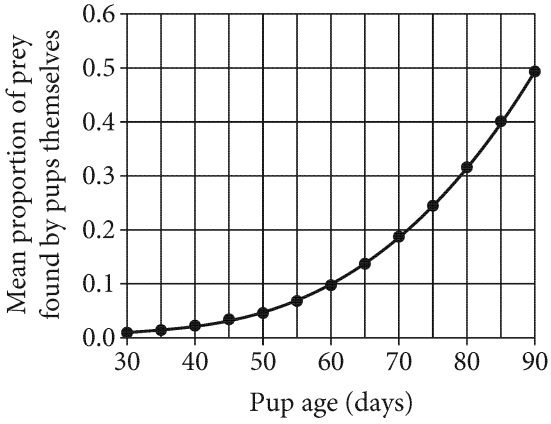


Figure 2

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.

CONTINUE

21

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.

22

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 41-45 ("Indeed . . . struggling")

D) Lines 49-51 ("However . . . skills")

23

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.

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 pubs 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.

CONTINUE

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 here 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.

CONTINUE

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 Luddites[1] 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

CONTINUE

32

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.

33

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 30-32 ("Data . . . Netherlands")

C) Lines 46-47 ("Using . . . results")

D) Lines 55-57 ("What . . . workers")

34

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.

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.

CONTINUE

38

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

A) Lines 11-16 ("Mr Clark . . . declines")
B) Lines 44-45 ("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.

CONTINUE

Questions 43-52 are based on the following passage.

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 ebulliant 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.

CONTINUE

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.

CONTINUE

49

As used in line 44, "marked" most nearly means

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

50

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.

51

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

A) Lines 77-80 ("Meanwhile . . . Pacific")
B) Lines 80-84 ("In parts . . . farmlands")
C) Lines 84-85 ("Quite . . . ocean")
D) Lines 85-88 ("The iron . . . productive")

52

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.

STOP

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

CollegeBoard SAT®

OCTOBER 2, 2021
INTERNATIONAL

The SAT®

Test Book

IMPORTANT REMINDERS

1

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

2

Sharing any questions with anyone is a violation of Test Security and Fairness policies and may result in your scores being canceled.

Reading Test

65 MINUTES, 52 QUESTIONS

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

DIRECTIONS

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

Questions 1-10 are based on the following passage.

This passage is adapted from Oscar Hijuelos, *The Fourteen Sisters of Emilio Montez O'Brien*. ©1993 by Oscar Hijuelos. Mariela Montez and her husband Nelson O'Brien live in a small town in Pennsylvania with their fifteen children.

When it came to music, Mariela would hear a ragtime piece out the saloon doors, the "Cubanola Glide," and never know that it was about Cuba, as it sounded like so many other rinky-dinky piano rags of that time, and in the days when Nelson had the house wired for electricity and purchased, like half of the country, their very own Atwater Kent superheterodyne crystal-radio set, she might cruise the stations and come across a performance of the Havana Symphony conducted by the composer Ernesto Lecuona, his splendid melodies borne on a spectrally guided wavelength, the music fading in and out, the voice of an announcer commenting from radio station CMCQ in Havana in a storm of staticky convolutions and atmospheric pops, as if spirits, capricious and loud, were gushing, whistling, and shuddering like the winds—the voice announcing the words "*de la Habana, Cuba*," sounding as if it were coming from far away, as far away as the planet Mars.

But that was all, for the most part, of Cuba for many years. She tried to keep the notion of it alive in her daughters, especially the oldest, describing to her with true sweetness the substance of her family's life there before the war in 1895 had disrupted it, a serene petit-bourgeois life, her father Emilio Montez—after whom her only son, Emilio Montez O'Brien, would be named—being a farmer and merchant of adequate means. He owned two farms and a stable in the city of Santiago, the farms razed to the ground during the war. Her stories of her life in that household before the war sometimes lingered in the minds of the sisters, so that at night, when thinking about their mother and her past life, the life she had lived before any of them was born, they would feel certain changes taking place in the household. Even though they were living just off a road called Abelmyer, some few miles outside of a small Pennsylvania town, the notion of Cuba, like their own femininity, exerted a powerful pull. Sometimes at night they would think about their mother's Cuba and they would have the sensation that the rooms of the house had been turned into a rain forest, that orchids were budding out of the walls, that lianas were hanging off the ceiling beams, that one could hear in the distance the ocean and smell the sea foam—all coming on waves of unconscious speculation, thoughts buzzing in the halls and floating through the doors and from mind to mind of each sleeping sister, arms wrapped about one another, the sisters flinching and breathing loudly—a sigh in the middle of the night—Cuba in the air, the atmosphere of a house in the tropics, sunlight glaring through the windows though it was the dead of darkness.

There was also, at the same time, the Irish influence of their father Nelson, which certain of the sisters, most particularly the younger ones, more closely identified with. It was a more understandable

CONTINUE

mystery, as they had very few ideas what Ireland was like. Though their father was not a talkative man, at least the nature of his language, English—they knew nothing of the Gaelic tongue—did not mystify them the way the Spanish spoken by the older sisters with their mother did, falling upon their ears like the nearly Babylonian chitchat of songbirds. The name O'Brien had been their main legacy, that and fair complexions and the freckles that burst over their faces in the spring and the blue eyes and the feeling that far away, in a distant land—not Cuba, however—there were others like themselves. It was a world far beyond, about which they knew nothing, the principles of its history, as with Cuba, reduced to a few names from schoolbooks, the most prominent being that of Parnell, and the lore of the place remembered by the shamrock and notes out of the books which would say things like "And it is said that if one kisses the Blarney Stone, then that person will be blessed by luck." And they had those few visual clues as to what their father had left behind in Ireland—no photographs save for one, of a beautiful young woman, life brimming within her, kept on the wall in a gold-leaf oval frame, their Aunt Kate, Nelson's sister, they'd been told, with whom their father had first traveled to America in 1896, and then there was that print, of a lovely house in an emerald meadow in the early-morning mist, the print captioned, "A house, Shannon, Ireland," which the daughters had presented their Poppy for Christmas one year, 1922.

1

In lines 12-20 ("the music . . . Mars"), the narrator's account of the radio broadcast mainly serves to

A) establish that Mariela believes her family will never return to Cuba.

B) suggest that Mariela feels isolated from the country of her childhood.

C) underscore Mariela's fascination with radio technology.

D) imply that Mariela rarely thinks about Cuba anymore.

2

It can most reasonably be inferred from the passage that when Mariela discusses her youth with her daughters, she is selective in the way that she

A) minimizes difficulties faced by her family.

B) explains controversial events in Cuba's history.

C) portrays her father's professional accomplishments.

D) encourages them to learn from her past mistakes.

3

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

A) Lines 21-22 ("But that . . . years")

B) Lines 22-29 ("She tried . . . means")

C) Lines 29-31 ("He owned . . . war")

D) Lines 37-40 ("Even . . . pull")

4

As used in line 24, "substance" most nearly means

A) object.

B) effect.

C) essence.

D) burden.

5

The description of the effect of Mariela's stories on her daughters (lines 31-37) marks a shift in the passage from

A) the perspective of the older daughters to that of their younger sisters.

B) the daughters' perspective during childhood to their views as adults.

C) Mariela's perspective to that of her parents.

D) Mariela's perspective to that of her daughters.

CONTINUE

6

Which choice best supports the idea that over time Mariela increasingly communicated with some of her children in the language of their surrounding community?

A) Lines 41-47 ("Sometimes . . . foam")
B) Lines 47-55 ("all . . . darkness")
C) Lines 59-61 ("It was . . . like")
D) Lines 61-66 ("Though . . . songbirds")

7

The narrator's use of the words "buzzing" (line 48) and "glaring" (line 54) to describe the sisters' impressions primarily serves to

A) heighten a general feeling of apprehension.
B) convey the vividness of certain imaginary conditions.
C) contrast with the barrenness of life in Pennsylvania.
D) suggest the improbable nature of Mariela's stories.

8

It can most reasonably be inferred from the passage that Nelson chooses not to discuss his life in Ireland with his daughters mainly because he

A) prefers to confide in Mariela.
B) compares his daughters unfavorably with Kate.
C) refrains from extended conversations in general.
D) resents intrusive questions about his past.

9

The narrator presents the "shamrock" (line 76) and the "Blarney Stone" (line 78) as examples of

A) Irish superstitions that Americans have adopted.
B) traditions in Ireland that the younger sisters find amusing.
C) symbols of Ireland that are familiar to the younger sisters.
D) Irish mythology known to readers throughout the world.

10

The passage indicates that unlike the print of the house in Shannon, Ireland, the photograph of Aunt Kate is

A) a treasured memento from Nelson's past.
B) an image portraying life in Ireland.
C) of little interest to the younger sisters.
D) a symbol of Nelson's desire to return to Ireland.

CONTINUE

Questions 11-20 are based on the following passages.

Passage 1 is adapted from Thomas Carlyle, "Signs of the Times." Originally published in 1829. Passage 2 is adapted from Oscar Wilde, "Art and the Handicraftsman." Originally published in 1908, from manuscripts written in the 1880s. Carlyle was a British essayist, and Wilde was an Irish author.

Passage 1

Were we required to characterise this age of ours by any single epithet, we should be tempted to call it, not an Heroical, Devotional, Philosophical, or Moral Age, but, above all others, the Mechanical Age. It is the Age of Machinery, in every outward and inward sense of that word; the age which, with its whole undivided might, forwards, teaches and practises the great art of adapting means to ends. Nothing is now done directly, or by hand; all is by rule and calculated contrivance. For the simplest operation, some helps and accompaniments, some cunning abbreviating process is in readiness. Our old modes of exertion are all discredited, and thrown aside. On every hand, the living artisan is driven from his workshop, to make room for a speedier, inanimate one. The shuttle drops from the fingers of the weaver, and falls into iron fingers that ply it faster. The sailor furls his sail, and lays down his oar; and bids a strong, unwearied servant, on vaporous wings, bear him through the waters. . . . We remove mountains, and make seas our smooth highways; nothing can resist us. We war with rude Nature; and, by our resistless engines, come off always victorious, and loaded with spoils.

What wonderful accessions have thus been made, and are still making, to the physical power of mankind; how much better fed, clothed, lodged and, in all outward respects, accommodated men now are, or might be, by a given quantity of labour, is a grateful reflection which forces itself on every one. What changes, too, this addition of power is introducing into the Social System; how wealth has more and more increased, and at the same time gathered itself more and more into masses, strangely altering the old relations, and increasing the distance between the rich and the poor, will be a question for Political Economists, and a much more complex and important one than any they have yet engaged with.

. . . These things, which we state lightly enough here, are yet of deep import, and indicate a mighty change in our whole manner of existence. For the same habit regulates not our modes of action alone, but our modes of thought and feeling. Men are grown mechanical in head and in heart, as well as in hand. They have lost faith in individual endeavour, and in natural force, of any kind.

Passage 2

Do not think that the commercial spirit which is the basis of your life and cities here is opposed to art. Who built the beautiful cities of the world but commercial men and commercial men only? Genoa built by its traders, Florence by its bankers, and Venice, most lovely of all, by its noble and honest merchants. . . .

Do you think, for instance, that we object to machinery? I tell you we reverence it; we reverence it when it does its proper work, when it relieves man from ignoble and soulless labour, not when it seeks to do that which is valuable only when wrought by the hands and hearts of men. Let us have no machine-made ornament at all; it is all bad and worthless and ugly. And let us not mistake the means of civilisation for the end of civilisation; steam-engine, telephone and the like, are all wonderful, but remember that their value depends entirely on the noble uses we make of them, on the noble spirit in which we employ them, not on the things themselves.

It is, no doubt, a great advantage to talk to a man at the Antipodes through a telephone; its advantage depends entirely on the value of what the two men have to say to one another. If one merely shrieks slander through a tube and the other whispers folly into a wire, do not think that anybody is very much benefited by the invention.

The train that whirls an ordinary Englishman through Italy at the rate of forty miles an hour and finally sends him home without any memory of that lovely country but that he was cheated by a courier at Rome, or that he got a bad dinner at Verona, does not do him or civilisation much good. But that swift legion of fiery-footed engines that bore to the burning ruins of Chicago[1] the loving help and generous treasure of the world was as noble and as beautiful as any golden troop of angels that ever fed the hungry and clothed the naked in the antique

CONTINUE

85 times. As beautiful, yes; all machinery may be beautiful when it is undecorated even. Do not seek to decorate it. We cannot but think all good machinery is graceful, also, the line of strength and the line of beauty being one.

[1] The Great Chicago Fire in 1871 destroyed a large portion of the city.

11

In the context of Passage 1, Carlyle's use of the phrase "not an Heroical, Devotional, Philosophical, or Moral Age" (lines 3-4) is primarily meant to convey the idea that the Mechanical Age

A) is more impressive than previous historical periods.
B) has several different labels that can be accurately applied to it.
C) is less noble in character than previous ages.
D) is characterized by practicality.

12

In Passage 1, Carlyle implies that the use of machines has

A) replaced individual efforts with systematized processes.
B) contributed to improvements in long-standing educational and medical institutions.
C) caused people to emigrate in search of gainful employment.
D) led to a deterioration in the quality of manufactured products.

13

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

A) Lines 8-12 ("Nothing . . . readiness")
B) Lines 24-29 ("What . . . every one")
C) Lines 38-40 ("These . . . existence")
D) Lines 40-42 ("For . . . feeling")

14

As used in line 11, "cunning" most nearly means

A) clever.
B) deceitful.
C) manipulative.
D) unexpected.

15

According to Carlyle in Passage 1, the Mechanical Age has led to changes in society that include

A) a shift in philosophical and religious principles.
B) greater economic disparity between the wealthy and the poor.
C) a preoccupation with acquiring material possessions.
D) widespread hostility toward artisans who continue to make products by hand.

16

In Passage 2, lines 46-52 ("Do not . . . merchants") most strongly suggest that Wilde's perspective is that of someone who

A) believes that major trading centers in Europe owe their prosperity to innovative financiers.
B) attempts to restore to honor the reputations of certain discredited merchants.
C) seeks to correct a misapprehension about the compatibility of art and business.
D) defends businessmen accused of failing to support civic art and great architecture.

CONTINUE

17

In the last paragraph of Passage 2, what is the main effect of the references to a "swift legion of fiery-footed engines" (line 80) and a "golden troop of angels" (line 83)?

A) To highlight the qualities of industriousness and kindness that characterize the way people should behave during a tragedy

B) To suggest that the beauty and grace of earlier times is not compatible with modern business

C) To draw attention to the increasing pace of events in modern life

D) To make a favorable comparison between a charitable act facilitated by modern technology and charitable acts performed long ago

18

Which statement best describes the relationship between the passages?

A) Passage 1 describes a civilization in decline, while Passage 2 repudiates this view.

B) Passage 1 scorns the influence of a new technology, while Passage 2 is cautiously optimistic about this influence.

C) Passage 1 questions new ideas that erode traditions, while Passage 2 explains their necessity.

D) Passage 1 raises concerns about the rise of mechanization, while Passage 2 embraces it as long as certain criteria are met.

19

Based on Passage 2, how would Wilde most likely respond to Carlyle's concern expressed in lines 12-20 of Passage 1 ("Our . . . waters")?

