Reading Test

65 MINUTES, 52 QUESTIONS

Turn to Section 1 of your answers 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 Rita Dove, *Through the ivory Gate*. ©1992 by Rita Dove. The novel's main character, Virginia, has just found her old cello while unpacking after a move.

She had not played seriously since college. Accompanying the theater troupe's performances and clowning around as her friend Parker picked out old Beatles songs on the piano didn't count—that wasn't real music, music that made you forget where you were, made you forget where your arms and legs ended and luscious sound began.

She had started playing the cello when she was nine, shortly after the move to Arizona. At the beginning of the school year in Akron, every child in fourth grade had been issued a pre-instrument called a tonette so the teacher could determine who had an "aptitude" for music. Virginia had liked the neatness of the tonette, its modest musical range and how it fit into her school desk on the right side. Whenever she covered a fingerhole, she felt the contour of its slightly raised lip and imagined she was playing the tentacle of an octopus.

She had chafed through months of scales and simple songs, waiting for the moment when she would walk across the auditorium stage and choose: kneel among the rows of somber black cases, undo the metal clasps and fling open the lid to reveal her instrument, a flute or a clarinet, glowing softly, half buried in deep blue velvet.

But before she could make her choice, they moved to Arizona. There, the music instruments were stored in a classroom trailer, and when she opened the flute case she nearly winced from the glare bouncing off all that polished silver, those gloating caps and hinges. The clarinet was worse—it looked like an overdesigned walking stick, sounded like a clown laughing, and had reeds that needed to be softened in spit.

The music teacher shut the cases with a succession of curt clicks. "That leaves the strings," she sighed, leading the way back through the noonday blaze and into the main building, where the violins, violas, cellos and double basses were housed. There, by virtue of its sonorous name, Virginia asked for the violoncello—and was too intimidated by the teacher's growing impatience to protest when what emerged from the back closets was something resembling not a guitar, but a childsized android. In her anguish Virginia bowed her head and blindly accepted the instrument. It was not long, however, before she realized that she had made a good choice, for the sound of its name was synonymous with the throbbing complaint that poured out of its cumbersome body.

It took her nearly a year just to learn how to hold it properly. She had been accustomed to practicing after school, but one weekend evening while her parents were out, she dragged the instrument into their bedroom and used pillows to prop the music on the armchair. She was just about to sit on the edge of the bed when something, maybe the shadow thrown from the flowered lampshade or the slats of light sifting from

CONTINUE

the street, made her want to *do things right*. She got a straightback chair from the dining room and sat down correctly, bringing the instrument slowly toward her body. The lamp picked up the striations down the back of the wood, each strip slightly different, a little browner, a little more golden, but meeting its mate at the spine, a barely perceptible seam. For the first time she saw that the back of the cello was rounded like a belly, the belly of a tiger she had to bring close to her, taming it before she was torn limb from limb. She had to love and not be scared, and show the cat that it did not need to growl to protect itself. The animal stood on its hind legs and pressed its torso to hers, one paw curled like a ribbon behind her left ear. It was heavy; she sat very straight in the chair in order to support it.

Funny how fantasy works. And memory. I haven't thought about that evening in years. Virginia bent down and lay the cello case on its back, as she knelt to unsnap the metal clasps.

1

The repetition of the phrase "made you forget" in lines 5-6 primarily serves to

A) emphasize the qualities Virginia associates with powerful music.

B) re-create Virginia's emotional reaction to the Beatles songs she once heard.

C) suggest that Virginia's memories of the theater troupe are fading with time.

D) highlight the regret Virginia feels about ending her musical studies.

2

In the passage, the description of Virginia's experience with the tonette illustrates which aspect of her relationship with music?

A) Her extraordinary aptitude for music at a young age.

B) Her early interest in and commitment to music.

C) Her initial fear of failure as she learned to play music.

D) Her resentment as a child of the time required to practice music.

3

As used in line 38, "housed" is most similar in meaning to which other word as used in the passage?

A) "covered" (Line 15)

B) "moved" (Line 26)

C) "stored" (Line 27)

D) "opened" (Line 28)

4

Based on the passage, which choice best describes Virginia's reaction to the flute and clarinet in the classroom trailer?

