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 Amy Tan, *The Bonesetter's Daughter*. ©2001 by Amy Tan.

At last, Old Widow Lau was done haggling with the driver and we stepped inside Father's shop. It was north-facing, quite dim inside, and perhaps this was why Father did not see us at first. He was busy with a customer, a man who was distinguished-looking, like the scholars of two decades before. The two men were bent over a glass case, discussing the different qualities of inksticks. Big Uncle welcomed us and invited us to be seated. From his formal tone, I knew he did not recognize who we were. So I called his name in a shy voice. And he squinted at me, then laughed and announced our arrival to Little Uncle, who apologized many times for not rushing over sooner to greet us. They rushed us to be seated at one of two tea tables for customers. Old Widow Lau refused their invitation three times, exclaiming that my father and uncles must be too busy for visitors. She made weak efforts to leave. On the fourth insistence, we finally sat. Then Little Uncle brought us hot tea and sweet oranges, as well as bamboo latticework fans with which to cool ourselves.

I tried to notice everything so I could later tell GaoLing what I had seen, and tease out her envy. The floors of the shop were of dark wood, polished and clean, no dirty footprints, even though this was during the dustiest part of the summer. And along the walls were display cases made of wood and glass. The glass was very shiny and not one pane was broken. Within those glass cases were our silk-wrapped boxes, all our hard work. They looked so much nicer than they had in the ink-making studio at Immortal Heart village.

I saw that Father had opened several of the boxes. He set sticks and cakes and other shapes on a silk cloth covering a glass case that served as a table on which he and the customer leaned. First he pointed to a stick with a top shaped like a fairy boat and said with graceful importance, "Your writing will flow as smoothly as a keel cutting through a glassy lake." He picked up a bird shape: "Your mind will soar into the clouds of higher thought." He waved toward a row of ink cakes embellished with designs of peonies and bamboo: "Your ledgers will blossom into abundance while bamboo surrounds your quiet mind."

As he said this, Precious Auntie came back into mind. I was remembering how she taught me that everything, even ink, had a purpose and a meaning: Good ink cannot be the quick kind, ready to pour out of a bottle. You can never be an artist if your work comes without effort. That is the problem of modern ink from a bottle. You do not have to think. You simply write what is swimming on the top of your brain. And the top is nothing but pond scum, dead leaves, and mosquito spawn. But when you push an inkstick along an inkstone, you take the first step to cleansing your mind and your heart. You push and you ask yourself, What are my intentions? What is in my heart that matches my mind?

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CONTINUE

I remembered this, and yet that day in the ink shop, I listened to what Father was saying, and his words became far more important than anything Precious Auntie had thought. "Look here," Father said to his customer, and I looked. He held up an inkstick and rotated it in the light. "See? It's the right hue, purple-black, not brown or gray like the cheap brands you might find down the street. And listen to this." And I heard a sound as clean and pure as a small silver bell. "The high-pitched tone tells you that the soot is very fine, as smooth as the sliding banks of old rivers. And the scent—can you smell the balance of strength and delicacy, the musical notes of the ink's perfume? Expensive, and everyone who sees you using it will know that it was well worth the high price."

I was very proud to hear Father speak of our family's ink this way.

1

Which choice best summarizes the passage?

A) A character's arrival at her family's ink shop sparks fond memories of her favorite aunt.

B) A character's surprise visit leads to a happy reunion at her family's ink shop.

C) A character comes to understand her father's ambitions while visiting her family's ink shop.

D) A character's visit to her family's ink shop deepens her appreciation of her family's work.

2

A main theme of the passage is that

A) family relationships should be nurtured.

B) quality is achieved through deliberate effort.

C) hard work results in material compensation.

D) creativity needs to be expressed concretely.

3

Throughout the passage, the narrator is portrayed as someone who is

A) reserved around unfamiliar people.

B) attuned to her immediate surroundings.

C) sympathetic to the needs of others.

D) anxious about her responsibilities.

4

It can be most reasonably inferred from the passage that Old Widow Lau's reluctance to stay for tea is

A) feigned, because she is not genuinely firm in her resolve.

B) inconsiderate, because the family has been planning her visit.

C) appropriate, because the shop is unusually busy.

D) ill-advised, because she is exhausted from the journey.

5

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

A) Lines 1-4 ("At last . . . first")

B) Lines 11-15 ("And he . . . customers")

C) Lines 15-18 ("Old . . . leave")

D) Lines 19-21 ("Then . . . ourselves")

6

The narrator indicates that the contrast between the ink-making studio at Immortal Heart village and her family's ink shop is that the ink shop

A) displays the family's ink more impressively.