A) By suggesting that economic success is more important to society than are the concerns of individual workers

B) By asserting that technology connects the world far more effectively than individual artisans ever could

C) By pointing out that much of the work that technology eliminates is difficult and monotonous

D) By arguing that the market already has safeguards in place that will make it less likely that workers will be negatively affected

20

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

A) Lines 46-49 ("Do not . . . only")

B) Lines 54-58 ("I tell . . . men")

C) Lines 67-70 ("It is . . . another")

D) Lines 70-73 ("If one . . . invention")

CONTINUE

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

This passage is adapted from Laurel Hamers, "Eggshell Nanostructure Protects a Chick and Helps It Hatch." ©2018 by Society for Science & the Public.

A chicken eggshell has a tricky job: It must protect a developing chick, but then ultimately let the chick break free. The secret to its success lies in its complex
Line nanostructure—and how that structure changes as
5 the egg incubates.

Chicken eggshells are about 95 percent calcium carbonate by mass. But they also contain hundreds of different kinds of proteins that influence how that calcium carbonate crystallizes. The interaction
10 between the mineral crystals and the proteins yields an eggshell that's initially crack-resistant, while making nanoscale adjustments over time that ultimately let a chick peck its way out, researchers report online in *Science Advances*.

15 Researchers used a beam of ions to cut thin cross sections in chicken eggshells. They then analyzed the shells with electron microscopy and other high-resolution imaging techniques. The team found that proteins disrupt the crystallization of calcium
20 carbonate, so that what seems at low resolution to be neatly aligned crystals is actually a more fragmented jumble. This misalignment can make materials more resilient: Instead of spreading unimpeded, a crack must zig and zag through scrambled crystals.

25 Lab tests back up that finding: The researchers added a key shell-building protein called osteopontin to calcium carbonate to yield crystals like those seen in the eggshells. The presence of that protein makes calcium carbonate crystals form in a nanostructured
30 pattern, rather than smooth and even crystal, study coauthor Marc McKee, a biomineralization researcher at McGill University in Montreal, and colleagues found.

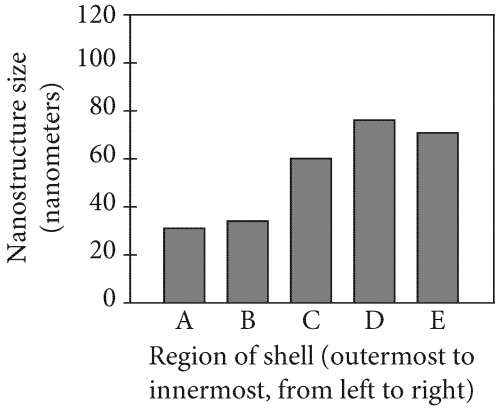
The team also found structural variation on a
35 minute scale throughout the eggshell, though it's only about a third of a millimeter thick. Inner layers have less osteopontin, leading to bigger nanostructures. That may make the inner shell less resilient than the outer shell, which makes sense,
40 McKee says. The outer shell needs to be hard enough to protect the chick, while the inner shell nourishes the developing chick.

Over time, the inner layers of the shell dissolve through a chemical reaction, releasing calcium to
45 build a chick's developing bones. The eggshell undergoes structural changes to facilitate that process, McKee and his colleagues found.

The researchers compared fertilized eggs incubated for 15 days to nonfertilized eggs.
50 Over time, the nanostructures toward the inner shell became smaller in fertilized eggs, but remained the same in the nonfertilized eggs. The change gives the inside of the eggshell a bumpier texture, and by extension, more surface area. That provides more
55 space for that shell-dissolving chemical reaction to take place, the researchers propose. The reaction also thins the shell overall, making it easier for a chick to break through from the inside when it's time to hatch.

60 Advances in imaging technology are helping scientists find new details like this even in objects as familiar as a chicken eggshell, says Lara Estroff, a materials scientist at Cornell University who wasn't part of the research. In connecting the eggshell's
65 functionality with its fine-grain structure, the new study could provide inspiration for designing new kinds of materials with specific properties.

Atomic Force Microscopy (AFM) Analysis of the Nanostructure of Chicken Eggshell (*G. gallus*) by Region



Adapted from Dimitra Athanasiadou et al., "Nanostructure, Osteopontin, and Mechanical Properties of Calcitic Avian Eggshell." ©2018 by Dimitra Athanasiadou et al.

CONTINUE

21

The main purpose of the passage is to

A) discuss research that focuses on the structure of eggshells.

B) promote the use of nanostructure technology in new materials.

C) investigate the role of nanostructures in different natural environments.

D) explore ways to make eggshells more resistant to cracking.

22

As used in line 1, "tricky" most nearly means

A) unrealistic.

B) deceptive.

C) unstable.

D) difficult.

23

Which choice best summarizes the information in the third paragraph (lines 15-24)?

A) The researchers examined the layers of an eggshell and determined that the calcium carbonate crystals are not uniformly arranged.

B) The researchers proposed an experiment to identify the components of the various layers of an eggshell.

C) The researchers carried out an experiment to find out what percentage of an eggshell is composed of calcium carbonate.

D) The researchers concluded that the presence of neatly aligned calcium carbonate crystals prevents an eggshell from cracking before incubation is complete.

24

Based on the passage, which assumption did the researchers make in designing the study?

A) Using high-resolution imaging techniques would enable them to determine which proteins are most abundant in chicken eggshells.

B) Examining thin cross sections of chicken eggshells would reveal what percentage of the shell is composed of calcium carbonate.

C) Combining a particular protein with calcium carbonate would simulate an important effect produced by the proteins found in chicken eggshells.

D) Adjusting the protein levels in chicken eggshells would allow them to enhance crack resistance in eggshells.

25

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

A) Lines 15-16 ("Researchers . . . eggshells")

B) Lines 16-18 ("They . . . techniques")

C) Lines 18-22 ("The team . . . jumble")

D) Lines 25-28 ("The researchers . . . eggshells")

26

Which choice regarding resistance to cracking can most reasonably be inferred from the passage?

A) Shells with relatively high levels of proteins tend to be less resistant to cracking than shells with lower levels are.

B) Shells with relatively large nanostructures tend to be less resistant to cracking than shells with smaller nanostructures are.

C) Shells with more neatly aligned calcium carbonate crystals tend to be more resistant to cracking than shells with less neatly aligned calcium carbonate crystals are.

D) Shells with bumpier surface textures tend to be more resistant to cracking than shells with smoother surface textures are.

CONTINUE

27

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

A) Lines 9-14 ("The interaction . . . *Advances*")
B) Lines 22-24 ("This . . . crystals")
C) Lines 34-36 ("The team . . . thick")
D) Lines 36-40 ("Inner . . . says")

28

As used in line 60, "advances" most nearly means

A) improvements.
B) approaches.
C) motions.
D) allowances.

29

The last paragraph mainly serves to

A) provide a summary of the findings described in the passage.
B) propose a follow-up study about the nanostructures of eggshells.
C) offer an alternative explanation for how nanostructures form in eggshells.
D) suggest a practical application for the research discussed in the passage.

30

According to the graph, which two regions of a chicken eggshell are closest in nanostructure size?

A) Regions A and B
B) Regions A and C
C) Regions A and D
D) Regions A and E

31

Based on the passage, which region of shell depicted in the graph is likely to have the highest level of osteopontin?

A) Region A
B) Region C
C) Region D
D) Region E

CONTINUE

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

This passage is adapted from Marco A. Palma, "Research on How Self-Control Works Could Help You Stick with New Year's Resolutions." ©2018 by The Conversation US, Inc.

For decades, studies of self-control in short-term decision-making have led to two clear, but seemingly contradictory, results.

Line
5 One model suggested that self-control is a finite resource that can get used up if you lean on it too heavily, like a battery that loses its charge over time. Each little demonstration of self-control throughout the day ends up exhausting the limited reserves.

The alternative model suggested that exercising
10 self-control can help you build up the skill like a snowball that gets bigger as it builds momentum rolling downhill.

Part of the problem has been how hard it is to conduct behavioral research. Traditional methods
15 assume that test subjects fully understand the questions they're asked and give honest answers. Unfortunately, researchers had no practical way of knowing whether this was the case, or whether they actually measured what they intended to.

20 But here at the nation's largest biometrics lab, my Texas A&M colleagues and I figured out a new way to investigate the question that didn't rely on just what volunteers report to us.

We designed a two-part experiment. First, we
25 asked subjects to focus on a red bull's-eye at the bottom of a computer screen for either six or 30 minutes. This task requires volunteers to exert self-control—it's tempting to look away from the boring, unchanging bull's-eye to the animated video
30 playing elsewhere on the screen.

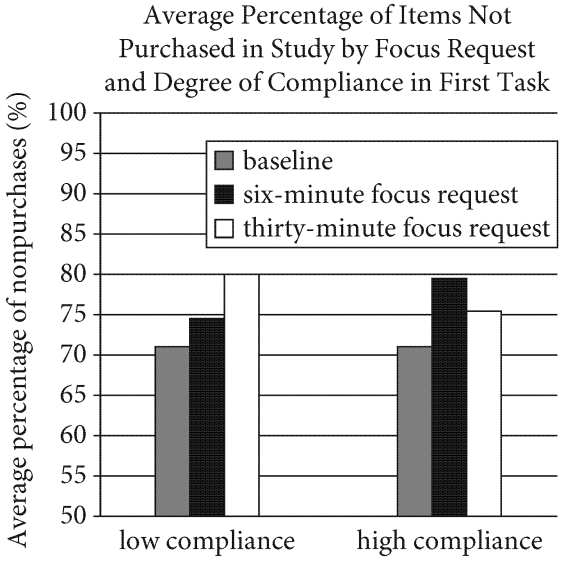
Then subjects participated in a second laboratory task meant to measure impulsive buying: They could conserve a real US $5 cash endowment or purchase several household items on-site they hadn't been
35 looking to obtain. The task is analogous to going to the store and buying products that aren't on your list. The idea is that self-control helps individuals rein in these impulse purchases.

Our innovation was that we did not have to
40 assume people fully complied with the video-watching task—we were actually able to measure it via their physiological responses. By tracking eye movements, we could quantify very precisely when participants stuck to staring at the bull's-eye—that is,
45 when their self-control was keeping them on task. We also measured facial expression and brain activity for a clearer understanding of what was going on with each subject.

For a while, most people could focus on the
50 boring bull's-eye. But they'd hit a fatigue point. After that, if subjects hung in there and still stuck with the task, they ended up exhausting their self-control "battery." We could see this by looking at how many impulse buys they made in the second half
55 of the study. If they'd pushed past the fatigue threshold in the previous task, they showed less self-control and ended up making more impulsive purchases. This pattern was shown in both what they "bought" in our experiment and also in the brain:
60 The prefrontal cortex showed patterns indicative of impulse-buying behavior.

On the other hand, subjects who eased off once they'd reached the fatigue threshold had a different experience. They remained in the "snowball" stage of
65 self-control—they practiced the skill a bit, but didn't overdo it to the point of exhaustion. In the next task, their brains didn't exhibit the typical impulse-buying activity patterns. Exercising self-control on the bull's-eye task, but not overdoing it, led to more
70 self-control in our second task. These subjects did better at controlling impulse purchases than the other group of subjects who didn't have the initial bull's-eye-watching session that turned out to rev up self-control.

CONTINUE



Adapted from Marco A. Palma et al., "Self-Control: Knowledge or Perishable Resource?" ©2017 by Marco A. Palma et al.

32

The main purpose of the passage is to

A) discuss research that helps explain a growing trend in findings about self-control.

B) present a study that helps resolve a long-standing question about self-control.

C) compare the effectiveness of two different methods of assessing self-control.

D) describe an experiment designed to find ways that people can increase self-control.

33

In the second and third paragraphs (lines 4-12), the author refers to a battery and a snowball most likely to

A) support the validity of behavioral models by showing the validity of analogous models.

B) emphasize the contrast between psychological theories by presenting a familiar natural contrast.

C) identify similarities between two accounts of motivation that are typically regarded as distinct.

D) clarify hypothesized mental processes by comparing them to accessible physical processes.

34

As used in line 7, "demonstration" most nearly means

A) explanation.

B) protest.

C) act.

D) confirmation.

35

Based on the passage, the author would most likely agree that self-control studies prior to the one he conducted with his colleagues had which problem?

A) The studies relied in part on data that may have been inaccurate, and thus the studies may have overstated or understated participants' self-control.

B) The studies typically used methods that exhausted participants, and thus the studies may have made participants appear to have less self-control than they actually did.

C) The studies were designed in ways that may have encouraged participants to show more self-control than the participants would show in nonexperimental settings.

D) The studies tended to include participants who were not representative of the populations being studied with regard to their level of self-control.

CONTINUE

36

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

A) Lines 1-3 ("For . . . results")
B) Lines 4-8 ("One . . . reserves")
C) Lines 13-14 ("Part . . . research")
D) Lines 14-19 ("Traditional . . . intended to")

37

Based on the passage, the design of the second task in the experiment was most likely intended to ensure that participants would

A) believe that they could retain the cash endowment even if they made purchases.
B) have good reason to refrain from making purchases.
C) recognize that making purchases indicated a lack of self-control.
D) make purchases only if they fully complied with the first task.

38

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

A) Lines 31-35 ("Then . . . obtain")
B) Lines 37-38 ("The idea . . . purchases")
C) Lines 39-42 ("Our . . . responses")
D) Lines 42-45 ("By tracking . . . task")

39

Based on the findings presented in the passage, self-control is most analogous to a

A) muscle that grows stronger the more frequently and intensely it is exercised.
B) singing voice that benefits from a moderate warm-up but weakens if used too much in a short period.
C) knife that grows dull with regular use but can be temporarily improved by being thoroughly sharpened.
D) natural deposit of oil that cannot be recovered once it is used.

40

According to the figure, which group, on average, purchased the lowest percentage of items?

A) The baseline group
B) The high compliance participants in the six-minute focus request group
C) The high compliance participants in the thirty-minute focus request group
D) The low compliance participants in the thirty-minute focus request group

CONTINUE

41

If the "alternative model" (line 9) were correct, how would the data for the high compliance group most likely differ from the actual data for the high compliance group shown in the figure?

A) The average percentage of nonpurchases for the baseline group would be higher than 75%.

B) The average percentage of nonpurchases for the six-minute focus request group would be lower than 70%.

C) The average percentage of nonpurchases for the six-minute focus request group would be lower than the average percentage of nonpurchases for the baseline group.

D) The average percentage of nonpurchases for the thirty-minute focus request group would be higher than the average percentage of nonpurchases for the six-minute focus request group.

42

Based on the passage and the figure, the researchers would most likely explain the difference in the data shown for the two thirty-minute focus request groups by asserting that

A) the low compliance participants were able to maintain self-control in the second part of the experiment as a result of having especially high fatigue thresholds.

B) the low compliance participants exhausted their self-control early and thus had none to maintain during the second part of the experiment.

C) the high compliance participants depleted their self-control by continuing to focus beyond their fatigue thresholds in the first part of the experiment.

D) the high compliance participants had diminished self-control because they did not sufficiently practice the skill during the first part of the experiment.

Questions 43-52 are based on the following passage.

This passage is adapted from Hal Whitehead and Luke Rendell, *The Cultural Lives of Whales and Dolphins*. ©2015 by The University of Chicago. Some humpback whales practice lobtail feeding, in which they tail slap the surface to concentrate or confuse prey; bubble-cloud feeding is the practice of surrounding prey with netlike masses of bubbles.