A) She is skeptical of the quality of both instruments, in particular that of the clarinet.

B) She is repelled by the appearance of both instruments and by the sound of the clarinet.

C) She is concerned about the poor conditions in which both instruments have been store.

D) She is frustrated by the difficulty of playing either instrument properly.

CONTINUE

5

According to the passage, Virginia allows herself to be assigned the violoncello because

A) she is reluctant to request an alternative.

B) it is the last instrument remaining in the trailer.

C) its graceful form reminds her of a wild animal.

D) the sound it produces has soulful attributes.

6

In the passage, the narrator suggests that Virginia perceives a relationship between which aspects of a musical instrument?

A) What it is called and how it sounds.

B) How it should be played and the maintenance it requires.

C) What it looks like and how popular it is.

D) How widely available it is and how easy it is to master.

7

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

A) Lines 19-25 ("She...velvet")

B) Lines 26-30 ("But...hinges")

C) Lines 34-38 ("The music...housed")

D) Lines 44-48 ("It was...body")

8

In the sixth paragraph (lines 49-71), the narrator suggests that Virginia recognizes a need to change her attitude toward the cello from one of

A) uncertainty to firm commitment.

B) dissatisfaction to reluctant acceptance.

C) apprehension to calm affection.

D) frustration to deep respect.

9

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

A) Lines 49-50 ("It took...properly")

B) Lines 50-54 ("She had...armchair")

C) Lines 57-60 ("She...her body")

D) Lines 66-68 ("She...itself")

10

In the context of the passage as a whole, the italicized sentences in lines 72-73 mainly serve to

A) cast doubt on the accuracy of Virginia's memories.

B) introduce the point of view of a new character.

C) suggest a contrast between real and imagined events.

D) indicate a shift in time and perspective.

CONTINUE

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

This passage is adapted from Elizabeth Svoboda, *What Makes a Hero? The Surprising Science of Selflessness.* ©2013 by Elizabeth Svoboda.

A variety of studies have confirmed the strength of the connection between altruism and well-being. In 1999, the behavioral medicine specialist Carolyn Schwartz, then at the University of Massachusetts, and her colleagues divided multiple sclerosis patients into two groups and had members of one group call members of the other regularly to provide them with emotional support. After tracking the groups for three years, Schwartz found that the helpers—the people in the phone-call group—reported profound improvements in their self-worth and their moods. "These people seemed to be blossoming," Schwartz says. "They talked about how helping other people transformed their experience of multiple sclerosis from something that victimized them to something that enabled them to be a positive force in the world."

In a 2010 survey of more than 4,500 American volunteers, 89 percent—nearly 9 in 10—stated that volunteering improved their sense of well-being, while a sizable majority reported that it lowered their stress levels and enhanced their sense of purpose in life. This connection appears to hold true regardless of culture: In a 2012 study of older Maori and non-Maori in New Zealand, those who volunteered more often scored higher on happiness measures.

In best-case scenarios, regular helping may even help stave off an early death. Analyzing data from more than seven thousand respondents collected for the government's Longitudinal Study of Aging, the researchers Alex Harris and Carl Thoresen found that frequent volunteers had a 19 percent lower mortality risk than people who never volunteered when the subjects' level of social support was taken into account. That means volunteering is associated with longer survival independent of the advantages social ties provide. Even more dramatically, when University of Michigan researchers studied 423 older couples who were followed for five years, those who helped others were nearly 60 percent less likely to die during the study period than those who never helped.

While many survey studies have found more or less strong associations between helping and happiness, the University of California, Riverside, psychologist Sonja Lyubomirsky wanted to test the connection in a real-world setting. She asked students to carry out five "random acts of kindness" of their choice every week for six weeks—they could choose anything that benefited others, from making a homeless person a meal to helping a kid with a school assignment. The subjects experienced higher levels of happiness than controls when they performed all five kind acts in one day, suggesting that the well-being boost is pronounced when people help often.

Interestingly, though, students who spaced the kind acts out, performing them on different days, *didn't* experience the same happiness boost. Lyubomirsky's work suggests altruistic acts may need to be frequent in order to confer a lasting change in well-being. With isolated acts of helping, says the London School of Economics social scientist Francesca Borgonovi, "it could be that there's a very short—narrowly defined in time and space—bump in happiness that doesn't shift your [overall] happiness in any meaningful way."