B) is more conveniently located for the public.

C) provides greater individual attention to customers.

D) offers a larger space for presenting products.

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CONTINUE

7

Based on the artistic philosophy expressed in the fourth paragraph (lines 46-59), it is reasonable to infer that Precious Auntie would consider a hastily written first draft of a story to be

A) emotionally raw and powerful.
B) creatively satisfying for the author.
C) essentially worthless in and of itself.
D) inappropriately analytical for a piece of art.

8

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

A) Lines 46-48 ("As he . . . meaning")
B) Lines 49-50 ("Good . . . bottle")
C) Lines 52-55 ("You simply . . . spawn")
D) Lines 57-59 ("You push . . . mind")

9

As used in line 59, "matches" most nearly means

A) competes against.
B) corresponds with.
C) runs counter to.
D) treats equally.

10

As used in line 68, "clean" most nearly means

A) complete.
B) skillful.
C) distinct.
D) upright.

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CONTINUE

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

This passage is adapted from "How the Web Affects Memory." ©2011 by Harvard Magazine Inc.

Search engines have changed the way we use the Internet, putting vast sources of information just a few clicks away. But Harvard professor of psychology Daniel Wegner's recent research proves that websites—and the Internet—are changing much more than technology itself. They are changing the way our memories function.

Wegner's latest study, "Google Effects on Memory: Cognitive Consequences of Having Information at Our Fingertips," shows that when people have access to search engines, they remember fewer facts and less information because they know they can rely on "search" as a readily available shortcut.

Wegner, the senior author of the study, believes the new findings show that the Internet has become part of a transactive memory source, a method by which our brains compartmentalize information. First hypothesized by Wegner in 1985, transactive memory exists in many forms, as when a husband relies on his wife to remember a relative's birthday. "[It is] this whole network of memory where you don't have to remember everything in the world yourself," he says. "You just have to remember who knows it." Now computers and technology as well are becoming virtual extensions of our memory.

The idea validates habits already forming in our daily lives. Cell phones have become the primary location for phone numbers. GPS devices in cars remove the need to memorize directions. Wegner points out that we never have to stretch our memories too far to remember the name of an obscure movie actor or the capital of Kyrgyzstan—we just type our questions into Google. "We become part of the Internet in a way," he says. "We become part of the system and we end up trusting it."

Working with researchers Betsy Sparrow of Columbia University and Jenny Liu of the University of Wisconsin–Madison, Wegner conducted four experiments to demonstrate the phenomenon, using various forms of memory recall to test reliance on computers. In the first experiment, participants demonstrated that they were more likely to think of computer terms like "Yahoo" or "Google" after being asked a set of difficult trivia questions. In two other experiments, participants were asked to type a collection of readily memorable statements, such as "An ostrich's eye is bigger than its brain." Half the subjects were told that their work would be saved to a computer; the other half were informed that the statements would be erased. In subsequent memory testing, participants who were told their work would not be saved were best at recalling the statements. In a fourth experiment, participants typed into a computer statements they were told would be saved in specific folders. Next, they were asked to recall the statements. Finally, they were given cues to the wording and asked to name the folders where the statements were stored. The participants proved better able to recall the folder locations than the statements themselves.

Wegner concedes that questions remain about whether dependence on computers will affect memories negatively: "Nobody knows now what the effects are of these tools on logical thinking." Students who have trouble remembering distinct facts, for example, may struggle to employ those facts in critical thinking. But he believes that the situation overall is beneficial, likening dependence on computers to dependence on a mechanical hand or other prosthetic device.

And even though we may not be taxing our memories to recall distinct facts, we are still using them to consider where the facts are located and how to access them. "We still have to remember things," Wegner explains. "We're just remembering a different range of things." He believes his study will lead to further research into understanding computer dependence, and looks forward to tracing the extent of human *inter*dependence with the computer world—pinpointing the "movable dividing line between us and our computers in cyber networks."