In the waters off Cape Cod, lobtail feeding was first seen in 1980, by just one of the 150 feeding humpback whales observed that year. In 1981, of the fifty-one known whales seen feeding at the surface that year, two were lobtail feeding. The behavior spread through the 1980s. By 1989, forty-two of the eighty-three whales seen surface feeding that year were lobtail feeding. Lobtail feeding had become common through the population, with similar proportions of males and females, but it was far from universal. A substantial proportion of the population was never seen to lobtail feed. Lobtail feeders would feed in the same area, sometimes on the same fish aggregation, as whales using other methods, primarily standard bubble-cloud feeding, without the lobtails.

Mason Weinrich, a scientist who has dedicated decades to studying this population, tried to work out how the animals were learning this new feeding technique. Lobtail feeding was rare in the older animals. The whales seemed to pick up the technique from age two, although two-year-olds sometimes appeared to be "playing" or "practicing" at lobtail feeding, with smaller, less-dense bubble clouds and no evidence of actual food. Many of the lobtail feeders had mothers who were known not to lobtail feed. Thus, the evidence accumulated by Weinrich suggested primarily oblique or horizontal transmission of lobtail feeding among immature whales, or from elders to the young. Recently, Luke Rendell has been working with Weinrich, a student named Jenny Allen, and other colleagues in an analysis of the data records from the beginning of lobtail feeding in 1981 right through to 2008. This analysis highlighted several important points. The first was that the use of this foraging tactic was strongly related to the abundance of sand lance fish in the habitat. The incidence of lobtail feeding in the population waxed and waned roughly in line with how much sand lance was around, so lobtail feeding appears to be a specialization that takes advantage of

CONTINUE

a particular reaction shown by this species of fish. The second was that, as in Weinrich's original study, having a mother that did this made very little difference to whether her calf would go on to develop the behavior. Third, Rendell and his colleagues found that the data on the spread of the behavior (who took up lobtail feeding and when they started) massively supported a role for social learning: those humpbacks with many associates who were lobtail feeding themselves were much more likely to take up the habit than those with few lobtail-feeding associates.

This analysis demonstrates how ecology and culture can interact with each other—ecologically, the availability of a particular prey item, the sand lance, was varying over time. At some point, one bright, or lucky, humpback figured out that hitting the water with his or her tail did something to the sand lance (perhaps causing them to bunch together more, making the shoal easier to enclose with a bubble net), and since then this trick has been spread and maintained in the population by cultural transmission. The lack of relationship with maternal inheritance is interesting. It is a strong contrast to the pattern of mother-offspring transmission of foraging techniques among dolphins and, also, to the inheritance of migration routes in humpbacks themselves. Instead, the behavior is mostly learned after weaning, and can therefore spread rapidly within generations. This is fortunate—or maybe the result of smart use of social learning by the humpbacks—since the abundance of sand lance can vary manyfold within intervals of just two to three years.

43

Which statement best describes the overall structure of the passage?

A) The authors summarize early research on a topic, identify significant shortcomings in that research, and report the findings of an improved research study.

B) The authors present background information on an observed phenomenon, describe two studies about that phenomenon in greater detail, and discuss the significance of the studies' findings.

C) The authors describe a hypothesis proposed by researchers, explain experiments conducted to test that hypothesis, and suggest revisions to the hypothesis based on the findings.

D) The authors outline a complex problem, summarize a failed attempt to resolve that problem, and reveal the details of a successful resolution.

44

As used in line 11, "substantial" most nearly means

A) extraordinary.

B) comfortable.

C) considerable.

D) physical.

45

According to the passage, one finding shared by the study about lobtail feeding conducted by Weinrich and the data analysis he conducted with Rendell and their colleagues is that

A) whales as young as two years are able to master the technique.

B) the whales' use of the technique coincided with their use of bubble-cloud feeding.

C) whether a whale practiced the technique as a youth generally had no effect on its likelihood of using it as an adult.

D) whether a mother practiced the technique had little effect on her calf's likelihood of adopting it.

CONTINUE

46

Which choice best supports the idea that responses to certain predation strategies likely vary among different kinds of fish?

A) Lines 35-38 ("The first . . . habitat")
B) Lines 38-43 ("The incidence . . . fish")
C) Lines 43-46 ("The second . . . behavior")
D) Lines 57-64 ("At some . . . transmission")

47

As used in line 44, "original" most nearly means

A) authentic.
B) firsthand.
C) novel.
D) initial.

48

The sentence in lines 54-57 ("This . . . time") serves mainly to

A) criticize a naive assumption about an outcome.
B) provide an example of an unusual effect.
C) present an opposing view of a compelling example.
D) broaden the relevance of a research result.

49

Which choice represents a claim supported by the research of Rendell and his colleagues?

A) Lobtail feeding is preferred to bubble-cloud feeding in humpback whale groups with a relatively high proportion of older whales.
B) Changes in the type and availability of food sources can generate the learning of new behaviors in humpback whales.
C) Humpback whale behavior that is acquired before weaning is less complex and less useful to the group than behavior learned after weaning.
D) Humpback whale traits that are correlated with foraging are transmitted more quickly within groups than are other traits unrelated to foraging.

50

Which choice represents an underlying assumption of the authors' discussion regarding humpback whale mothers and their calves?

A) Mothers often transmit important knowledge to their calves.
B) Mothers and calves continue to hunt together after weaning.
C) Mothers delay teaching their calves certain techniques until they are older.
D) Mothers and calves have lifelong social relationships with one another.

CONTINUE

51

It can reasonably be inferred from the passage that behaviors taught to humpback whale offspring by their mothers

A) are less likely to be communicated to other members of a population than those acquired later.

B) eventually lead to effective social learning.

C) have a greater effect on species survival than environmental conditions do.

D) can simultaneously be transmitted to other animals.

52

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

A) Lines 46-53 ("Third . . . associates")

B) Lines 65-69 ("It is . . . themselves")

C) Lines 69-71 ("Instead . . . generations")

D) Lines 71-75 ("This . . . years")

STOP

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

CollegeBoard SAT®

DECEMBER 4, 2021
US

The SAT®

Test Book

IMPORTANT REMINDERS

1

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

2

Sharing any questions with anyone is a violation of Test Security and Fairness policies and may result in your scores being canceled.

Reading Test

65 MINUTES, 52 QUESTIONS

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

DIRECTIONS

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

Questions 1-10 are based on the following passage.

This passage is adapted from Naomi Jackson, *The Star Side of Bird Hill*. ©2014 by A. Naomi Jackson. Ten-year-old Phaedra is visiting her grandmother, Hyacinth, in Bird Hill, Barbados. Simone Saveur and Christopher are local children.

On her first and last visit of Hyacinth's house, Simone Saveur sat down and started looking around, taking mental notes, collecting grist for the gossip mill. Because while Hyacinth could safely say that she had been into almost every house on Bird Hill, whether to deliver a baby or visit an old person who was feeling poorly, or just to sit for a while talking about who had died and left and been born, only a handful of hill women could say that they had seen Hyacinth's house beyond the gallery where she sat with guests. All of them had at one point or another been invited to admire Hyacinth's rose garden, which in her vanity she sometimes showed off, going on about how they bloomed, the insects that troubled them, her pruning techniques. It could be said that Hyacinth's rose garden, which she tended to like another set of grandchildren, was an elaborate fortress whose beauty so thoroughly enchanted its visitors that they never questioned why they'd never been invited inside.

When Phaedra saw Simone looking around, she suddenly felt protective of Hyacinth and her house and everything in it: a pitcher and glasses with orange slices etched into them that had been around since before Phaedra was born, the open jalousies and the white curtains that lapped against the girls' faces, the lovingly carved archway that separated the front room from the dining room, just barely fitting a dining table and a hutch, the pictures of Phaedra and her sister Dionne and their mother, Avril, lining the walls. Where their apartment building in Brooklyn was marked with just a number, 261, Phaedra loved her grandmother's house because of the question "Why worry?" written in blue script above the front steps. Everything in Hyacinth's house had been touched by those she loved, and so it was Phaedra's and Dionne's in a way that their apartment in Brooklyn never would be.

Once, when there was a lull in conversation, Simone Saveur's roving eyes settled on Phaedra. Simone tried to explain the concept of cooking a dirt pot, but Phaedra was not at all interested in cooking, not even for play. She knew she wouldn't be playing any such game, or spending time with girls who thought this was a good time. Phaedra's mouth corners turned down and soon everyone was saying their good-byes. Phaedra's mother said that her daughter's gloomy face could rain out a good time. In this case, Phaedra thought the force of her foul mood came in handy; it encouraged a quick end to what had been an uncomfortable, bordering on unpleasant, afternoon.

That summer, Christopher and Phaedra were inseparable. Phaedra could barely trouble herself to remember the other girls' names, having put them in the category of "just girls," which was the same as

CONTINUE

dumping them into the rubbish bin of her mind. With Chris, there was ease to their play, a rough-and-tumbleness that she welcomed. Chris made Phaedra most happy by not asking her too many questions.

Phaedra liked to look at Christopher, who had the same sloe-eyed gaze as his mother's, an ever-ready smile, and pink lips that made him seem more tender than other boys his age. Now she watched as he stuffed the stocky fingers of his eternally ashy hands into his pockets and surveyed the land below the hill, mimicking the firm stance he'd seen his father take in the pulpit.

From where they stood, Phaedra and Chris could see the fishermen's boats at Martin's Bay, the buoys bobbing up and down in the blue-green water. Further east, a riot of rock formations, vestiges of an island long since gone, jutted out at Bathsheba. It was Phaedra's first summer in Barbados, and she wanted more than anything to feel the sand between her toes and to look at her feet through the clear-clear water. With its natural beauty, Barbados was far superior to Brooklyn. She stood next to Chris. It was hard to explain, but she had a feeling, standing there, that she'd never felt before in Brooklyn, not that she owned these things, but that she was somehow part of them. When Phaedra went on a class trip to the Empire State Building and looked down at the city from 102 stories above the sidewalk, she didn't have that feeling. The city was beautiful in its own way, but it wasn't hers. She didn't try to explain how she felt to Chris. What she most liked about their friendship was how much space there was for silence, the kind of quiet she'd never found with girls her age.

1

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

A) depicting a lasting memory from an island visit to illustrating daily life in a large city.

B) recounting an unwanted social interaction to describing a meaningful friendship.

C) retelling a conversation among members of an extended family to characterizing the elements of an ideal home.

D) explaining an event from a sheltered childhood to portraying a moment of independence.

2

It can reasonably be inferred from the passage that a primary motivation for Simone's visit to the house is to

A) fulfill a social obligation to pay a visit to Hyacinth.

B) obtain a stem of one of the highly prized roses in the garden.

C) caution Phaedra about the other girls in the neighborhood.

D) gain a social advantage by spending time in the house.

3

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

A) Lines 1-4 ("On her . . . mill")

B) Lines 11-15 ("All . . . techniques")

C) Lines 39-41 ("Once . . . Phaedra")

D) Lines 41-43 ("Simone . . . play")

4

In the context of the passage, Phaedra's reaction to the question written on the Bird Hill house (line 34) mainly serves to

A) illustrate her admiration of touches that reflect personalization.

B) intensify a conflict that puts her at odds with Simone.

C) explain her decision to adopt Christopher's aloofness.

D) contradict the neighbors' unkind assumptions about her.

CONTINUE

5

Based on the passage, which benefit does Phaedra get from staying in Hyacinth's house?

A) Freedom to share her opinions without reservation
B) An unaccustomed experience of living amid luxury
C) Reminders of her strong connections to her family
D) A chance to witness her grandmother's generosity

6

In describing the "force of her foul mood" (line 50), the narrator most likely means that Phaedra is able to

A) postpone a tough confrontation.
B) influence the outcome of a situation.
C) convince others to alter their preferences.
D) exaggerate the severity of a problem.

7

The passage most strongly suggests that Phaedra's attitude toward girls who want to befriend her is best described as

A) resentful, because she feels obligated to spend time with them.
B) dismissive, because she has no desire to get to know them individually.
C) uncertain, because she recognizes that she has little in common with them.
D) awkward, because she finds them uninteresting but wants to spare their feelings.

8

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

A) Lines 46-47 ("Phaedra's . . . good-byes")
B) Lines 47-52 ("Phaedra's . . . afternoon")
C) Lines 54-58 ("Phaedra . . . mind")
D) Lines 58-61 ("With . . . questions")

9

The main purpose of the fifth paragraph (lines 62-69) is to

A) describe a character's qualities that endear him to another character.
B) illustrate a character's striking resemblance to a family member.
C) explain the reason for a character's admiration for his father.
D) highlight a turning point in the relationship between two characters.

10

As used in line 67, "surveyed" most nearly means

A) researched.
B) questioned.
C) estimated.
D) considered.

CONTINUE

Questions 11-21 are based on the following passage and supplementary material.

This passage is adapted from Julie Sedivy and Greg Carlson, *Sold on Language: How Advertisers Talk to You and What This Says about You*. ©2011 by John Wiley & Sons Ltd.

Metaphors can play a role in triggering not just a specific set of *thoughts*, but also a specific set of *feelings*. This aspect of metaphor is like turning on the colored stage lights. Using metaphor can have the effect of switching from a flat white light aimed at the stage to one that bathes the scene in melancholy blue. It makes you care.

Political scientist Todd Hartman demonstrated how metaphors matter by applying them to the rather arcane policy issue of network neutrality. The issue affects how information is priced and transmitted over the Internet, and became important in response to lobbying efforts by broadband service providers to be allowed to charge a premium for transmitting certain data at high speeds. Those opposed to the lobbying efforts argued that tiered pricing would violate the "neutrality" principle of the Internet—in other words, the principle that the Internet was originally created with the intent of treating all data equally. To see whether metaphors could move people more than straightforward, unembellished language, Hartman had some volunteers in his study read this accurate, but somewhat dry statement:

Congressman Alan Davidson, who specializes in technology issues, supports Network Neutrality legislation. He recently told reporters: 'Telecoms want to charge fees on the Internet to connect content providers to their customers. Network Neutrality would prevent this from happening. It would ensure that we don't have a system where some companies have access to fast services, while the rest are left with slower connections.'

Others got a version that was built around the metaphor of the Internet as the information superhighway:

Congressman Alan Davidson, who specializes in technology issues, supports Network Neutrality legislation. He recently told reporters: 'Telecoms want to set up toll booths on the Internet to stand between content providers and their customers. Network Neutrality would prevent this from happening. It would ensure that we don't have a system where some companies have access to an express lane, while the rest are stuck waiting in line at the toll booth.'

The first message communicates pretty much the same policy content as the second metaphor-filled message. But it treats the issue as an *abstract* policy matter. Most people likely feel they don't have enough of a framework within which to evaluate the consequences of the proposed fee structure. The emotional impact of the language is pretty bland: sometimes fees for service are good, or at least necessary; sometimes they're bad. The message itself gives no particular reason to think one way or the other about them. But the second message brings the whole thing into the domain of personal experiences that everyone can relate to. Voters' experiences with toll booths aren't abstract—they're very concrete, and *very* annoying. And by alluding to the idea of the Internet as an information superhighway, with its images of speed, modernity, and dynamic movement, the message draws into the foreground people's feelings about the transformational potential of unfettered access to the Internet. Who could possibly be in favor of informational gridlock?

Not surprisingly, the persuasive effects of the two messages were dramatically different. People who read the dry version that was stripped of metaphor were no more supportive of network neutrality afterwards than another group who'd read neither of the messages—both of these groups were about 44% in favor of network neutrality. So, the persuasive work of the plain language was approximately zilch. But among the group who'd read the message laced with metaphor, the level of support for network neutrality soared to 61%.