On balance, though, being generous boosts your mood and health because it strengthens your sense that you're really doing something significant. The social psychologist Sara Konrath of the University of Michigan notes that helping others may signal our bodies to release pleasurable chemicals such as oxytocin. The boost we get from helping may also mute our stress response, causing us to release fewer jarring stress hormones such as cortisol and norepinephrine.

CONTINUE

Figure 1

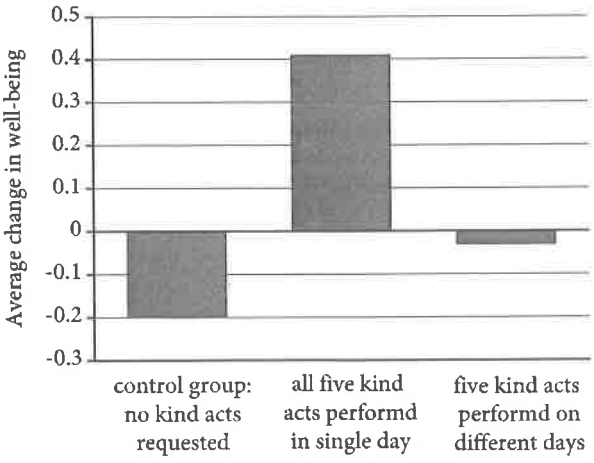
Selected Response to 2010 Survey of 4,500 American Adults Who Volunteered in the Previous Year

Survey statement	percent of respondents agreeing
Volunteering has made me feel physically healthier	68%
Volunteering has improved My sense of well-being	89%
Volunteering lowers my Stress level	73%
Volunteering enriches my Sense of purpose in life	92%

Adapted from "Volunteering and Your Health: How Giving Back Benefits Everyone." ©2010 by UnitedHealth Group.

Figure 2

Average Change in Well-Being over a Six-Week Period for Three Groups



Adapted from Sonja Lyubomirsky, Kennon M. Sheldon, and David Schkade, "Pursuing Happiness: the Architecture of Sstainable Change." ©2005 by the Educational Publishing Foundation.

Subjects completed measures of well-being at the beginning and end of the experiment. Positive values indicate greater well-being at the end than at the beginning; negative values indicate lower well-being at the end than at the beginning.

11

Based on the passage, which choice best describes the relationship between emotional support and well-being as shown by Schwartz's study?

A) Both givers and recipients of emotional support reported increased well-being.

B) Givers of emotional support reported increased well-being, while recipients reported no change.

C) Givers of emotional support reported increased well-being.

D) Both givers and recipients of emotional support reported initial well-being followed by a return to their previous condition.

12

As used in line 16, "positive" most nearly means

A) confident.

B) practical.

C) specific.

D) beneficial.

13

As used in line 42, "associations" most nearly means

A) links.

B) organizations.

C) combinations.

D) partnerships.

CONTINUE

14

If true, which finding of a survey of the general population would most undermine the author's interpretation of Lyubomirsky's study?

A) The happiness boost associated with altruistic acts remains constant when more than five altruistic acts are performed in a single day.

B) While all altruistic acts confer a happiness boost, altruistic acts that lead to immediate benefits confer the greatest boost.

C) The amount of happiness people feel as a result of performing altruistic acts increases with the effort those acts require.

D) Occasional altruistic acts result in long-lasting increases in the personal happiness of those who perform them.

15

In lines 61-64, the author includes the quotation from Borgonovi most likely to

A) indicate the hypothesis that Lyubomirsky's study was intended to test.

B) provide a possible explanation for a result of Lyubomirsky's study.

C) criticize Lyubomirsky for failing to consider the benefits of short-term happiness.

D) compare the results of Lyubomirsky's study with those of another study about kind acts.

16

The author most strongly suggests that people who perform altruistic acts benefit partly because of

A) beliefs that they hold about the effect of such acts.

B) feedback that they receive from those who benefit from such acts.

C) changes in brain chemistry that occur when they merely think about such acts.

D) the social approval that they receive for performing such acts.