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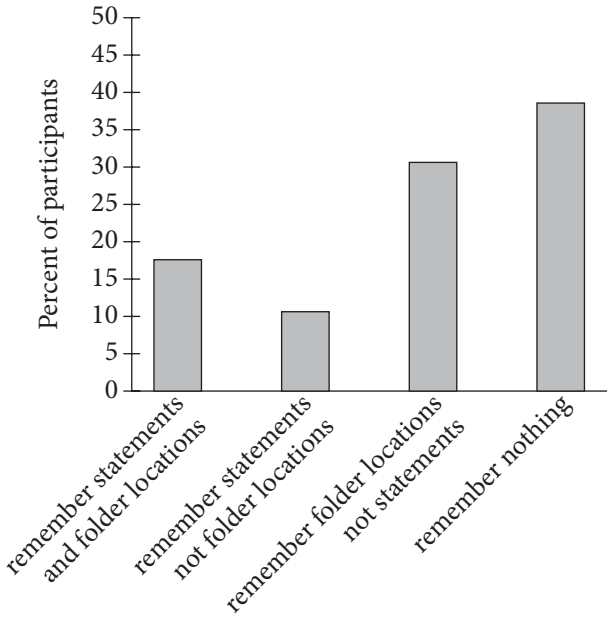
CONTINUE

Results of Experiment 4: Memory of Statements and Folder Locations



Adapted from Betsy Sparrow et al., "Google Effects on Memory: Cognitive Consequences of Having Information at Our Fingertips." ©2011 by American Association for the Advancement of Science.

11

The main purpose of the passage is to

A) describe a series of experiments on the way technology interferes with critical thinking.

B) assert that people have become overly dependent on computers for storing information.

C) discuss the idea that humans' capacity for memory is much weaker than it once was.

D) share the findings of a study examining the effect of computer use on memory recall.

12

Which choice best supports the idea that reliance on computers does not necessarily diminish human memory?

A) Lines 3-6 ("But Harvard . . . itself")

B) Lines 31-33 ("Wegner . . . Kyrgyzstan")

C) Lines 66-68 ("Students . . . thinking")

D) Lines 72-75 ("And even . . . them")

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CONTINUE

13

In context, the reference to remembering a relative's birthday mainly serves to

A) show that people who are closely related tend to have shared memories.

B) demonstrate how people initially developed external sources of memory.

C) emphasize the effectiveness and accuracy of transactive memory sources.

D) illustrate the concept of a transactive memory source using a familiar situation.

14

Based on the information in the passage, which of the following would be considered a transactive memory source?

A) A souvenir brought home from a memorable trip

B) A written list of a user's passwords for different websites

C) A library database that helps users locate specific books

D) A website that helps users plan and make travel arrangements

15

As used in line 26, "extensions of" most nearly means

A) delays in.

B) additions to.

C) lengths of.

D) developments of.

16

The discussion of the experiments suggests that people are inclined to think of specific information sources in response to being

A) required to memorize details that will then be made inaccessible.

B) directed to develop a system for organizing and saving content.

C) asked to provide facts that are not already familiar to them.

D) prompted to identify terms related to dependence on computers.

17

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

A) Lines 42-45 ("In the . . . questions")

B) Lines 48-51 ("Half . . . erased")

C) Lines 51-53 ("In subsequent . . . statements")

D) Lines 59-61 ("The participants . . . themselves")

18

As used in line 67, "employ" most nearly means

A) utilize.

B) enroll.

C) exert.

D) assign.

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CONTINUE

19

According to the graph, approximately what percentage of participants remembered both parts of the information given to them during the fourth experiment?

A) 7%
B) 10%
C) 17%
D) 30%

20

Based on the description of Wegner's fourth experiment, what is the most likely explanation for the findings for the largest single group of participants represented in the graph?

A) Those participants focused on remembering the folder locations.
B) Those participants attempted to remember the statements and the folder locations.
C) Those participants did not attempt to remember any specific pieces of information.
D) There is not enough information to determine the cause of the results for those participants.

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

This passage is adapted from Marlene Zuk, *Paleofantasy: What Evolution Really Tells Us about Sex, Diet, and How We Live*. ©2013 by Marlene Zuk.

A female guppy can be sexually mature at two months of age and have her first babies just a month later. This unstinting rate of reproduction makes guppies ideally suited for studying the rate of evolution, and David Reznick, a biologist at UC Riverside, has been doing exactly that for the last few decades.

People usually think of guppies as colorful aquarium fish, but they also have a life in the real world, inhabiting streams and rivers in tropical places like Trinidad, where Reznick has done his fieldwork. Guppies can experience different kinds of conditions depending on the luck of the draw. A lucky guppy is born above a waterfall or a set of rapids, which keep out the predatory fish called pike cichlids found in calmer downstream waters. As you might expect, the guppy mortality rate—that is, the proportion of individuals that die—is much higher in the sites with the rapacious cichlids than in those without them.