CONTINUE

Figure 1

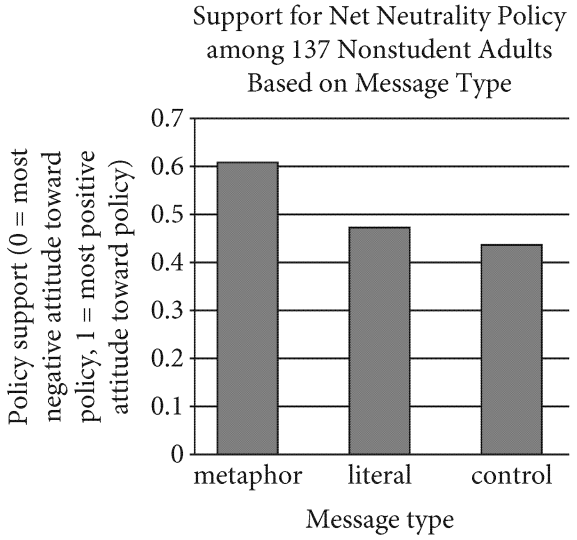
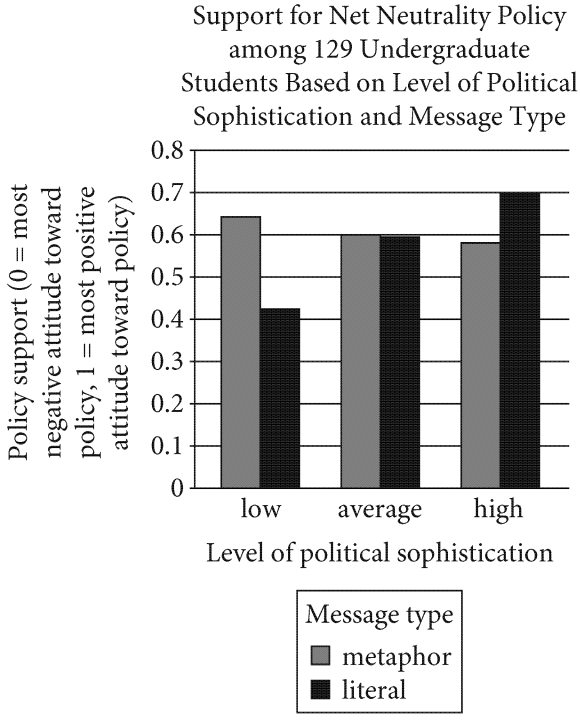


Figure 2



Figures adapted from Todd K. Hartman, "Toll Booths on the Information Superhighway? Policy Metaphors in the Case of Net Neutrality." ©2012 by Taylor & Francis Group, LLC.

11

Lines 3-7 ("This . . . care") serve mainly to

A) elaborate on a claim.
B) challenge a perspective.
C) define a term.
D) introduce a theory.

12

According to the passage, the issue of network neutrality came to the attention of the public as a result of

A) legislators petitioning for access to faster Internet speeds for their constituents.
B) everyday users desiring to benefit from competition among Internet companies.
C) Internet service providers wanting to charge higher and more variable fees.
D) political analysts debating the issue in the media.

13

The passage indicates that the first version of Davidson's message

A) presented his position on the issue of net neutrality dispassionately.
B) provided a detailed explanation of an unpopular policy.
C) addressed people's concerns about the negative effects of a major policy change.
D) acknowledged the difficulty of balancing Internet access with company profits.

CONTINUE

14

Which choice best supports the idea that the authors believe that when presented with the second version of Davidson's message, most people would support network neutrality?

A) Lines 34-36 ("Others . . . superhighway")
B) Lines 42-45 ("*It would . . . booth*")
C) Lines 60-65 ("And by . . . Internet")
D) Lines 65-66 ("Who could . . . gridlock")

15

As used in line 48, "treats" most nearly means

A) helps.
B) reveals.
C) realizes.
D) handles.

16

Based on the passage, which aspect of the study contributed most directly to its success?

A) The statements read by the study participants were written by a congressman who was a technology specialist.
B) The metaphor used in the second message focused on an experience that was familiar to the study participants.
C) The issue addressed in the messages had financial implications for Internet users.
D) The participants in the study were asked about their support for the issue after they read their assigned messages.

17

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

A) Lines 11-15 ("The issue . . . speeds")
B) Lines 25-27 ("*Congressman . . . legislation*")
C) Lines 51-54 ("The emotional . . . bad")
D) Lines 56-58 ("But the . . . relate to")

18

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

A) activity.
B) duty.
C) influence.
D) product.

19

Which statement from the passage most directly addresses the control message type depicted in figure 1?

A) Lines 67-68 ("Not . . . different")
B) Lines 68-73 ("People . . . neutrality")
C) Lines 73-75 ("So, the . . . zilch")
D) Lines 75-77 ("But among . . . 61%")

CONTINUE

20

According to the data in figure 2, which combination of message type and political sophistication reflects the lowest support for network neutrality?

A) Metaphor; low

B) Literal; low

C) Literal; average

D) Metaphor; high

21

Based on the passage, with which statement about data presented in figure 2 would the authors most likely agree?

A) Students with a high level of political sophistication tend to have a more negative attitude toward network neutrality when it's explained to them in a metaphorical message because this type of message fails to acknowledge their analytical strengths.

B) Students with a high level of political sophistication tend to have a more positive attitude toward network neutrality when it's explained to them in a literal message because the conciseness of this type of message helps keep their attention.

C) Students with a low level of political sophistication tend to have a more positive attitude toward network neutrality when it's explained to them in a literal message because this type of message more clearly explains the facts surrounding the issue.

D) Students with a low level of political sophistication tend to have a more negative attitude toward network neutrality when it's explained to them in a literal message because this type of message is the least likely to help listeners form an opinion.

CONTINUE

Questions 22-31 are based on the following passage.

This passage is from Ewen Callaway, "Gene Drives Thwarted by Emergence of Resistant Organisms." ©2017 by Macmillan Publishers Limited, part of Springer Nature.

In the small city of Terni in central Italy, researchers are putting the final touches on what could be the world's most sophisticated mosquito cages. The enclosures, each occupying 150 cubic metres, simulate the muggy habitats in which Africa's *Anopheles gambiae* mosquitoes thrive. By studying the insects under more-natural conditions, scientists hope to better understand how to eradicate them—and malaria—using an emerging genetic-engineering technology called gene drives.

The technique can quickly disseminate genetic modifications in wild populations through an organism's offspring, prompting some activists to call for it to be shelved. Yet gene drives might not be as effective as activists think. Recent research has identified a major hurdle to using them to eliminate diseases and vanquish invasive pests: evolution.

Organisms altered by gene drives, including mosquitoes, have shown promise in proof-of-concept laboratory experiments. But wild populations will almost certainly develop resistance to the modifications. Researchers have begun identifying how this occurs so that they can address the problem.

Gene drives thwart the rules of inheritance in sexually reproducing organisms. Normally, offspring have a 50:50 chance of inheriting a gene from their parents. Gene drives alter those odds, preferentially passing on one version to an organism's offspring until, in theory, an entire population bears that gene.

Such 'selfish' genetic elements occur naturally in mice, beetles and many other organisms, and researchers have had modest success with hijacking them to battle pests. But interest in gene drives has surged with the advent of CRISPR–Cas9 gene editing, which can be used to copy a mutation from one chromosome into another.

In late 2015, researchers reported a CRISPR gene drive that caused an infertility mutation in female mosquitoes to be passed on to all their offspring. Lab experiments showed that the mutation increased in frequency as expected over several generations, but resistance to the gene drive also emerged, preventing some mosquitoes from inheriting the modified genome.

This is hardly surprising, says Philipp Messer, a population geneticist at Cornell University in Ithaca, New York. Just as antibiotics enable the rise of drug-resistant bacteria, population-suppressing gene drives create the ideal conditions for resistant organisms to flourish.

One source of this resistance is the CRISPR system itself, which uses an enzyme to cut a specific DNA sequence and insert whatever genetic code a researcher wants. Occasionally, however, cells sew the incision back together after adding or deleting random DNA letters. This can result in a sequence that the CRISPR gene-drive system no longer recognizes, halting the spread of the modified code.

The researchers building the mosquito cage in Italy, part of a multimillion-dollar project called Target Malaria, found this form of resistance in some mosquitoes. And Messer's team reported in December that these mutants are likely to flourish.

Natural genetic variation is another route to resistance. CRISPR-based gene drives work by recognizing short genetic sequences, and individuals with differences at these sites would be immune to the drive. A recent study analysed the genomes of 765 wild *Anopheles* mosquitoes from across Africa. The team found extreme genetic diversity, which would limit the list of potential gene-drive targets, the researchers say.

"These things are not going to get too far in terms of eradicating a population," says Michael Wade, an evolutionary geneticist at Indiana University Bloomington. Gene drives could result in the genetic isolation—in which populations do not mate with each other—of groups that manage to avoid inheriting the modified genetic code, he and his colleagues found. And gene variants that decrease a population's propensity to mingle with other populations—such as those that limit flight capacity in insects—would suddenly prove beneficial and could spread.

Resistance to gene drives is unavoidable, so researchers are hoping that they can blunt the effects long enough to spread a desired mutation throughout a population. Some have floated the idea of creating gene drives that target multiple genes, or several sites within the same gene, diminishing the speed with which resistance would develop. By surveying a species' natural genetic diversity, researchers could target genes common to all individuals.

CONTINUE

22

Which of the following statements about the research in Terni, Italy, on *Anopheles gambiae* mosquitoes can most reasonably be inferred from the passage?

A) The study was noteworthy for being the first to employ mosquito cages for research purposes.

B) The study was unable to reproduce the typical environment that mosquitoes in the wild are accustomed to.

C) The researchers planned to take what they learned about mosquito behavior and apply it to other animals.

D) The researchers' objective in studying the mosquitoes was to find a way to get rid of them completely.

23

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

A) Lines 1-4 ("In the . . . cages")

B) Lines 4-6 ("The enclosures . . . thrive")

C) Lines 6-10 ("By studying . . . drives")

D) Lines 11-14 ("The technique . . . shelved")

24

Which of the following best characterizes one of the author's beliefs about gene drives?

A) Without enough genetic variation in a population, gene drives won't be able to introduce the intended genomic changes.

B) Gene drives can be harmful to the various groups of plants and animals in which they occur naturally.

C) With some fine-tuning, gene drives will soon be able to prevent organisms from developing resistance.

D) Gene drives may not have as big an impact on the genetic makeup of a population as some opponents of the technique predict.

25

The main purpose of the fourth paragraph (lines 25-30) is to

A) criticize the use of the gene-drive technique by explaining its effects on a species.

B) provide context for how the gene-drive technique works in certain organisms.

C) offer a solution to the problem of organisms in the wild developing genetic resistance.

D) convey a sense of excitement that researchers feel about the possibilities of thwarting genetic resistance.

26

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

A) flowed.

B) increased.

C) rushed.

D) spilled.

27

The author mentions the 2015 mosquito research in the sixth paragraph (lines 38-45) mainly to support the argument that

A) CRISPR gene drives have solved the problems that earlier experiments with gene drives faced.

B) CRISPR gene drives shouldn't be used on mosquitoes because they cause infertility.

C) gene drives have encountered some problems despite promising early results.

D) gene drives have become less popular among researchers because of the problem of genetic resistance.

CONTINUE

28

The passage indicates that one of the reasons the *Anopheles* mosquitoes develop resistance to CRISPR-based gene drives is because of

A) the great difference in genetic makeup within a population.

B) a few difficulties in identifying the right enzymes to insert.

C) similarities between the species' lab and wild environments.

D) how ineffective the CRISPR gene is in males of the species.

29

Based on the passage, it can most reasonably be inferred that using some genetic-engineering technologies to attempt to get rid of mosquitoes could

A) make certain traits more likely to spread among surviving mosquitoes.

B) prove to be more effective in the wild than in laboratory experiments.

C) provide an inexpensive solution to an increasingly expensive problem.

D) be applied successfully to organisms that do not reproduce sexually.

30

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

A) Lines 55-57 ("Occasionally . . . letters")

B) Lines 60-63 ("The researchers . . . mosquitoes")

C) Lines 69-70 ("A recent . . . Africa")

D) Lines 81-85 ("And gene . . . spread")

31

As used in line 89, "floated" most nearly means

A) drifted.

B) proposed.

C) rested.

D) suspended.

CONTINUE

Questions 32-41 are based on the following passages.

Passage 1 is adapted from a speech delivered in 1914 by H. H. Asquith. Passage 2 is adapted from "Memorandum in Support of Ireland's Claim for Recognition as a Sovereign Independent State." Originally published in 1919. Asquith, the British prime minister, spoke in Dublin, Ireland, shortly after the start of the First World War. At the time, Ireland had been subject to government by English leaders for centuries.

Passage 1

I should like . . . to ask your attention and that of my fellow-countrymen to the end which, in this War, we ought to keep in view. Forty-four years ago . . . [British Prime Minister] Gladstone used these words. He said: "The greatest triumph of our time will be the enthronement of the idea of public right as the governing idea of European politics." . . . The idea of public right—what does it mean when translated into concrete terms? It means, first and foremost, the clearing of the ground by the definite repudiation of militarism as the governing factor in the relation of States and of the future moulding of the European world. It means, next, that room must be found and kept for the independent existence and the free development of smaller nationalities, each with a corporate consciousness of its own. Belgium, Holland, Switzerland, the Scandinavian countries, Greece, and the Balkan States—they must be recognised as having exactly as good a title as their more powerful neighbours—more powerful in strength and in wealth—to a place in the sun. And it means finally, or it ought to mean, perhaps by a slow and gradual process, the substitution for force, for the clash of competing ambitions, for groupings and alliances and a precarious equipoise, of a real European partnership based on the recognition of equal rights, and established and enforced by a common will. A year ago that would have sounded like a Utopian idea. It is probably one that may not, or will not, be realised either to-day or to-morrow, but if and when this War is decided in favour of the Allies it will at once come within the range, and before long within the grasp, of European statesmanship.

. . . Ireland is a loyal country, and she would, I know, respond with alacrity to any summons which called upon her to take her share in the assertion and the defence of our common interests. But the issues raised by this War are of such a kind that, unless I mistake her people and misrepresent her history, they touch a vibrating chord both in her imagination and in her conscience. How can you Irishmen be deaf to the cry of the smaller nationalities to help them in their struggle for freedom . . . ?

Passage 2

English rule has never been for the benefit of Ireland and has never been intended for the benefit of Ireland; . . . it has isolated Ireland from Europe, prevented her development, and done everything in its power to deprive her of a national civilization. So far as Ireland at present is lacking in internal peace, is behind other countries in education and material progress, is unable to contribute notably to the common civilization of mankind, these defects are the visible consequences of English intrusion and domination.

The Irish people have never believed in the sincerity of the public declarations of English statesmen in regard to their "war aims," except in so far as those declarations avowed England's part in the war to have been undertaken for England's particular and Imperial interests. They have never believed that England went to war for the sake of France or Belgium or Serbia, or for the protection or liberation of small nationalities, or to make right prevail against armed might. If English statesmen wish to be regarded as sincere, they can prove it to the world by abandoning, not in words but in act, the claim to subordinate Ireland's liberty to England's security.

Ireland's complete liberation must follow upon the application of [US] President Wilson's principles. It has not resulted from the verbal acceptance of those principles; and their rejection is implied in the refusal to recognise for Ireland the right of self-determination. Among the principles declared by the President . . . we cite the following:

. . . "Peace should rest upon the rights of peoples, not on the rights of governments—the rights of peoples, great and small, weak or powerful; their equal right to freedom and security and self-government, and to participation, upon fair terms, in the economic opportunities of the world." . . .