17

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

A) Lines 3-8 ("In 1999...support")

B) Lines 57-59 ("Lyubomirsky's...well-being")

C) Lines 65-67 ("On balance...significant")

D) Lines 68-71 ("The social...oxytocin")

18

According to figure 1, the highest percentage of respondents agreed that volunteering has

A) positively affected their physical health.

B) given them a renewed sense of self-esteem.

C) made them feel a greater sense of purpose.

D) helped them control their responses to stress.

CONTINUE

19

Based on information in the passage, it can reasonably be inferred that the majority of survey respondents represented in figure 1

A) value volunteering because they have a high degree of empathy.

B) may have experienced decreases in the level of certain hormones after volunteering.

C) are likely to live longer than are volunteers who disagreed with the statements.

D) always have higher levels of oxytocin circulating in their bloodstreams than do nonvolunteers.

20

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

A) Lines 17-22 ("In a...life")

B) Lines 22-25 ("This connection...measures")

C) Lines 36-40 ("Even...helped")

D) Lines 71-74 ("The boost...norepinephrine")

21

Which choice best states the relationship between the two figures and the passage?

A) Both figures offer data that challenge the primary claim of the passage.

B) Both figures provide the specific results of studies discussed in the passage.

C) Both figures present a visual interpretation of the first study mentioned in the passage.

D) Both figures describe studies that the author claims require further evaluation.

CONTINUE

Questions 22-31 are based on the following passage.

This passage is adapted from Jonathan Shaw, "The 'Bionic Leaf.'" ©2015 by Harvard Magazine Inc.

Harvard scientists have created a "bionic leaf" that converts solar energy into a liquid fuel. The work—a proof of concept in an exciting new field that might be termed biomanufacturing—is the fruit of a collaboration between the laboratories of professor of biochemistry and systems biology Pamela Silver and professor of energy Daniel Nocera. The pair, who began collaborating two years ago, share an interest in developing energy sources that might someday have practical application in remote locales in the developing world. Silver dubbed the system "bionic" because it joins a biological system to a clever piece of inorganic chemistry previously developed by Nocera: that invention, widely known as the *artificial* leaf, converts solar energy into hydrogen fuel.

Nocera's artificial leaf, which serves as the fuel source in the bionic leaf, works by sandwiching a photovoltaic cell between two thin metal oxide catalysts. When submersed in a glass of water at room temperature and normal atmospheric pressure, the artificial leaf mimics photosynthesis. Current from the silicon solar wafer is fed to the catalysts, which split water molecules: oxygen bubbles off the catalyst on one side of the wafer, while hydrogen rises from the catalyst on the wafer's other side. Nocera has been perfecting the artificial leaf since he first demonstrated it in 2011; today, it is far more efficient than a field-grown plant, which captures only 1 percent of sunlight's energy. He says he can reach efficiencies of 70 percent to 80 percent of the underlying solar-wafer technology, which is improving constantly.

The hydrogen it produces is a versatile fuel from a chemical standpoint, Nocera reports, and could easily become the basis of a fuel cell, but it has not been widely adopted, in part because it is a gas. Liquid fuels are much easier to handle and store, hence the new *bionic* leaf's importance.

In the bionic leaf, the hydrogen gas is fed to a metabolically engineered version of a bacterium called *Ralstonia eutropha*. The bacteria combine the hydrogen with carbon dioxide as they divide to make more cells, and then—through a trick of bioengineering pioneered by Anthony Sinskey, professor of microbiology and of health sciences and technology at MIT—produce isopropanol (rubbing alcohol), which can be burned in an engine much like the gasoline additive ethanol.

"The advantage of interfacing the inorganic catalyst with biology is you have an unprecedented platform for chemical synthesis that you don't have with inorganic catalysts alone," says Brendan Colón, a graduate student in systems biology in the Silver lab. "Life has evolved for billions of years to produce catalysts capable of making chemical modifications on complicated molecules with surgical precision, many times at room temperature," Colón explains. "If you can use enzymes for building chemicals, you open the door to making many of the natural compounds we rely on every day," such as antibiotics, pesticides, herbicides, fertilizer, and pharmaceuticals.