Reznick has shown that if you bring the fish into the lab and let them breed there, the guppies from the sites with many predators become sexually mature when they are younger and smaller than do the guppies from the predator-free sites. In addition, the litters of baby guppies produced by mothers from the high-risk streams are larger, but each individual baby is smaller than those produced by their counterparts. The disparity makes sense because if you are at risk of being eaten, being able to have babies sooner, and spreading your energy reserves over a lot of them, makes it more likely that you will manage to pass on some of your genes before you meet your fate. Reznick and other scientists also demonstrated that these traits are controlled by the guppies' genes, not by the environment in which they grow up.

How quickly, though, could these differences in how the two kinds of guppies lived their lives have evolved? Because there are numerous tributaries of the streams in Trinidad, with guppies living in some but not all of them, Reznick realized that he could, as he put it in a 2008 paper, "treat streams like giant test tubes by introducing guppies or predators" to places they had not originally occurred, and then watch as

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CONTINUE

natural selection acted on the guppies. This kind of real-world manipulation of nature is called "experimental evolution," and it is growing increasingly popular among scientists working with organisms that reproduce quickly enough for humans to be able to see the outcome within our lifetimes.

Along with his students and colleagues, Reznick removed groups of guppies from their predator-ridden lives below the waterfall and released them into previously guppy-free streams above the falls. Although small predatory killifish occurred in these new sites, these fish do not pose anything close to the danger of the cichlids. Then the scientists waited for nature to do its work, and they brought the descendants of the transplanted fish back to the lab to examine their reproduction. After just eleven years, the guppies released in the new streams had evolved to mature later, and have fewer, bigger offspring in each litter, just like the guppies that naturally occurred in the cichlid-free streams. Other studies of guppies in Trinidad have shown evolutionary change in as few as two and a half years, or a little over four generations, with more time required for genetic shifts in traits such as the ability to form schools and less time for changes in the colorful spots and stripes on a male's body.

Figure 1

Mean Number of Guppy Offspring in High- and Low-Predation Environments on North and South Slopes of Trinidad's Northern Range Mountains

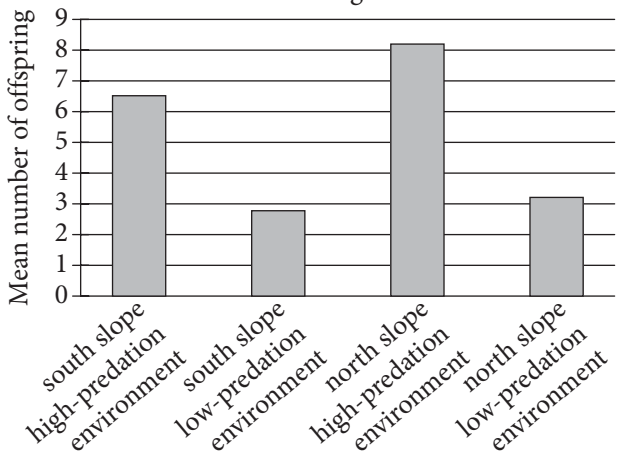
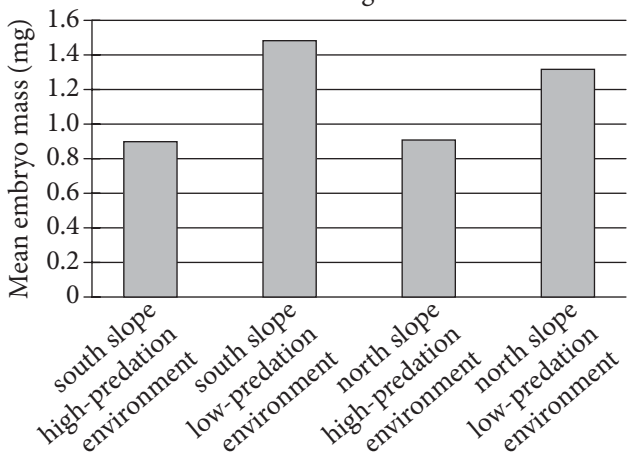


Figure 2

Mean Embryo Mass of Guppy Offspring in High- and Low-Predation Environments on North and South Slopes of Trinidad's Northern Range Mountains



Figures adapted from David N. Reznick, Cameron K. Ghalambor, and Kevin Crooks, "Experimental Studies of Evolution in Guppies: A Model for Understanding the Evolutionary Consequences of Predator Removal in Natural Communities." ©2007 by Blackwell Publishing Ltd.