It is evident that, while Ireland is denied the right to choose freely and establish that form of government which the Irish people desire, no

CONTINUE

international order can be founded on the basis of national right and international justice; the claim of the stronger to dominate the weaker will once more be successfully asserted; and there will be no true peace.

32

As used in line 9, "concrete" most nearly means

A) hard.
B) accurate.
C) specific.
D) compact.

33

Which statement best conveys Asquith's belief about the "Utopian idea" (line 29)?

A) It is already occurring.
B) It is a possibility.
C) It is unlikely to be realized.
D) It is unachievable.

34

The main purpose of the second paragraph of Passage 1 (lines 35-44) is to

A) appeal to the Irish people's sense of allegiance and justice.
B) emphasize the importance of national identity.
C) proclaim England's admiration for the Irish people's national pride.
D) encourage peace among European nations.

35

Passage 1 most strongly suggests that Asquith believes that Irish people will wish to take part in the war effort because they

A) want to promote unity among all small nations.
B) wish Ireland to be viewed as a powerful country.
C) seek to preserve the country's military reputation.
D) can empathize with citizens of smaller states.

36

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

A) Lines 16-21 ("Belgium . . . sun")
B) Lines 21-28 ("And it . . . will")
C) Lines 35-38 ("Ireland . . . interests")
D) Lines 38-44 ("But the . . . freedom")

37

As used in line 70, "complete" most nearly means

A) absolute.
B) intact.
C) concluded.
D) pure.

38

The last paragraph of Passage 2 mainly serves to

A) encourage other nations to protest England's domination of Ireland.
B) emphasize the interconnectedness of Ireland's domestic concerns and broader global movements.
C) highlight the need for unity in Ireland before national attention shifts to issues abroad.
D) argue that the fight for world peace is more important than Ireland's fight for freedom.

CONTINUE

39

Passage 1 and Passage 2 both use which kind of evidence in their analysis?

A) Anecdotes of individuals affected by war
B) Direct reference to a respected political figure
C) Examination of England's military history
D) References to England's past treatment of Ireland

40

Which choice provides the best evidence that Asquith would agree with some of Wilson's principles discussed in lines 77-83 of Passage 2?

A) Lines 1-3 ("I should . . . view")
B) Lines 9-13 ("It means, first . . . world")
C) Lines 13-16 ("It means, next . . . own")
D) Lines 29-34 ("It is . . . statesmanship")

41

The author of Passage 2 would most likely characterize Asquith's argument about the rights of states in Passage 1 as

A) insincere, because England has a long history of restraining the rights of other nations.
B) questionable, because England has failed to include Ireland in past efforts to support such rights.
C) idealistic, because England has not fully considered the cost of securing rights for these states.
D) hypocritical, because England has not extended such rights to the nation of Ireland.

CONTINUE

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

This passage is adapted from Laura Geggel, "Enormous Gorge Shaped by River's Tectonic Transformation." ©2014 by Purch.

The Tsangpo Gorge in Tibet, one of the deepest canyons in the world, formed when tectonic forces pushed up the earth and steepened the path of a river that then caused massive erosion, a new study finds.

The discovery rewrites the geological history of the region, which some researchers thought was caused by massive river erosion that triggered tectonic uplift in the Eastern Himalaya.

"Our observation in the end is relatively simple," said Dirk Scherler, a geologist at the GFZ German Research Centre for Geosciences in Potsdam. He and his colleagues said they think an unknown event caused an increase in tectonic uplift rates about 3 million years ago. As the uplift became more pronounced, about 2.5 million years ago, it dammed the Yarlung Tsangpo River that runs through the region, preventing it from flowing down the mountains.

"So the river either turns into a lake and gives up, or if it's carrying enough sediment, it can fill in that [area] and keep spilling over the edge," said Kelin Whipple, a professor of geomorphology at Arizona State University, who was not involved in the study.

Once the river dropped enough sediment and made it over the natural dam, it quickly flowed down the mountain. At that point, the mountain was steeper because of the increased tectonic uplift, causing the river to run faster and leading to vast erosion in the gorge, the researchers said.

Yet, the research team needed evidence of the ancient sediment to support their idea. The year before, civil engineers from the China Earthquake Administration had gathered core samples after drilling at five locations along the Yarlung Tsangpo River. One researcher visited the California Institute of Technology in Pasadena, and shared the core samples with Scherler, who was completing his postdoctoral research in geology.

Scherler and his colleagues examined the drill-core samples—some retrieved from up to 0.6 miles (1 kilometer) deep—to see whether the area in question had a sediment deposit. "And sure enough, there was," said Whipple, who wrote an opinion piece about the study for the journal Science. "And they show it very nicely in their study."

The core samples contained sand, rounded gravel and larger rocks cemented together, a mix indicative of sediment from a flowing river, the researchers said. About 2,600 feet (800 meters) below the surface, the samples contained bedrock, showing that the sediment had filled an ancient canyon.

The researchers studied the sediments at the bottom of the core samples—the earliest sediment layers—and measured two isotopes: beryllium-10 and aluminum-26. These isotopes are made when sediment is exposed to cosmic rays, high-energy radiation from space. The isotopes decay at different rates once the sediment is buried, and the river began dropping sediment about 2.5 million years ago, the researchers said.

Until now, many researchers viewed part of the Tsangpo Gorge, called the Namche Barwa massif, as a poster child of how rivers may influence tectonics.

Perhaps the Yarlung Tsangpo River collided with the Brahmaputra River (the two rivers are now connected), the model suggested. The collision may have diverted the Yarlung Tsangpo River, and caused it to cut down the mountain, quickly eroding it.

As the rock eroded, it would have become lighter, making it easier for the tectonic forces below to push the rock up in a so-called "tectonic aneurysm," which would have made the mountains steeper, Whipple said.

"In response to that very rapid erosion, you're thinning and weakening the crust as it's getting hotter in response to the erosion, bringing hot rocks closer to the surface," Whipple said. "And that induces a response where the rocks actually start flowing toward that spot, causing uplift."

CONTINUE

Figure 1

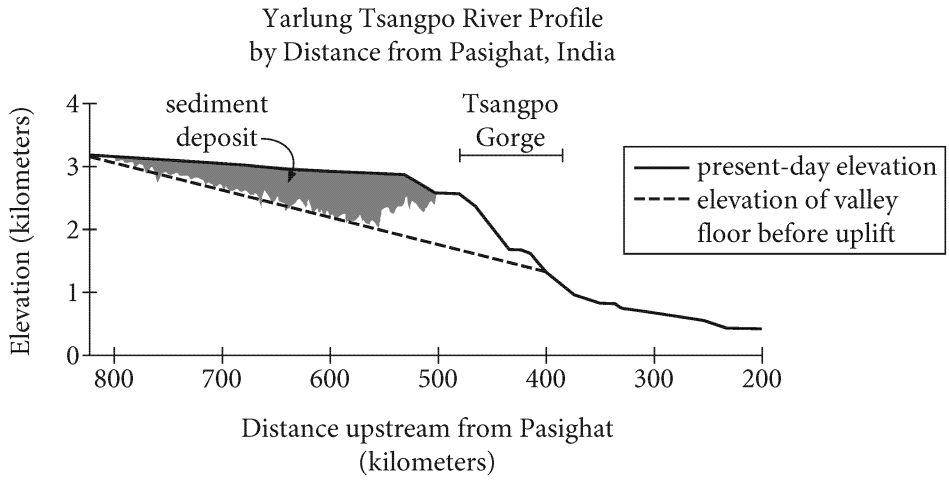
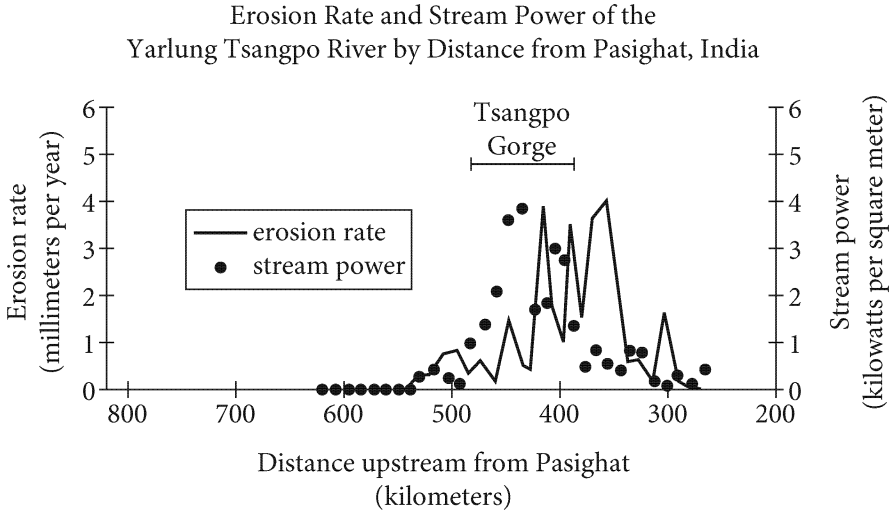


Figure 2



Figures adapted from Ping Wang et al., "Tectonic Control of Yarlung Tsangpo Gorge Revealed by a Buried Canyon in Southern Tibet." ©2014 by American Association for the Advancement of Science.

CONTINUE

42

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

A) a recounting of several hypotheses related to river gorge formation to a more detailed explanation of the prevalent hypothesis.

B) a description of a study focusing on a particular river gorge to an analysis of that study's applicability to other river gorges.

C) an argument defending controversial new research about river gorges to a counterargument supporting more established research.

D) an explanation of a recent finding that challenges a long-standing hypothesis about a river gorge to a description of that older hypothesis.

43

What is the main effect of the author's use of "massive" in lines 4 and 7 and "vast" in line 29?

A) To characterize the erosion as having occurred on an unusually large scale

B) To portray the river as having a high rate of flow unlikely to occur elsewhere

C) To credit the researchers with an especially important discovery

D) To emphasize the high level of force required to trigger erosion

44

As used in line 5, "rewrites" most nearly means

A) revises the published wording about.

B) shifts the authorship of.

C) changes the general understanding of.

D) replaces the data available for analysis on.

45

Based on the passage, what question central to Scherler's team's hypothesis remains unanswered?

A) When did the natural dam begin to block the flow of the Yarlung Tsangpo River?

B) How deep would the Tsangpo Gorge be now if the increase in tectonic uplift had not occurred?

C) What types of sediment deposits indicate that a river once flowed in an area?

D) What circumstances led to the tectonic uplift that dammed the Yarlung Tsangpo River?

46

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

A) Lines 11-14 ("He and . . . years ago")

B) Lines 14-18 ("As the . . . mountains")

C) Lines 46-49 ("The core . . . said")

D) Lines 49-51 ("About . . . canyon")

CONTINUE

47

Which choice provides the best evidence for the idea that Scherler's team constructed their hypothesis before being able to make direct observations related to it?

A) Lines 26-29 ("At that . . . said")
B) Lines 30-31 ("Yet, the . . . idea")
C) Lines 35-38 ("One researcher . . . geology")
D) Lines 39-42 ("Scherler . . . deposit")

48

It can reasonably be inferred from the passage that many geologists reacted to Scherler's team's study by

A) attempting to replicate its results.
B) accepting its conclusion.
C) questioning its methods.
D) publishing rebuttals to it.

49

As explained by Whipple, the previous hypothesis on the formation of the Tsangpo Gorge attributed the tectonic uplift to

A) the steepness of the Namche Barwa massif.
B) crust fissures.
C) river erosion.
D) the gorge wall's sedimentary makeup.

CONTINUE

50

The data in figure 1, gathered by Scherler's team, indicate that the team estimated the Yarlung Tsangpo River's valley floor before uplift to be a

A) steep drop followed by a gradual slope.

B) series of erratic elevation changes.

C) flat plane between gentle inclines.

D) steadily decreasing slope.

51

Based on figure 1, the "natural dam" (line 25) that Scherler's team believes existed on the Yarlung Tsangpo River was most likely located approximately how many kilometers from Pasighat?

A) 400

B) 500

C) 700

D) 800

52

According to the data in figure 2, the Yarlung Tsangpo River's stream power is strongest at about

A) 100 kilometers upstream from the upper rim of the Tsangpo Gorge.

B) the upper rim of the Tsangpo Gorge.

C) the midpoint of the Tsangpo Gorge.

D) the bottom of the Tsangpo Gorge.

STOP

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

CollegeBoard SAT®

DECEMBER 4, 2021
INTERNATIONAL

The SAT®

Test Book

IMPORTANT REMINDERS

1

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

2

Sharing any questions with anyone is a violation of Test Security and Fairness policies and may result in your scores being canceled.

Reading Test

65 MINUTES, 52 QUESTIONS

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

DIRECTIONS

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

Questions 1-10 are based on the following passage.

This passage is adapted from Kirstin Chen, *Soy Sauce for Beginners*. ©2014 by Kirstin Chen. The narrator and her friend Frankie have come from California to work at Lin's Soy Sauce, the narrator's family's business in Singapore.

Line

After I gave her a brief overview of everyone on the office floor—"Avoid the drama vultures in marketing; be nice to Fiona, she has more power than you'd expect"—Frankie and I hunkered down to evaluate the work my cousin Cal had already done on the US Expansion Project. Given my cousin's love of shortcuts, his tendency to keep crucial information to himself, and his questionable vision of a more modern Lin's, we were skeptical about whether his recommendations could be trusted.

From the start, I told Frankie she was in charge, and the arrangement seemed to please her. She got to work at once, methodically making her way through Cal's files, hunting down marketing and sales people—and even my father—when I was of no help. If she noticed the way her new colleagues whispered about her American assertiveness, she didn't let it bother her.

In contrast, I treated the work like a college class: doing the minimum it took to get by. I tried to coerce Frankie into taking breaks by showing her hilarious pictures I'd found on the Internet and bombarding her computer with inane instant messages. She'd indulge me for a minute or two before returning to work, but after I emailed her a third cat picture, she spun around to face me and said, "Look, I realize your uncle hired me mostly as a favor to you, but I really think I can make a difference around here."

Duly chastised, I began to read the files she deemed most relevant, and the more I learned, the more I had to admit that some of this stuff was actually interesting. Who knew that specialty food producers from bastions of Americana as Gainesville, Florida, and Louisville, Kentucky, had begun to experiment with artisanal soy sauce? According to a prominent food magazine, the Kentucky producer even aged its sauce in old bourbon barrels for an added whiff of smoke and local color. Top chefs all over America were raving about the depth of flavor the smoky sauce brought to dry-aged filet mignon and buttery black cod. An avant-garde chef in Chicago had infused the soy sauce into butter. The resulting concoction was spread on bite-sized brioche, topped with tobiko caviar, and served as the *amuse bouche* to his seventeen-course tasting menu.

One didn't need to pore over these files to discern the burgeoning excitement for all things natural and handmade—after all, Frankie and I both hailed from San Francisco, the epicenter of the artisanal food movement. And yet Lin's was edging away from its traditional brewing methods.

I filled Frankie in: several months earlier, Uncle Robert's first move as president had been to purchase the factory's first industrial fiberglass tanks, a decision my father had opposed. To avoid further angering my father, the tanks had been housed in a shed, out of sight. The new additions were large

CONTINUE

gray-green vats, as different from one of our jars as a Yamaha violin from a Stradivarius. But Uncle Robert argued that each fiberglass tank had five times the capacity of a single jar. Furthermore, the workers would no longer have to hand-stir the fermenting soybeans since a simple twist of a valve would agitate the contents of each tank. As a result, fermentation would be reduced from six months to four, shortening production time and lowering costs.