Members of Silver's lab have been working to perfect the tricky interface between the catalyst and the bacteria, so that they will thrive and grow optimally. In its first iteration, the bionic leaf matched the efficiency of photosynthesis in plants, far below the capabilities of Nocera's underlying artificial leaf. Now the team is working to surpass blue-green algae, which—at 5 percent efficiency—do better at photosynthesis than plants. Colón has been developing a strain of the bacterium that grows well even at the lower voltages that might be emitted by the solar wafer at the system's core on a cloudy day, for example; this could dramatically improve overall efficiency.

Ultimately, though, Silver's goal is not to create fuels from this work, but "high-value commodities" in remote places. Fuel, she notes wryly, is cheap "because we fight wars over it"—and developing a system that could make fuel at a price lower than gasoline would therefore be very difficult, she says. Drugs, on the other hand, are high-value commodities, so engineering a bacterium to produce not isopropanol but a vitamin or a drug may be her next goal for this system.

CONTINUE

22

The primary purpose of the passage is to

A) discuss the development and significance of the bionic leaf.

B) document current commercial uses of the bionic leaf.

C) present a scientific debate about the effectiveness of the bionic leaf.

D) analyze the differences between the artificial leaf and the bionic leaf.

23

The first paragraph implies that Silver and Nocera's research was motivated in part by a desire to address which problem?

A) Many developing countries lack natural resources that are convertible to fuel.

B) Liquid fuels are easier to produce than gas fuels but are less efficient.

C) It is difficult to transfer solar energy over long distances after it is collected.

D) Some communities lack adequate access to reliable energy sources.

24

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

A) Lines 1-2 ("Harvard...fuel")

B) Lines 2-7 ("The work...Nocera")

C) Lines 7-11 ("The pair...world")

D) Lines 11-15 ("Silver...fuel")

25

The main purpose of the second paragraph (lines 16-31) is to

A) A discuss the advantages of a potential competitor to the bionic leaf.

B) explain the workings of a central component of the bionic leaf.

C) describe the role of photosynthesis in the development of the bionic leaf.

D) compare the efficiency of the bionic leaf with that of the artificial leaf.

26

The passage indicates that the artificial leaf carries out which chemical process?

A) It splits water into hydrogen and oxygen.

B) It splits carbon dioxide into carbon and oxygen.

C) It combines oxygen and carbon dioxide.

D) It combines hydrogen and carbon dioxide.

27

As used in line 28, "captures" most nearly means

A) records.

B) describes.

C) uses.

D) conquers.

CONTINUE

28

As used in line 42, "trick" most nearly means

A) clever technique.

B) mischievous prank.

C) fleeting illusion.

D) deliberate deception.

29

Colón's remarks in the fifth paragraph (lines 48-60) primarily serve to

A) highlight the technological sophistication and intricate design of the bionic leaf.

B) praise the collaborative spirit and hard work of the inventors of the bionic leaf.

C) illustrate the careful testing and continuous improvement of the bionic leaf.

D) emphasize the innovative nature and great potential of the bionic leaf.

30

As presented in the passage, the researchers make which assumption about the bionic leaf that has yet to be substantiated?

A) The efficiency of the leaf can equal the efficiency of plant photosynthesis.

B) The leaf can be used to produce chemical compounds other than isopropanol.

C) The artificial catalysts used in the leaf can be replaced by natural catalysts.

D) The leaf can generate a fuel that powers engines as efficiently as ethanol does.

31

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

A) Lines 40-47 ("The bacteria...ethanol")

B) Lines 48-52 ("The advantage...lab")

C) Lines 53-56 ("Life...explains")

D) Lines 56-60 ("If you...pharmaceuticals")

CONTINUE

Questions 32-41 are based on the following passage.

Passage 1 is adapted from Albert Luthuli's speech to the South African Congress of Democrats, delivered in 1958. Passage 2 is adapted from Harold Macmillan's address to the South African Parliament, delivered in 1960. At the time of these speeches, South Africa was in the process of transitioning from a British colony to an independent republic under a system of white-minority rule known as apartheid Luthuli was the president of the African National Congress, a group advocating equality for black South Africans; Macmillan, the prime minister of Britain, was addressing the all-white South African Parliament.

Passage 1

Those of us who are in the freedom struggle in this country have really only one gospel. We may possibly shade it in different ways, but it is a gospel of democracy and freedom.