21

The first paragraph mainly serves to

A) establish the reason why a certain species was selected for scientific observation.

B) illustrate the value of studying the offspring of a particular animal shortly after birth.

C) introduce a theory at the center of an ongoing scientific debate.

D) offer a rationale for the prevalence of a new field of scientific inquiry.

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22

In describing the living conditions of guppies, the author indicates that a "lucky guppy" (line 14) is one that

A) is born in a major river having an established guppy population.
B) inhabits an environment that provides natural protection from predators.
C) manages to navigate the risks associated with living near a waterfall.
D) avoids predatory fish by living in calmer downstream waters.

23

Which choice provides the best evidence for the conclusion that the streams used by Reznick's team in their real-world study were not entirely free of predators?

A) Lines 14-16 ("A lucky . . . waters")
B) Lines 16-20 ("As you . . . them")
C) Lines 46-52 ("This . . . lifetimes")
D) Lines 57-59 ("Although . . . cichlids")

24

In lines 43-44, Reznick uses the phrase "giant test tubes" to suggest that certain streams can

A) provide suitable experimental conditions.
B) promote cooperative behaviors in specimens.
C) expedite the rate of genetic changes.
D) solve widespread environmental problems.

25

As used in line 49, "popular" most nearly means

A) accessible.
B) suitable.
C) widespread.
D) likable.

26

Which finding, if accurate, would undermine Reznick's findings?

A) Guppies examined in other parts of the globe exhibit genetic shifts in traits at a different rate from that exhibited by the guppies Reznick examined.
B) The new site into which Reznick released the guppies is inhabited by fish that are found to be as predatory as the cichlids in the original sites.
C) Experimental evolution is shown to be harmful to the environments where studies like Reznick's are conducted.
D) The descendants of Reznick's transplanted fish are proven to mature later than the guppies living below the waterfall.

27

It can most reasonably be inferred from the passage that the experiments in Trinidad have shown which of the following about guppies?

A) Some genetic traits will evolve more readily than others.
B) Some predatory fish are more dangerous to guppies than cichlids are.
C) Some guppies thrive better in areas below waterfalls than they do in areas above waterfalls.
D) Some genetic shifts are easier to prevent in a natural environment than in a lab.

28

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

A) Lines 38-40 ("How quickly . . . evolved")
B) Lines 40-46 ("Because . . . the guppies")
C) Lines 53-56 ("Along . . . falls")
D) Lines 67-72 ("Other . . . body")

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CONTINUE

29

According to figure 1, guppies living in the south slope high-predation environment produced a mean number of offspring between

A) 2 and 3.

B) 3 and 4.

C) 5 and 6.

D) 6 and 7.

30

Which conclusion about the mean mass of guppy embryos is best supported by figure 2?

A) The slope location was a better indicator of mean embryo mass than was the predation level observed in each environment.

B) The mean embryo mass of guppies born in the north slope environments exceeded the mean embryo mass of guppies born in the south slope environments.

C) The predation level observed in each environment had more of an effect on mean embryo mass than did slope location.

D) The guppies born in the low-predation environments had a mean embryo mass less than that of guppies born in the high-predation environments.

31

The data presented in figures 1 and 2 best support the conclusion that compared with guppies from high-predation environments, guppies from low-predation environments were more likely to

A) have fewer offspring and reach full maturity sooner.

B) be part of a smaller litter and have a greater mean embryo mass.

C) have a higher rate of survival and have less mean embryo mass.

D) produce a greater number of offspring and have a greater mean embryo mass.

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CONTINUE

Questions 32-42 are based on the following passage.

This passage is adapted from a speech delivered in 1838 by Sara T. Smith at the Second Anti-Slavery Convention of American Women.

We are told that it is not within the "province of woman," to discuss the subject of slavery; that it is a "political question," and we are "stepping out of our sphere," when we take part in its discussion. It is not true that it is *merely* a political question, it is likewise a question of justice, of humanity, of morality, of religion; a question which, while it involves considerations of immense importance to the welfare and prosperity of our country, enters deeply into the home-concerns, the every-day feelings of millions of our fellow beings. Whether the laborer shall receive the reward of his labor, or be driven daily to *unrequited* toil—whether he shall walk erect in the dignity of conscious manhood, or be reckoned among the beasts which perish—whether his bones and sinews shall be his own, or another's—whether his child shall receive the protection of its natural guardian, or be ranked among the live-stock of the estate, to be disposed of as the caprice or interest of the master may dictate—. . . these considerations are all involved in the question of liberty or slavery.