Frankie tapped her pen on the table. "Makes perfect sense. Especially if it all basically tastes the same, right?"

I didn't hide my incredulousness. "We can't go any further until you try some sauce." I reached over, closed Frankie's laptop and ordered her to move her papers aside.

And so I staged a spontaneous soy sauce tasting right in my office, exactly like the ones I'd seen my father lead dozens of times. Despite curious looks from co-workers passing by, I made Frankie take one sip after another of our premium sauces, until I was sure she understood the value of our clay jars—jars that were rinsed every six months in tepid water and left to dry in direct sunlight. This special treatment protected fifty years' worth of golden residue that coated the jars' insides and gave our sauce its signature earthiness.

"Incredible," Frankie said, smacking her lips. "I've had plenty of soy sauce in my lifetime, but this sauce isn't even remotely the same species."

1

Which choice best supports the idea that Frankie recognizes the value of Cal's files more quickly than the narrator does?

A) Lines 6-11 ("Given . . . trusted")
B) Lines 12-13 ("From . . . her")
C) Lines 17-19 ("If she . . . her")
D) Lines 30-33 ("Duly . . . interesting")

2

As used in line 9, "vision" most nearly means

A) illusion.
B) observation.
C) sight.
D) notion.

3

Over the course of the passage, the narrator's attitude toward her job gradually changes from one of

A) moderate anxiety to calm contentment.
B) casual unconcern to eager engagement.
C) obstinate apathy to reluctant cooperation.
D) pronounced pessimism to unreserved optimism.

4

The passage indicates that Frankie is the type of office worker who

A) strives to make a positive impression on her colleagues.
B) hopes to be promoted quickly.
C) handles tasks systematically and capably.
D) makes business decisions quickly and independently.

5

The information in lines 33-46 ("Who . . . menu") mainly serves to

A) emphasize the narrator's admiration for experimental cooking techniques.
B) demonstrate the narrator's extensive knowledge of US culinary trends.
C) hint at the narrator's desire to return to the United States.
D) convey the narrator's growing fascination with aspects of Cal's research.

CONTINUE

6

It can most reasonably be inferred from the passage that the changes Uncle Robert has initiated at Lin's Soy Sauce may prove to be

A) ineffective, since the expense of purchasing the new tanks exceeds the profit they could potentially generate.

B) misguided, since the kinds of production techniques prized by the narrator's father are actually in demand in the United States.

C) unpopular, since workers would likely resist the adoption of technologies that would make some of their tasks obsolete.

D) temporary, since the narrator's father would likely demand the removal of the tanks after discovering them.

7

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

A) Lines 47-52 ("One . . . methods")

B) Lines 53-56 ("I filled . . . opposed")

C) Lines 56-58 ("To avoid . . . sight")

D) Lines 62-67 ("Furthermore . . . costs")

8

As used in line 65, "agitate" most nearly means

A) churn.

B) upset.

C) compress.

D) confront.

9

Based on the passage, the narrator assumes that in order for the US Expansion Project to succeed, employees planning it must be able to

A) urge senior management to transform the company's products.

B) invent unconventional uses for the company's products.

C) understand the distinctive nature of the company's products.

D) accept changing social attitudes toward the company's products.

10

It can most reasonably be inferred from the passage that Frankie's experience of tasting the soy sauces will most likely lead her to

A) decide that the narrator should be in charge of the US Expansion Project.

B) become skeptical about the company's use of industrial tanks.

C) place less importance on Cal's research files.

D) embrace a more relaxed attitude toward her job.

CONTINUE

Questions 11-20 are based on the following passage and supplementary material.

This passage and accompanying figure are adapted from Ian Morris, *Foragers, Farmers, and Fossil Fuels: How Human Values Evolve*. ©2015 by Ian Morris.

In the last two centuries, humans have vastly increased the amount of energy they capture by learning to tap into fossilized sunlight. This comes chiefly in the form of vast deposits of coal, gas, and oil buried under the earth's surface since the Carboniferous Era, roughly 300 to 360 million years ago. Exploiting fossil fuels has set off an energy bonanza, transforming human societies and values.

Fossil-fuel society is the product of two innovations. The first, which some northwest Europeans had already made two thousand years ago, was the discovery that coal could be burned to release heat. Only around AD 1000 (in China) and 1600 (in England), however, did coal begin to rival wood as an energy source. The second breakthrough, initially made in the third century BC by engineers in Egypt, was that heat could be converted to motion by burning wood to boil water and then using the steam to power pistons. Egyptians did little with this idea, however, beyond providing their gods with steam-powered temple doors that appeared to open magically by themselves.

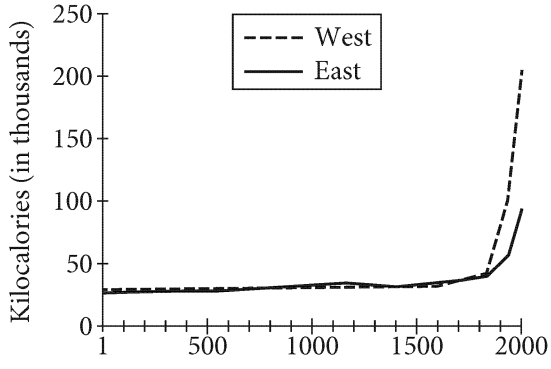
Not until the seventeenth century were fossil fuels and steam power put together in a productive way, by northwest European coalminers who realized that they could burn the coal they dug up to power engines that would pump water out of their mineshafts, allowing them to dig deeper to find more coal. The earliest steam engines burned so much coal that they were economical only if used right next to the mines that fed them, but in 1776, James Watt and Matthew Boulton managed to build an engine with separate heating and condensing chambers, dramatically cutting its coal consumption. Industrialists quickly figured out how to augment human and animal muscles with steam power in all walks of life. Productivity soared and prices collapsed, but despite this, sales increased so much that profits rose much higher than ever before. Energy capture per capita in the most industrialized Western economies grew sevenfold, from roughly 38,000 kilocalories per person per day around 1800 to 230,000 by the 1970s. The age of energy abundance had begun.

People of course still needed to eat, which meant that domesticated plants and animals remained vital sources of energy, but fossil fuels quickly transformed farming too. By the late nineteenth century, trains and steamships had made it much easier and cheaper to move food to people, and in the twentieth, chemical fertilizers, gasoline for tractors, and electricity to pump water to fields directly increased output. By 2000, each acre of American farmland absorbed, on average, eighty times as much energy as it had done in 1900, and yielded four times as much food.

Like foraging and farming, serious fossil-fuel use began in a specific place (Northwest Europe) at a specific time (roughly two hundred years ago). The great difference between the industrial revolution and the two earlier transformations in energy capture, though, was that industrialization changed the world much more abruptly. It made so much energy available so suddenly that Britain, where the initial breakthrough came, was able to project its power across the entire globe in the nineteenth century. Consequently, once Britain began its industrial revolution, there was no time for anyone else to invent fossil-fuel industry independently. By 1914, most of the people on earth were part of a Western-dominated fossil-fuel economy and tied to global markets, and Europeans and their overseas colonists had exploited the advantages of being early adopters to take control of 84 percent of the planet's landmass and 100 percent of its oceans.

The industrial revolution is the biggest discontinuity in human history—so far.

Average Energy Use per Person per Day



CONTINUE

11

As used in line 7, "exploiting" most nearly means

A) influencing.
B) utilizing.
C) reaching.
D) mistreating.

12

Which choice best supports the idea that steam power lowered the cost of industrial production?

A) Lines 15-19 ("The second . . . pistons")
B) Lines 23-29 ("Not . . . coal")
C) Lines 35-37 ("Industrialists . . . life")
D) Lines 37-39 ("Productivity . . . before")

13

Based on the passage, the author is most likely writing from the point of view of

A) an industrialist highlighting the historical importance of steam power.
B) an engineer outlining major setbacks and developments in energy capture.
C) a scientist concerned about the environmental effects of fossil fuel use.
D) a scholar with expertise on the impact of technology on social history.

14

Based on the passage, which choice best describes the effect of fossil fuel use on food production?

A) Fossil fuels have reduced the amount of land needed to produce a given amount of food.
B) Fossil fuels have raised the costs of food production due to farmers purchasing more equipment.
C) Fossil fuels have decreased the amount of food that needs to be produced per acre of land.
D) Fossil fuels have resulted in increased food production by increasing the number of farmers.

15

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

A) Lines 40-43 ("Energy . . . 1970s")
B) Lines 43-44 ("The age . . . begun")
C) Lines 45-48 ("People . . . too")
D) Lines 53-56 ("By 2000 . . . food")

16

In the passage, the author compares the Industrial Revolution with other major developments in energy use to make the point that the Industrial Revolution occurred

A) earlier in history.
B) in a more limited region.
C) with lesser impact.
D) more rapidly.

17

The main effect of the phrase "so far" in line 77 is to

A) imply uncertainty about the accuracy of the data in the passage.
B) emphasize the cautions issued throughout the passage.
C) suggest that a future development may negate the preceding claim.
D) note the topic of the author's future publications.

18

The information in the figure best supports the claim in which lines from the passage?

A) Lines 1-3 ("In the . . . sunlight")
B) Lines 3-7 ("This . . . ago")
C) Lines 9-10 ("Fossil-fuel . . . innovations")
D) Lines 13-15 ("Only . . . source")

CONTINUE

19

Which claim about energy use in the East is best supported by the figure?

A) It established an initial model that the West has followed.

B) It will not surpass the levels recorded in the West.

C) It has been more erratic over time than that in the West.

D) It has largely been consistent with that in the West.

20

During which range of years represented in the graph did energy use in the West increase the most?

A) 1–500

B) 500–1000

C) 1000–1500

D) 1500–2000

CONTINUE

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

This passage is adapted from Jessica P. Johnson, "Amoeba Have Long-Distance Preference for Certain Bacteria, Pointing to Other Cell-Sensing Insights." ©2019 by National Academy of Sciences. Gram-negative and Gram-positive bacteria have different types of cell walls and are categorized according to their ability to take on stains during a test called Gram staining.

How does the microscopic amoeba track down prey in the vastness of the forest floor? Ample research on the soil amoeba *Dicytostelium discoideum*, affectionately called "Dicty" by researchers, has provided some clues. But the mechanisms behind long-distance sensing of bacterial signals are still largely a mystery. A recent study takes a simple behavioral biology approach to uncover crucial clues. Further insights could elucidate other cell-sensing mysteries, such as how immune cells pick up signals from invading pathogens.

Previous research suggested that Dicty, a popular model system for studying phagocytosis [ingestion of smaller cells by larger cells], chemotaxis [movement in response to a chemical stimulus], and host-pathogen interactions, can tell the difference between the Gram-negative and Gram-positive bacteria that it eats. It appears to selectively turn on certain cellular machinery depending on the type of prey it ingests. But few studies have investigated whether Dicty can distinguish between different bacteria during the hunt.

Now, a low-tech behavioral study shows that Dicty prefers to hunt Gram-negative bacteria over Gram-positives. "For an organism that's been studied extensively for many decades, including its ability to sense bacteria, the fact that it discriminates or responds differentially to bacteria at a distance hadn't been shown," says paper coauthor Elizabeth Ostrowski, an evolutionary biologist at Massey University in Auckland, New Zealand.

Researchers know that Dicty can phagocytize bacteria, but much is still unknown about the mechanisms underlying bacterial recognition, explains Michelle Snyder, a cell biologist at Towson University in Maryland who was not involved in the research.

Ostrowski and her coauthor set up paired assays in which Dicty had to choose whether to crawl toward one of four Gram-negative bacterial species or one of four Gram-positive species. In 21 of the 24 assays, Dicty chose the Gram-negative bacteria. "This is a classic test in behavioral biology," Ostrowski says. "We used the tools of behavioral biology and learned something new about its behavior that had been overlooked."

Three different Dicty strains collected from different geographical regions of the US all behaved surprisingly similarly in the Gram-negative/Gram-positive paired assays. "To me, this suggests that [the Dicty strains] have a very basic mechanism of sensing bacteria that is not a rapidly evolving trait," Ostrowski says. "It's something that's fairly evolutionarily conserved."

In a follow up experiment, the researchers tested whether Dicty might be homing in on the large amounts of cyclic adenosine monophosphate (cAMP) that Gram-negative bacteria regularly spill from their cells, whereas Gram-positives excrete little to no cAMP. They observed that Dicty preferentially migrated toward a mutant Gram-negative *Escherichia coli* strain that overproduced cAMP versus a wild type *E. coli* and another mutant strain that produced no cAMP.

The experiments suggest that cAMP might play a role in Dicty preference for Gram-negatives. However, cAMP is likely not the only chemotactic molecule at work. In a control experiment, Dicty preferred the cAMP non-producing *E. coli* mutant over no bacteria at all.

"It would be nice to see if you could somehow manipulate cAMP levels so that you had a Gram-negative and a Gram-positive that secreted the same levels of cAMP," Snyder suggests. She also would like to see experiments that take a Dicty cell missing the receptor that allows for chemotaxis toward cAMP and investigate whether it still discriminates between Gram-negatives and Gram-positives.