If we are true to South Africa, that must be our vision, a vision of South Africa as a fully democratic country. It cannot in honesty be claimed that she is yet really democratic, when only about a third of her people enjoy democratic rights, and the rest—notwithstanding the fact that they constitute the majority—are still subjected to apartheid rule. I emphasize the words "are still" because I do believe firmly that it is not a state that can be perpetuated. Apartheid rule is the antithesis of democracy. Apartheid—in theory and in practice—is an effort, to make Africans march back to tribalism.

Sometimes very nice and pretty phrases are used to justify this diversion from the democratic road. The one that comes to my mind is the suggestion that we Africans will "develop along our own lines." I do not know of any people who really have "developed along their own lines." My fellow white South Africans, enjoying what is called "Western civilization," should be the first to agree that this civilization is indebted to previous civilizations, from the East, from Greece, Rome and so on. For its heritage, Western civilization is really indebted to very many sources, both ancient and modern....

The essence of development along your own lines is that you must have the right to develop, and the right to determine how to develop.

Its essence is freedom and—beyond freedom—self-determination. This is the vision we hold for our future and our development.

One might ask, "Is this vision of a democratic society in South Africa a realizable vision? Or is it merely a mirage?" I say, it is a realizable vision. For it is in the nature of man, to yearn and struggle for freedom. The germ of freedom is in every individual, in anyone who is a human being. In fact, the history of mankind is the history of man struggling and striving for freedom. Indeed, the very apex of human achievement is FREEDOM and not slavery. Every human being struggles to reach that apex.

Passage 2

The wind of change is blowing through this continent and whether we like it or not, this growth of national consciousness is a political fact. And we must all accept it as a fact, and our national policies must take account of it.

Of course you understand this better than anyone, you are sprung from Europe, the home of nationalism, and here in Africa you have yourselves created a free nation. A new nation. Indeed, in the history of our times yours will be recorded as the first of the African nationalists. And this tide of national consciousness which is now rising in Africa, is a fact, for which you and we, and the other nations of the Western world are ultimately responsible. For its causes are to be found in the achievements of Western civilization....

I am sure you will agree that in our own areas of responsibility we must each do what we think right. What we British think right derives from a long experience both of failure and success in the management of these affairs. We try to learn and apply the lessons of both. Our judgement of right and wrong and of justice is rooted in the same soil as yours—in Christianity and in the rule of law as the basis of a free society. This experience of our own explains why it has been our aim in the countries for which we have borne responsibility, not only to raise the material standards of life, but to create a society that respects the rights of individuals, a society in which men are given the opportunity to grow to their full stature—and that must in our view include the opportunity of an increasing share in political power and responsibility, a society finally in which individual merit and individual merit alone, is the criterion for a man's advancement, whether political or economic.

Finally, in countries inhabited by several different races, it has been our aim to find means by which the community can become more of a community, and fellowship fostered between its various parts.

CONTINUE

32

In Passage 1, Luthuli argues that South Africa will become a fully democratic country only when black South Africans

A) enjoy the same rights as white citizens.

B) have economic as well as political power.

C) form their own political organizations.

D) constitute a majority of the government.

33

Luthuli refers to "very nice and pretty phrases" (line 17) primarily to show that language is being used in order to

A) rectify an intolerable situation.

B) obscure an indefensible governing system.

C) undermine outspoken critics of the government.

D) depict the daily experience of the majority of citizens.

34

When Luthuli describes the vision of a democratic society in South Africa as "realizable" (lines 36-37), he means that this vision can be

A) acquired

B) comprehended

C) achieved

D) pursued

35

In Passage 2, Macmillan implies that the growth of national consciousness in Africa is

A) baffling, because most African nations function efficiently without strong nationalist movements.

B) invigorating, because most African nations are ready to embrace diversity.

C) inevitable, because nationalism in Africa is a force that cannot be stopped.

D) remarkable, because many Europeans doubted that nationalism would take hold in Africa.

36

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

A) Lines 45-49 ("The wind...of it")

B) Lines 53-55 ("Indeed...nationalists")

C) Lines 58-59 ("For its...civilization")

D) Lines 68-74 ("This...stature")

37

In Passage 2, Macmillan presents his argument to the South African government by

A) asserting that Britain and South Africa share certain important values.