And is a subject comprehending interests of such magnitude, merely a "political question," and one in which woman "can take no part without losing something of the modesty and gentleness which are her most appropriate ornaments"? May not the "ornament of a meek and quiet spirit" exist with an upright mind and enlightened intellect, and must woman necessarily be less gentle because her heart is open to the claims of humanity, or less modest because she feels for the degradation of her enslaved sisters, and would stretch forth her hand for their rescue?

By the Constitution of the United States, the whole physical power of the North is pledged for the suppression of domestic insurrections, and should the slaves, maddened by oppression, endeavor to shake off the yoke of the taskmaster, the men of the North are bound to make common cause with the tyrant, and put down, at the point of the bayonet, every effort on the part of the slave, for the attainment of his freedom. And when the father, husband, son, and brother shall have left their homes to mingle in the unholy warfare, "to become the executioners of their brethren, or to fall themselves by their hands,"[1] will the mother, wife, daughter, and sister feel that they have no interest in this subject? Will it be easy to convince them that it is no concern of theirs, that their homes are rendered desolate, and their habitations the abodes of wretchedness? Surely this consideration is of itself sufficient to arouse the slumbering energies of woman, for the overthrow of a system which thus threatens to lay in ruins the fabric of her domestic happiness; and she will not be deterred from the performance of her duty to herself, her family, and her country, by the cry of political question.

But admitting it to be a political question, have we no interest in the welfare of our country? May we not permit a thought to stray beyond the narrow limits of our own family circle, and of the present hour? May we not breathe a sigh over the miseries of our countrymen, nor utter a word of remonstrance against the unjust laws that are crushing them to the earth? Must we witness "the headlong rage or heedless folly," with which our nation is rushing onward to destruction, and not seek to arrest its downward course? Shall we silently behold the land which we love with all the heart-warm affection of children, rendered a hissing and a reproach throughout the world, by this system which is already tolling the death-bell of her decease among the nations? No: the events of the last two years have cast their dark shadows before, overclouding the bright prospects of the future, and shrouding the destinies of our country in more than midnight gloom, and we cannot remain inactive. Our country is as dear to us as to the proudest statesman, and the more closely our hearts cling to "our altars and our homes," the more fervent are our aspirations that every inhabitant of our land may be protected in his fireside enjoyments by just and equal laws; that the foot of the tyrant may no longer invade the domestic sanctuary, nor his hand tear asunder those whom God himself has united by the most holy ties. Let our course, then, still be *onward*!

[1] A quotation from the Declaration of Independence

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CONTINUE

32

Smith's main purpose in the passage is to

A) accuse fellow abolitionists of overlooking the contributions that women have made to the movement.

B) argue that the causes of abolition and women's rights are continuations of the spirit of the American Revolution.

C) make the case that women's rights are meaningless while slavery exists.

D) encourage women to see their participation in the abolitionist cause as just and important.

33

Which statement provides the best description of a technique that Smith uses throughout the passage to advance her main point?

A) She presents claims in the form of rhetorical questions that mostly have implicit negative answers.

B) She criticizes her opponents by quoting self-contradictory remarks they have made.

C) She illustrates each of her central ideas with an emotionally powerful anecdote.

D) She emphasizes the reasonableness of her views by presenting them as though they are universally held.

34

How does Smith develop her argument about slavery as a "political question" (line 3) over the course of the passage?

A) She claims the designation is an outdated one and then offers alternative definitions.

B) She dismisses the designation as too narrow but then demonstrates its relevance to her audience.

C) She contends that the designation has become trite and then invites her audience to revitalize it.

D) She describes the meaning the designation has for men and then challenges women to embrace it.

35

Which choice best summarizes the first paragraph?

A) Smith explains a conventional viewpoint and presents evidence supporting it.

B) Smith rejects a claim and elaborates on her reasons for doing so.

C) Smith introduces her subject and provides historical background for understanding it.

D) Smith identifies a problem and proposes steps to remedy it.

36

In the passage, Smith argues that it is possible for women to engage in which activity?