CONTINUE

Figure 1

Response of *Dictyostelium Discoideum* Strains from Three Geographic Regions to Gram-negative and Gram-positive Bacterial Pairs

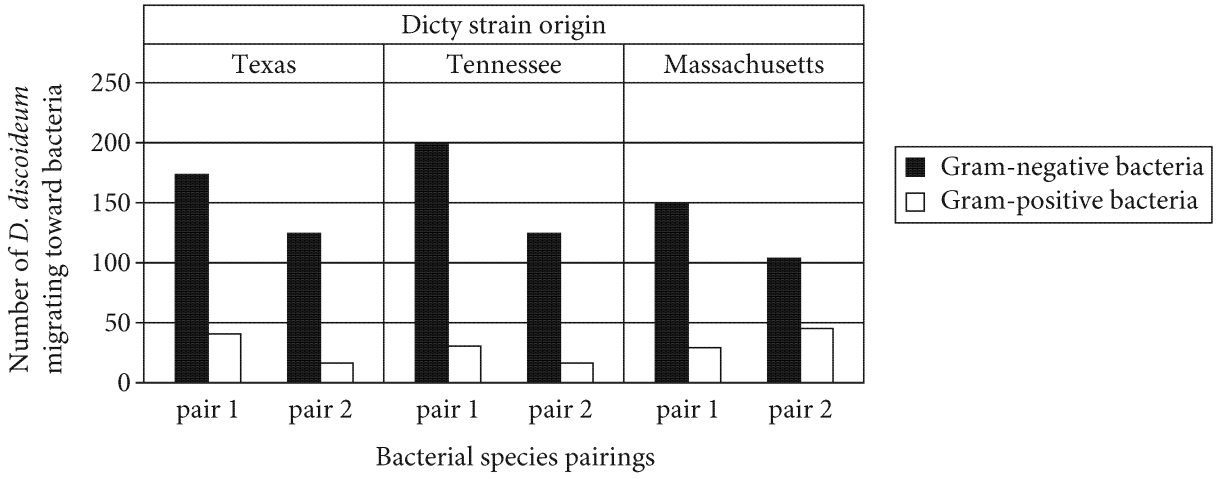
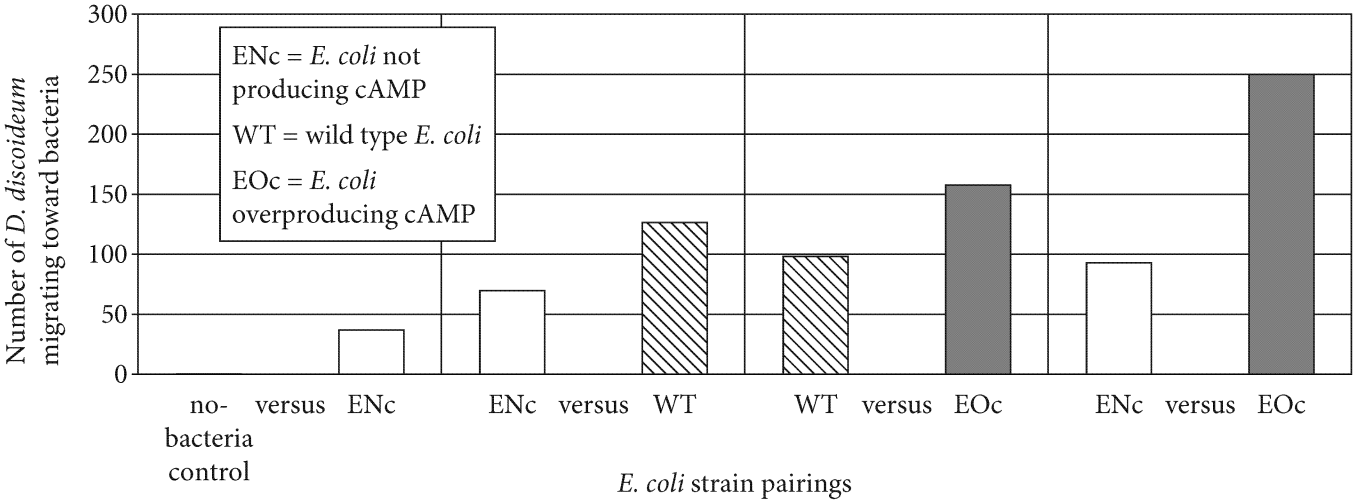


Figure 2

Response of Tennessee *Dictyostelium discoideum* Strain to *E. coli* Strains with and without cAMP Mutations



Figures adapted from Ghazai Rashidi and Elizabeth A. Ostrowski, "Phagocyte Chase Behaviours: Discrimination between Gram-Negative and Gram-Positive Bacteria by Amoebae." ©2019 by Ghazai Rashidi and Elizabeth A. Ostrowski.

CONTINUE

21

The main purpose of the passage is to

A) discuss research that explores factors that influence the prey selection of a soil amoeba.

B) examine the relationship between different cell-sensing mechanisms used by a soil amoeba.

C) challenge the consensus view about a soil amoeba and the chemical stimuli it responds to.

D) suggest that further research into different strains of a soil amoeba is necessary to understanding bacterial signals.

22

According to the passage, the soil amoeba *D. discoideum* has been

A) a popular choice for experimentation because of its widespread availability.

B) an ideal proxy for studying immune cells because it readily detects invading organisms.

C) useful for research into chemotaxis and phagocytosis.

D) investigated for its ability to sense cAMP over long distances.

23

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

A) approval.

B) realization.

C) identification.

D) respect.

24

A student claims that *D. discoideum* will pursue Gram-positive bacteria only if there are no Gram-negative bacteria available. Does the information provided in the passage support this claim?

A) Yes, because the amoeba has shown a strong preference for Gram-negative bacteria when evaluated in paired assays.

B) Yes, because the amoeba can distinguish between Gram-positive and Gram-negative bacteria and exhibits chemotaxis by moving toward the Gram-negative bacteria.

C) No, because the amoeba was sometimes observed to pursue Gram-positive bacteria when both Gram-positive and Gram-negative bacteria were available.

D) No, because Gram-positive bacteria that do not secrete cAMP are preferred to Gram-negative bacteria that do not secrete cAMP.

25

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

A) Lines 21-23 ("But . . . hunt")

B) Lines 24-26 ("Now . . . Gram-positives")

C) Lines 39-42 ("Ostrowski . . . species")

D) Lines 42-43 ("In 21 . . . bacteria")

CONTINUE

26

It can reasonably be inferred from the passage that the design of the study by Ostrowski and her coauthor helps to minimize which potential criticism?

A) The behavior of only a single amoeba strain is not representative of the behavior of all strains of that amoeba.

B) The experiment did not include assays under a variety of environmental conditions.

C) The levels of cAMP secreted by the Gram-negative and Gram-positive bacteria were inconsistent across the assays.

D) The distances the amoebas were expected to travel in order to select a bacterial species were not equivalent in all of the assays.

27

Which conclusion about the relationship between *D. discoideum* and bacteria that produce cAMP is best supported by the passage?

A) While *D. discoideum* shows a preference for a strain of Gram-negative bacteria that produced larger than normal amounts of cAMP over a strain of the same bacteria that produced no cAMP, that preference does not fully account for the amoebas' hunting behavior.

B) While *D. discoideum* demonstrates chemotaxis toward cAMP under normal circumstances, in situations where the amoeba lacks the necessary receptor, movement toward cAMP is not observed.

C) While *D. discoideum* locates Gram-negative bacteria by the cAMP that they produce, it is not clear what chemotactic molecule the amoeba tracks in Gram-positive bacteria.

D) While *D. discoideum* moves toward *E. coli* producing high levels of cAMP in greater numbers than it moves toward a wild-type strain of the same bacteria, *D. discoideum* does not move toward other types of bacteria that overproduce cAMP.

28

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

A) Lines 56-61 ("In a . . . cAMP")

B) Lines 61-65 ("They . . . cAMP")

C) Lines 66-71 ("The experiments . . . at all")

D) Lines 75-80 ("She . . . Gram-positives")

29

Which statement about the response of *D. discoideum* strains studied is best supported by the data in figure 1?

A) In both bacterial species pairings used with the Texas strain, the number of *D. discoideum* migrating toward Gram-negative bacteria reached 150.

B) Across the bacterial species pairings used with all three strains, the number of *D. discoideum* migrating toward Gram-positive bacteria was higher in pair 2 than it was in pair 1.

C) A greater number of *D. discoideum* in the Massachusetts strain showed a preference for Gram-negative bacteria over Gram-positive bacteria in pair 2 than in pair 1.

D) In none of the bacterial species pairings did the number of *D. discoideum* migrating toward Gram-positive bacteria reach 50.

CONTINUE

30

Which statement about wild-type *E. coli* is best supported by the data in figure 2?

A) *D. discoideum* preferred wild-type *E. coli* over *E. coli* not producing cAMP, but it preferred *E. coli* overproducing cAMP over wild-type *E. coli*.

B) *D. discoideum* preferred wild-type *E. coli* over both *E. coli* overproducing cAMP and *E. coli* not producing cAMP.

C) Twice the number of *D. discoideum* migrated toward wild-type *E. coli* when paired with *E. coli* not producing cAMP than migrated toward wild-type *E. coli* when paired with *E. coli* overproducing cAMP.

D) The number of *D. discoideum* migrating toward *E. coli* overproducing cAMP over wild-type *E. coli* was smaller than the number of *D. discoideum* migrating toward *E. coli* not producing cAMP over the no-bacteria control.

31

As used in line 73, "manipulate" most nearly means

A) reveal.

B) control.

C) negotiate.

D) misrepresent.

Questions 32-42 are based on the following passages.

Passage 1 is adapted from a speech delivered to the Canadian House of Commons in 1978 by Leonard Jones. ©1978 by the Crown. Passage 2 is adapted from James S. Cox, "Three Reasons to End the Monarchy in Canada." ©2016 by The Vimy Report. Canada shares a constitutional monarchy with England, meaning that the Queen of England is also Canada's legal head of state.

Passage 1

Let me point out to you the major reasons why Canadians feel the Queen of Canada should be retained as an integral part of our federal democratic system. First, the Queen as an hereditary figure provides Canada with a continuous, constant, stable head of state. No matter what kind of confusion takes place at the political level, in a constitutional monarchy, which we now have, we are assured of the continuous presence of a most able ruler. In an electoral system there is always a chance that the system will be stalemated. The presence of a constitutional monarch rules out the threat of a possible lack of government. Citizens in a democracy must be able to criticize and remove their leaders without fear that there will be no one to take over.

Second, the presence of a constitutional monarch takes away the struggle for power which occurs in so many countries and often leads to dictatorship. The Queen ensures freedom in Canada. After all, the system of a constitutional monarchy is certainly better than absolute leadership.

Third, elevation of rulers and the formation of courts and cliques is inevitable in governments of all kinds. A constitutional monarchy is not only less dangerous and less costly than most of them, it also limits, although it does not prevent, this tendency to form potentates and courts which neither democratic theory nor electoral practice have been able to diminish. The presence of the Queen of Canada ensures that [prime] ministers are in second place and are not the sole authority.

Fourth, the Queen presents to Canadians an aura of humanity amidst the vast realms of governmental bureaucracy. She is above partisan politics in government. When a Canadian sees Her Majesty in our country, he or she does not have to wonder if she is visiting that certain portion of the country to get votes. The Canadian cannot lend political overtones to her phrases. The Queen is truly a head of state to be respected.

CONTINUE

Passage 2

[O]ur model of governance is something of a pretend monarchy. The Queen does not really *rule* over Canada, she *reigns* abstractly, in a constitutionally neutered way. We could do away with the monarchy tomorrow and continue quite nicely with the same structure, under a truly Canadian Governor General overseeing a parliamentary republic, where *republic* is defined generically as a state governed by elected individuals exercising power according to the rule of law. Modern usage usually refers to states without a monarch. . . .

We do not need a monarchy, constitutional or otherwise, or a royal family of any kind. Canadians have proven time and time again that they can manage their own affairs in their own way, without guidance from Britain. What then is the purpose of an off-shore, paternalistic institution ranking above the government of Canada?

As matters stand today, the Governor General is appointed by the Queen, on the advice of the Prime Minister, and serves functionally as Canada's Head of State. Why do we also need an abstraction in the form of *The Crown* to represent the Canadian state over and above the Governor General? Moreover, in our federal system, the Queen is also represented in each province by a Lieutenant Governor. What real purpose is served by having 11 vice-regal representatives within the same country?

Some will argue that, despite the occasional test, Canadian unity has endured under a constitutional monarchy, so why tinker with something that apparently works? There are three problems with this approach. First, it is based on a false premise. The existence of a constitutional monarchy has had nothing to do with constraining centrifugal forces in Canada. . . . Malcontents have been isolated and defeated because people decided that remaining in Canada was to their benefit, both economically and socially. Second, sticking with what we have ignores the impact of the growth and change which has occurred in Canada in past generations, and the maturing and development that will continue in future generations. . . . Third, since 1940, Canada has steadily drifted away from its strongly British heritage and linkage, to find comfort in an American sphere of influence. The notion of a constitutional monarchy seems oddly ill-fitted to western hemisphere republicanism.

32

Which choice best describes the overall structure of Passage 1?

A) The author highlights a well-known generalization and then provides reasons why people should reject that generalization.

B) The author proposes a new measure and then outlines the steps that should be followed to implement that measure.

C) The author introduces a common argument and then outlines the thinking underpinning that argument.

D) The author recounts an anecdote and then narrates a sequence of events that resulted from the occurrence described in that anecdote.

33

According to Passage 1, which important power enjoyed by citizens in a democracy is best protected when that democracy is a constitutional monarchy?

A) The ability to remove elected representatives without incurring a crisis in government

B) The political leverage to ensure elected representatives adhere to the rule of law

C) The legal authority to punish elected representatives who engage in corrupt political practices

D) The reassurance that elected representatives prioritize their constituents' needs

34

As used in line 27, "form" most nearly means

A) establish.

B) educate.

C) mold.

D) discipline.

CONTINUE

35

According to Passage 2, the Queen's control over Canada

A) has stifled the country's economic growth.

B) will weaken if the monarchy does not change with the times.

C) makes the elected parliamentary government ineffective.

D) is in reality largely nonexistent.

36

In lines 57-59, 63-65, and 67-69, Cox asks questions mainly to

A) highlight the redundancy of the Queen's role in the Canadian government.

B) address anticipated counterarguments against his characterization of the Queen's duties.

C) emphasize the controversial nature of his proposal to revise the Canadian constitution.

D) summarize the kinds of questions constituents might ask about the differences between a republic and a constitutional monarchy.

37

Which choice from Passage 1 best supports the idea that Jones believes that in democracies, people are generally suspicious of politicians' motives when they address their constituents?

A) Lines 29-31 ("The presence . . . authority")

B) Lines 32-34 ("Fourth . . . bureaucracy")

C) Lines 35-38 ("When . . . votes")

D) Lines 39-40 ("The Queen . . . respected")

38

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

A) arrival.

B) strategy.

C) procedure.

D) advance.

39

It can most reasonably be inferred from Passage 2 that Cox believes that with respect to traditional institutions, societies should

A) find compromises that would make these institutions more compatible with modern attitudes.

B) accept the idea that these institutions still play a significant role in shaping the country's national identity.

C) be prepared to replace these institutions if they no longer address a nation's current needs.

D) be reluctant to allow foreign countries to have too much influence over how these institutions continue to evolve.

40

Which choice best describes a key difference between the passages' characterizations of the Queen's function in the Canadian government?

A) Passage 1 defends the current scope of the Queen's responsibilities, whereas Passage 2 recommends additional constitutional restrictions be imposed on her powers.

B) Passage 1 praises the Queen for the leadership she capably provides, whereas Passage 2 points out that the Queen's authority is merely ceremonial.

C) Passage 1 indicates that the general public has misunderstood the nature of the Queen's influence, whereas Passage 2 argues that the public feels strongly that the Queen's role is outdated.

D) Passage 1 details how the Queen's guidance has been useful to politicians, whereas Passage 2 suggests that the Queen has overstepped her prescribed responsibilities.

CONTINUE

41

Cox (Passage 2) would most likely respond to Jones's claim in lines 6-9, Passage 1 ("No matter . . . ruler") by arguing that

A) the government's ability to function is the result of public will rather than the influence of one ascendant leader.

B) the need for consensus is less important to Canadians than the idea that they can choose their representatives.

C) people find disputes among politicians to be less significant to their daily lives than economic matters that affect them personally.

D) Canadian history has shown that monarchs have tended to create more political tensions than they resolve.

42

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

A) Lines 53-54 ("We do . . . kind")

B) Lines 54-57 ("Canadians . . . Britain")

C) Lines 60-63 ("As matters . . . State")

D) Lines 70-73 ("Some . . . works")

CONTINUE

Questions 43-52 are based on the following passage.

This passage is adapted from Elizabeth Gibney, "Astronomers Detect Light from the Universe's First Stars." ©2018 by Macmillan Publishers Limited, part of Springer Nature.

Astronomers have for the first time spotted long-sought signals of light from the earliest stars ever to form in the Universe—around
Line 180 million years after the Big Bang.

The signal is a fingerprint left on background radiation by hydrogen that absorbed some of this primordial light. The evidence hints that the gas that made up the early Universe was colder than predicted. This, physicists say, is a possible sign of dark matter's influence. If confirmed, the discovery could mark the first time that dark matter has been detected through anything other than its gravitational effects.