B) urging the government to take a leadership role among African nations.

C) acknowledging that South Africa faces greater challenges than does Britain.

D) lamenting Britain's difficulties in sustaining free and just societies.

CONTINUE

38

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

A) Lines 50-53 ("Of course...nation")

B) Lines 60-61 ("I am...right")

C) Lines 62-64 ("What...affairs")

D) Lines 65-68 ("Our judgment...society")

39

Luthuli would most likely respond to Macmillan's demand for a society in which all individuals have a "share in political power and responsibility" (lines 75-76) by arguing that

A) economic power is more important to black South Africans than political power.

B) such a society is impossible as long as apartheid exists in South Africa.

C) many black South Africans do not want to participate in a corrupt political system.

D) many black South Africans already have significant political responsibilities.

40

Luthuli and Macmillan would most likely agree on which statement about freedom?

A) Just societies give people the freedom to develop as individuals.

B) Democracy cannot exist where freedom is in any way compromised.

C) Political freedom must precede economic and social freedom.

D) Freedom is directly related to a spirit of nationalism.

41

The speeches of Luthuli (Passage 1) and Macmillan (Passage 2) differ in their approach to social change in that

A) Luthuli suggests that major social change in South Africa is unlikely to happen soon, while Macmillan argues that significant change is imminent.

B) Luthuli implies that the people of South Africa themselves will initiate social change, while Macmillan emphasizes the role played by those in positions of power.

C) Luthuli states that eliminating apartheid is only the first step toward genuine social change, while Macmillan contends that eliminating apartheid is an ultimate goal.

D) Luthuli believes that change in South Africa will come about through collective action, while Macmillan emphasizes the need for change at the individual level.

CONTINUE

Questions 42-52 are based on the following passage.

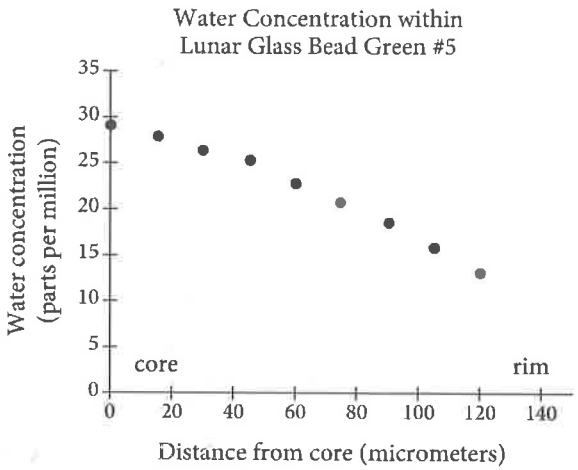
This passage is adapted from Robert M. Hazen, *The Story of Earth: The First 4.5 Billion Years, from Stardust to Living Planet.* ©2012 by Robert M. Hazen.

The Moon is bone-dry by conventional wisdom (actually drier than bone, which retains a significant water component even when baked in the desert sun). Multiple lines of evidence point to this aridity: Earth-based telescopes reveal no characteristic infrared absorption; Moon rocks from all six Apollo landing sites held no detectable traces of water (at least by 1970 analytical standards); and the finding of unrusted iron metal after four billion years on the lunar surface would seem to preclude even a trace of corrosive water.

It's a funny thing about conventional wisdom, though. Eventually someone will challenge what everyone else knows to be true, and once in a while something really interesting will be found. In 1994 a single flyby of the Clementine spacecraft mission produced radar measurements that were consistent with water ice, though many planetary scientists were unconvinced. Four years later the Lunar Prospector employed neutron spectroscopy to detect a significant concentration of hydrogen atoms, and hence possibly water ice or water-containing minerals, near the poles. Still, many experts pointed to implanted hydrogen ions from the Sun's solar wind as a more likely source of the signal. Then in October 2009 NASA smashed the upper stage of an Atlas rocket into one of the Moon's craters (the Cabeus crater, near the southern lunar pole) and scrutinized the plume of impact debris for signs of H_2O. Sure enough, the flurry of dust incorporated a small but significant amount of the life-giving stuff—enough to renew interest in lunar water and its possible origins. Three back-to-back articles in *Science* that same October established that evidence for water on the Moon is now unambiguous.