A) Acting according to humanitarian principles while preserving their femininity

B) Adhering to personal morality while being politically neutral

C) Contributing to their family's financial security while meeting social expectations

D) Resisting calls for war while still opposing slavery

37

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

A) Lines 26-33 ("May . . . rescue")

B) Lines 42-47 ("And when . . . subject")

C) Lines 51-54 ("Surely . . . happiness")

D) Lines 77-82 ("Our . . . laws")

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CONTINUE

38

According to Smith, the US Constitution requires which action on the part of the Northern free states if slaves were to revolt?

A) The Northern states would have to sever ties with the slave states.
B) The Northern states would have to give shelter to refugees from the slave states.
C) The Northern states would have to help the slave states fight the slaves' rebellion.
D) The Northern states would have to provide financial assistance to the rebelling slaves.

39

In context, what is the main effect of Smith's use of the word "tyrant" in lines 40 and 83?

A) It identifies a specific individual as oppressive.
B) It highlights the threat of aggression from abroad.
C) It critiques the limited roles for women in antislavery movements.
D) It emphasizes the unjustness of slavery.

40

As used in line 52, "slumbering" most nearly means

A) lethargic.
B) drowsy.
C) dormant.
D) unconscious.

41

In the passage, Smith most strongly suggests that slavery affects the United States by

A) lowering the country's reputation in the international community.
B) leading many women to disavow their allegiance to the country.
C) causing violent conflicts in many areas of the country.
D) weakening the authority of the country's government.

42

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

A) Lines 48-50 ("Will it . . . wretchedness")
B) Lines 59-61 ("May . . . hour")
C) Lines 68-73 ("Shall . . . nations")
D) Lines 73-77 ("No: the . . . inactive")

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CONTINUE

Questions 43-52 are based on the following passages.

Passage 1 is adapted from Brian Handwerk, "A New Antibiotic Found in Dirt Can Kill Drug-Resistant Bacteria." ©2015 by Smithsonian Institution. Passage 2 is adapted from David Livermore, "This New Antibiotic Is Cause for Celebration—and Caution." ©2015 by Telegraph Media Group Limited.

Passage 1

"Pathogens are acquiring resistance faster than we can introduce new antibiotics, and this is causing a human health crisis," says biochemist Kim Lewis of Northeastern University.

Lewis is part of a team that recently unveiled a promising antibiotic, born from a new way to tap the powers of soil microorganisms. In animal tests, teixobactin proved effective at killing off a wide variety of disease-causing bacteria—even those that have developed immunity to other drugs. The scientists' best efforts to create mutant bacteria with resistance to the drug failed, meaning teixobactin could function effectively for decades before pathogens naturally evolve resistance to it.

Natural microbial substances from soil bacteria and fungi have been at the root of most antibiotic drug development during the past century. But only about one percent of these organisms can be grown in a lab. The rest, in staggering numbers, have remained uncultured and of limited use to medical science, until now. "Instead of trying to figure out the ideal conditions for each and every one of the millions of organisms out there in the environment, to allow them to grow in the lab, we simply grow them in their natural environment where they already have the conditions they need for growth," Lewis says.

To do this, the team designed a gadget that sandwiches a soil sample between two membranes, each perforated with pores that allow molecules like nutrients to diffuse through but don't allow the passage of cells. "We just use it to trick the bacteria into thinking that they are in their natural environment," Lewis says.

The team isolated 10,000 strains of uncultured soil bacteria and prepared extracts from them that could be tested against nasty pathogenic bacteria. Teixobactin emerged as the most promising drug. Mice infected with bacteria that cause upper respiratory tract infections (including *Staphylococcus aureus* and *Streptococcus pneumoniae*) were treated with teixobactin, and the drug knocked out the infections with no noticeable toxic effects.

It's likely that teixobactin is effective because of the way it targets disease: The drug breaks down bacterial cell walls by attacking the lipid molecules that the cell creates organically. Many other antibiotics target the bacteria's proteins, and the genes that encode those proteins can mutate to produce different structures.

Passage 2

Many good antibiotic families—penicillin, streptomycin, tetracycline—come from soil fungi and bacteria and it has long been suspected that, if we could grow more types of bacteria from soil—or from exotic environments, such as deep oceans—then we might find new natural antibiotics. In a recent study, researchers [Kim Lewis and others] found that they could isolate and grow individual soil bacteria—including types that can't normally be grown in the laboratory—in soil itself, which supplied critical nutrients and minerals. Once the bacteria reached a critical mass they could be transferred to the lab and their cultivation continued. This simple and elegant methodology is their most important finding to my mind, for it opens a gateway to cultivating a wealth of potentially antibiotic-producing bacteria that have never been grown before.