"This is the first time we've seen any signal from this early in the Universe, aside from the afterglow of the Big Bang," says Judd Bowman, an astronomer at Arizona State University in Tempe who led the work, which is published in *Nature*. "If it's true, this is major news," says Saleem Zaroubi, a cosmologist at the University of Groningen in the Netherlands. Other teams will need to confirm the signal but, so far, the finding seems to be robust, he says. "It's very exciting stuff. This is a period in the Universe's history we know very little about."

Physicists think that the Big Bang, 13.8 billion years ago, generated an ionized plasma, which cooled rapidly as the Universe expanded. After about 370,000 years, this soup began to form neutral hydrogen atoms. Over time—and under gravity's influence—these clumped together, forming stars that ignited. This transition is known as the cosmic dawn.

Light from these stars would now be so faint that detecting it with Earth-based telescopes is near impossible. But astronomers have long hoped to see it indirectly: the light would have subtly shifted the behaviour of the hydrogen that once filled the space between stars. This change would have allowed hydrogen gas to absorb radiation from the cosmic microwave background (CMB)—the afterglow of the Big Bang—at a characteristic radio wavelength of 21 centimetres, which leaves a dip in the intensity of the CMB.

To search for the signal, the team used a radio telescope called the Experiment to Detect the Global Epoch of Reionization Signature (EDGES), based at the Murchison Radio-astronomy Observatory in Western Australia. Because our own galaxy and human-generated FM radio generate waves in the same band as the signal, spotting the dip meant carefully filtering out these more powerful sources. But Bowman and his colleagues soon found the predicted signal at roughly the frequency they expected. And despite being a puny 0.1% drop in the radiation, it was still twice the magnitude predicted. The finding was so stark that the researchers spent two years checking that it didn't come from an instrumental effect or noise. They even built a second antenna and pointed their instruments at different patches of sky at different times. "After two years, we passed all of these tests, and couldn't find any alternative explanation," says Bowman. "At that point, we started to feel excitement."

Radiation from this period arrives stretched out by the expansion of the Universe, meaning the band in which the signal was found gives away its age. This allowed the team to date the latest onset of the cosmic dawn to 180 million years after the Big Bang. The signal's disappearance gives away a second milestone—when more-energetic X-rays from the deaths of the first stars raised the temperature of the gas and turned off the signal. Bowman's team puts that time around 250 million years after the Big Bang.

Understanding these primordial stars is important not only because they shaped the matter around them, but also because their explosive deaths created the soup of heavier elements, such as carbon and oxygen, from which later stars formed, says Bowman. "If we really want to understand the cosmic ladder of our origins, this is a critical step to understand," he says.

While the signal appeared at an expected frequency, its strength was utterly unexpected, says Rennan Barkana, a cosmologist at Tel Aviv University in Israel. "I was actually quite amazed," says Barkana, who has published a second, related paper. He says the strength suggests that either there was more radiation than expected in the cosmic dawn, or the gas was cooler than predicted. Both would be "very strange and unexpected", he says.

CONTINUE

The only explanation that makes sense to Barkana is that the gas was cooled by something. That points to dark matter, he says, which theories suggest should have been cold in the cosmic dawn.

43

The main purpose of the passage is to

A) present findings that illustrate the challenges of identifying dark matter in the early universe.

B) discuss an ongoing debate concerning the possibility of using radiation to date the earliest stars.

C) summarize research dating the first stars and pointing to a potential impact of dark matter.

D) describe efforts to measure the temperatures of primordial stars and determine their composition.

44

Which choice best supports the idea that the decrease in cosmic background radiation caused by the first stars has yet to be established conclusively?

A) Lines 7-9 ("The evidence . . . predicted")

B) Lines 9-10 ("This . . . influence")

C) Lines 14-18 ("This . . . *Nature*")

D) Lines 21-22 ("Other . . . says")

45

The main purpose of the quotation from Zaroubi in lines 22-24 ("It's very . . . about") is to

A) characterize the research approach used by the astronomers as unconventional.

B) convey the potential importance of the study's findings in the field of astronomy.

C) acknowledge the limitations of the study's findings for understanding early stars.

D) indicate the difficulty of replicating the astronomers' research findings.

46

As used in line 36, "shifted" most nearly means

A) repositioned.

B) displaced.

C) modified.

D) transferred.

47

As used in line 39, "allowed" most nearly means

A) enabled.

B) empowered.

C) admitted.

D) released.

48

The fourth paragraph (lines 25-32) mainly serves to

A) describe the circumstances that physicists believe led to the formation of the first stars in the universe.

B) explain how physicists determined that the Big Bang occurred 13.8 billion years ago.

C) underscore a point of disagreement among physicists as to how quickly the universe expanded.

D) reveal how physicists first identified the signals of light from the earliest stars.

CONTINUE

49

It can reasonably be inferred from the passage that the experiment conducted by Bowman's team helped to exclude the possibility that

A) the intensity of the signal differed when measured by researchers in the Southern Hemisphere.

B) radio waves from the signal were in the same band as the waves from more powerful sources on Earth.

C) the signal's strength was due to an isolated phenomenon observed only in one location.

D) the intensity of the signal fluctuated as the telescope scanned for longer periods of time.

50

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

A) Lines 44-48 ("To search . . . Australia")

B) Lines 48-51 ("Because . . . sources")

C) Lines 56-58 ("The finding . . . noise")

D) Lines 58-60 ("They . . . times")

51

Based on the passage, which finding would likely have led Bowman's team to arrive at a different conclusion about the onset of the cosmic dawn?

A) The gas making up the early universe was colder than Bowman's team had predicted.

B) The signal was determined to be 1.5 times the magnitude Bowman's team had predicted.

C) The drop in radiation was greater than the 0.1% drop that Bowman's team discovered.

D) The signal was found at a much different frequency than Bowman's team had expected.

52

The last paragraph mainly serves to

A) call into question the previous methods of dating early stars.

B) offer a rationale for the unexpected strength of early star signals.

C) suggest that the research on signals from early stars is still in the initial stages.

D) address a potential criticism of the astronomers' findings on the cosmic dawn.

STOP

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

March 13, 2021 US (Official)

ANSWER KEY

Reading Test Answers

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

READING TEST RAW SCORE (NUMBER OF CORRECT ANSWERS)

Writing and Language Test Answers

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

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

Math Test – No Calculator Answers

1 D	11 D	
2 A	12 D	
3 B	13 A	
4 C	14 C	
5 B	15 B	
6 C	16 2	
7 C	17 56	
8 B	18 3	
9 A	19 5/3, 1.66, 1.67	
10 D	20 1/2, .5	

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

Math Test – Calculator Answers

1 D	11 B	21 D	31 80
2 B	12 C	22 C	32 10
3 A	13 C	23 A	33 4/5, .8
4 C	14 A	24 B	34 863
5 C	15 A	25 C	35 12/5, 2.4
6 C	16 D	26 C	36 5000
7 B	17 D	27 B	37 50/3, 16.6, 16.7
8 D	18 D	28 D	38 16
9 B	19 A	29 A	
10 B	20 A	30 C	

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

March 13, 2021 International

ANSWER KEY

Reading Test Answers

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

READING TEST RAW SCORE (NUMBER OF CORRECT ANSWERS)

Writing and Language Test Answers

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

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

Math Test – No Calculator Answers

1 A	11 A
2 C	12 A
3 D	13 D
4 B	14 A
5 B	15 C
6 D	16 7
7 D	17 300
8 B	18 42
9 D	19 6
10 C	20 8

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

Math Test – Calculator Answers

1 B	11 C	21 D	31 8
2 B	12 B	22 B	32 24
3 A	13 C	23 D	33 40
4 C	14 B	24 C	34 2
5 A	15 D	25 D	35 2/5, .4
6 C	16 A	26 C	36 1/2, .5
7 A	17 D	27 D	37 4.3
8 B	18 C	28 A	38 .613
9 B	19 B	29 D	
10 D	20 A	30 B	

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

April 13, 2021 US School Day (Official)

ANSWER KEY

Reading Test Answers

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

READING TEST RAW SCORE (NUMBER OF CORRECT ANSWERS)

Writing and Language Test Answers

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

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

Math Test – No Calculator Answers

1 B	11 D
2 C	12 D
3 C	13 A
4 B	14 C
5 A	15 D
6 A	16 4
7 D	17 120
8 B	18 6
9 D	19 7
10 A	20 1/6, .166, .167

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

Math Test – Calculator Answers

1 B	11 A	21 D	31 1422
2 A	12 A	22 B	32 56
3 D	13 C	23 D	33 900
4 C	14 B	24 B	34 4.5, 9/2
5 B	15 C	25 C	35 40
6 D	16 D	26 A	36 1.25, 5/4
7 D	17 B	27 A	37 5000
8 C	18 C	28 D	38 .375, 3/8
9 C	19 D	29 D	
10 B	20 A	30 C	

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

May 8, 2021 US (Official)

ANSWER KEY

Reading Test Answers

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

READING TEST RAW SCORE (NUMBER OF CORRECT ANSWERS)

Writing and Language Test Answers

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

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

Math Test – No Calculator Answers

1 B	11 A
2 C	12 A
3 C	13 A
4 C	14 B
5 A	15 D
6 C	16 3
7 D	17 50
8 D	18 9
9 B	19 6
10 C	20 4

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

Math Test – Calculator Answers

1 A	11 D	21 C	31 36
2 B	12 A	22 B	32 5
3 D	13 C	23 C	33 1/4, .25
4 C	14 A	24 D	34 7070
5 B	15 C	25 B	35 4
6 C	16 A	26 C	36 1.62
7 D	17 A	27 A	37 1/3, .333
8 C	18 A	28 D	38 1
9 D	19 C	29 B	
10 B	20 B	30 D	

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

May 8, 2021 International (Official)

ANSWER KEY

Reading Test Answers

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

READING TEST RAW SCORE (NUMBER OF CORRECT ANSWERS)

Writing and Language Test Answers

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

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

Math Test – No Calculator Answers

1 A	11 D
2 A	12 D
3 A	13 C
4 D	14 D
5 C	15 A
6 B	16 4
7 D	17 .5, 1/2
8 B	18 50
9 B	19 8100
10 C	20 .25, 1/4

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

Math Test – Calculator Answers

1 D	11 C	21 A	31 576
2 C	12 D	22 D	32 2/9, .222
3 D	13 C	23 C	33 48
4 A	14 B	24 B	34 6
5 B	15 B	25 A	35 40
6 B	16 A	26 B	36 59
7 A	17 D	27 C	37 5
8 A	18 B	28 B	38 5/2, 2.5
9 A	19 D	29 C	
10 D	20 B	30 B	

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

August 28, 2021 US

ANSWER KEY

Reading Test Answers

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

READING TEST RAW SCORE (NUMBER OF CORRECT ANSWERS)

Writing and Language Test Answers

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

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

Math Test – No Calculator Answers

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

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

Math Test – Calculator Answers

1 A	11 D	21 A	31 3888
2 B	12 B	22 A	32 30
3 C	13 A	23 A	33 20
4 D	14 A	24 B	34 11
5 C	15 D	25 C	35 70
6 B	16 B	26 C	36 7
7 A	17 C	27 D	37 5
8 C	18 A	28 C	38 11
9 D	19 C	29 B	
10 B	20 D	30 B	

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

August 28, 2021 International

ANSWER KEY

Reading Test Answers

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

READING TEST RAW SCORE (NUMBER OF CORRECT ANSWERS)

Writing and Language Test Answers

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

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

Math Test – No Calculator Answers

1 A	11 A
2 B	12 B
3 B	13 D
4 B	14 D
5 A	15 C
6 C	16 9
7 D	17 0, 4
8 D	18 12
9 C	19 3
10 C	20 60

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

Math Test – Calculator Answers

1 B	11 C	21 C	31 2
2 C	12 D	22 A	32 .4, 2/5
3 C	13 B	23 B	33 5
4 C	14 A	24 C	34 7
5 D	15 A	25 D	35 54.5
6 B	16 B	26 A	36 4
7 D	17 C	27 D	37 6
8 A	18 A	28 D	38 600
9 D	19 C	29 A	
10 B	20 D	30 A	

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

October 2, 2021 US (Official)

ANSWER KEY

Reading Test Answers

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

READING TEST RAW SCORE (NUMBER OF CORRECT ANSWERS)

Writing and Language Test Answers

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

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

Math Test – No Calculator Answers

1 A	11 D
2 A	12 B
3 A	13 B
4 D	14 A
5 B	15 B
6 D	16 70
7 C	17 3/5, .6
8 C	18 2
9 B	19 4
10 C	20 8

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

Math Test – Calculator Answers

1 B	11 A	21 C	31 1/2, .5
2 A	12 B	22 A	32 20
3 B	13 B	23 D	33 1890
4 A	14 D	24 B	34 2
5 D	15 B	25 B	35 4
6 A	16 C	26 C	36 66
7 C	17 C	27 B	37 .71
8 D	18 A	28 D	38 3/2, 1.5
9 A	19 C	29 B	
10 A	20 B	30 D	

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

October 2, 2021 International

ANSWER KEY

Reading Test Answers

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

READING TEST RAW SCORE (NUMBER OF CORRECT ANSWERS)

Writing and Language Test Answers

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

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

Math Test – No Calculator Answers

1 D	11 B
2 B	12 D
3 A	13 D
4 D	14 A
5 D	15 D
6 A	16 2
7 D	17 6
8 B	18 1.2, 6/5
9 B	19 124
10 C	20 26

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

Math Test – Calculator Answers

1 C	11 B	21 D	31 351
2 C	12 C	22 A	32 10
3 A	13 C	23 A	33 5/8
4 C	14 A	24 C	34 5
5 B	15 B	25 C	35 9.4
6 C	16 B	26 B	36 6
7 C	17 D	27 C	37 4
8 D	18 B	28 A	38 3
9 A	19 C	29 C	
10 D	20 B	30 B	

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

December 4, 2021 US

ANSWER KEY

Reading Test Answers

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

READING TEST RAW SCORE (NUMBER OF CORRECT ANSWERS)

Writing and Language Test Answers

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

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

Math Test – No Calculator Answers

1	D	11	A
2	B	12	D
3	C	13	C
4	A	14	C
5	D	15	B
6	A	16	4
7	B	17	2
8	B	18	12
9	B	19	7
10	C	20	376

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

Math Test – Calculator Answers

1	B	11	D	21	B	31	6
2	B	12	C	22	B	32	0, 8
3	C	13	D	23	D	33	24
4	A	14	A	24	D	34	9/5, 1.8
5	A	15	A	25	C	35	31, 32, 33, 34, 35
6	A	16	B	26	B	36	3
7	D	17	C	27	C	37	4/5, .8
8	A	18	D	28	B	38	2/3, 1.66, 1.67
9	C	19	B	29	D		
10	D	20	A	30	A		

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

December 4, 2021 International

ANSWER KEY

Reading Test Answers

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

READING TEST RAW SCORE (NUMBER OF CORRECT ANSWERS)

Writing and Language Test Answers

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

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

Math Test – No Calculator Answers

1 C	11 D
2 D	12 B
3 D	13 D
4 B	14 A
5 A	15 B
6 D	16 8/3, 2.66, 2.67
7 A	17 9
8 A	18 7
9 B	19 3
10 A	20 34

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

Math Test – Calculator Answers

1 D	11 C	21 C	31 80
2 B	12 A	22 D	32 3
3 C	13 A	23 C	33 3/2, 1.5
4 B	14 C	24 D	34 32
5 B	15 D	25 A	35 15
6 B	16 A	26 A	36 115
7 A	17 D	27 B	37 10
8 A	18 A	28 B	38 4, 12
9 B	19 D	29 A	
10 C	20 B	30 A	

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