Enter Erik Hauri and his colleagues at the Carnegie Institution. Using an ion microprobe—a highly sensitive instrument that hadn't been available to the first generation of scientists who studied the Apollo samples—Hauri's team has revisited the colorful glass beads collected during lunar missions in the late 1960s and early 1970s. Other scientists had examined the glass beads for signs of water decades earlier, but their detection capacities were no match for the ion microprobe's ability to resolve measurements at the scale of a millionth of an inch. Hauri and his coworkers polished a variety of glass beads so that their round cross sections were revealed in the ion probe. The beads' outer rims proved to be very dry, with only a few parts per million water, but the cores of the largest beads have as much as [46 parts per million]. Over billions of years, most of the glass beads' original water has evaporated to space, more from the outsides than from the cores. However, based on the significant amount of remaining water deep inside the beads, Hauri and his colleagues calculate that the original water content of the Moon's magma may have been as high as 750 parts per million—a lot of water, comparable to many volcanic rocks on Earth, and more than enough to drive surface volcanism that would have dispersed magma in explosive eruptions billions of years ago.

If that much water powered volcanoes in the Moon's past, then a great deal of water must still be locked somewhere inside the Moon's frozen interior. And since the Moon formed primarily by the wholesale excavation of Earth's primordial mantle during a collision with another massive object, our planets deep interior likely holds prodigious amounts of unseen water as well.



Adapted from Alberto E. Saal et al., "Volatile Content of lunar Volcanic Glasses and the Presence of Water in the Moon's Interior." ©2008 by Macmillan Publishers Limited.

CONTINUE

42

According to the author, challenging the conventional wisdom

A) usually produces unexpected outcomes.

B) generally occurs outside of scientific circles.

C) rarely results in technological innovations.

D) sometimes leads to significant new insights.

43

According to the passage, which choice is true about the 1994 Clementine spacecraft mission?

A) It provided evidence about the Moon that was featured in *Science* magazine.

B) It was not specifically designed to detect water on the Moon.

C) It offered preliminary indications of water on the Moon.

D) It did not use the most up-to-date radar technology in its flyby of the Moon.

44

It can reasonably be inferred from the passage that the idea that the Moon was completely arid was reinforced in part because

A) scientists were unfamiliar with some of the powerful analytical tools that were available to them.

B) some scientists were willing to challenge the conventional wisdom about the Moon.

C) evidence that might have contradicted this notion could be explained in another way.

D) Apollo Moon rocks were not available in sufficient quantities to support valid conclusions.

45

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

A) Lines 8-11 ("the finding...water")

B) Lines 12-15 ("It's a...found")

C) Lines 15-19 ("In 1994...unconvinced")

D) Lines 23-25 ("Still...signal")

46

As used in line 44, "resolve" most nearly means

A) distinguish between.

B) change into.

C) convert to.

D) clear from.

47

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

A) coerce.

B) fuel.

C) transport.

D) maneuver.

48

The author implies that any water currently present on the Moon

A) had its primary source on Earth.

B) is contained mainly in glass beads.

C) will eventually increase in volume.

D) exists in liquid form as well as ice form.

CONTINUE

49

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

A) Lines 36-41 ("Using...1970s")

B) Lines 53-57 ("However...million")

C) Lines 62-64 ("If that...interior")

D) Lines 65-69 ("And since...well")

50

According to the figure, at what distance from the core is the water concentration within lunar glass bead green #5 approximately 15 parts per million?

A) 40 micrometers

B) 60 micrometers

C) 80 micrometers

D) 100 micrometers

51

Based on data in the figure, which choice is a reasonable conclusion about lunar glass bead green #5?

A) Beyond 100 micrometers from its core, water is not detectable.

B) At no point in time did its water concentration exceed 30 parts per million.

C) Its water concentration at 120 micrometers is approximately half that at its core.

D) Its water concentration is 50 percent less than it once was.

52

The figure best supports which claim from the passage?

A) Line 4 ("Multiple...aridity")

B) Lines 6-8 ("Moon...standards")

C) Lines 25-29 ("Then...H_2O")

D) Lines 48-51 ("The beads'...million")

STOP

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

CONTINUE