The first new antibiotic that they've found by this approach, teixobactin, from a bacterium called *Eleftheria terrae*, is less exciting to my mind, though it doesn't look bad. Teixobactin killed Gram-positive bacteria, such as *S. aureus*, in the laboratory, and cured experimental infection in mice. It also killed the tuberculosis bacterium, which is important because there is a real problem with resistant tuberculosis in the developing world. It was also difficult to select teixobactin resistance.

So, what are my caveats? Well, I see three. First, teixobactin isn't a potential panacea. It doesn't kill the Gram-negative opportunists as it is too big to cross their complex cell wall. Secondly, scaling to commercial manufacture will be challenging, since the bacteria making the antibiotic are so difficult to grow. And, thirdly, it's early days yet. As with any antibiotic, teixobactin now faces the long haul of clinical trials: Phase I to see what dose you can safely give the patient, Phase II to see if it cures infections,

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and Phase III to compare its efficacy to that of
90 "standard of care treatment." That's going to take five years and £500 million and these are numbers we must find ways to reduce (while not compromising safety) if we're to keep ahead of bacteria, which can evolve far more swiftly and cheaply.

43

The first paragraph of Passage 1 primarily serves to

A) present a claim that is supported and developed over the course of the passage.

B) introduce a controversy that the study described in the passage is intended to resolve.

C) identify a problem that the research discussed in the passage may help to address.

D) offer a theory that is challenged by the findings presented in the passage.

44

The author of Passage 1 suggests that an advantage of the method Lewis's team used to grow microorganisms is that it

A) identifies the requirements for soil bacteria to thrive and replicates those features in artificial soil.

B) enables soil bacteria to take in more nutrients than they typically consume in natural settings.

C) directly affects the cell walls of bacteria rather than the proteins those bacteria produce.

D) allows researchers to make use of soil bacteria that they had previously been unable to exploit.

45

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

A) Lines 17-21 ("But only . . . now")

B) Lines 28-32 ("To do . . . cells")

C) Lines 32-34 ("We just . . . says")

D) Lines 44-47 ("It's likely . . . organically")

46

The author of Passage 2 would most likely agree with which statement about the development of teixobactin?

A) It reveals that some antibiotics are effective against gram-negative bacteria.

B) It shows that conventional methods can still yield new types of antibiotics.

C) It casts doubt on the practicality of searching for new antibiotics in exotic environments.

D) It confirms a long-held belief about a potential source of new antibiotics.

47

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

A) exceptions.

B) restrictions.

C) misgivings.

D) explanations.

48

In the last sentence of Passage 2, the author uses the phrase "five years and £500 million" primarily to

A) emphasize the scale of the effort needed to make teixobactin available for consumer use.

B) criticize the level of funding that the government has committed to teixobactin development.

C) underscore the amount of time and money that has already been spent researching teixobactin.

D) compare the amount of money spent developing teixobactin with the amount spent developing other antibiotics.

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Which choice best describes the relationship between Passage 1 and Passage 2?

A) Passage 2 offers an evaluation of the significance of the research discussed in Passage 1.

B) Passage 2 suggests a modification to the methodology described in Passage 1.

C) Passage 2 uses concrete examples to illustrate concepts considered in Passage 1.

D) Passage 2 takes a dismissive stance regarding the findings mentioned in Passage 1.

50

Both passages make the point that teixobactin could be useful in

A) standardizing the future development of antibiotics produced in laboratory environments.

B) combating infections that are no longer responding to treatment with other antibiotics.

C) controlling the spread of pathogenic soil fungi.

D) shaping a new method of studying the effectiveness of antibiotics.

51

Information in Passage 2 best supports which conclusion about the mice in the experiment described in Passage 1?

A) Exposure to teixobactin made them less susceptible to subsequent upper respiratory tract infections.

B) Gram-positive bacteria enhanced the effectiveness of teixobactin against their upper respiratory tract infections.

C) Their upper respiratory tract infections were likely not caused by gram-negative bacteria.

D) Teixobactin attacked the proteins of the bacteria that caused their upper respiratory tract infections.

52

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

A) Lines 51-56 ("Many . . . antibiotics")

B) Lines 64-68 ("This . . . before")

C) Lines 69-72 ("The first . . . bad")

D) Lines 80-82 ("It doesn't . . . wall")

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