

# Reading Test

60 MINUTES, 47 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 1-9 are based on the following passage.

This passage is adapted from Rabih Alameddine, *An Unnecessary Woman*. ©2013 by Rabih Alameddine.

I love Javier Mariás's work. I've translated two of his novels: *A Heart So White* and *Tomorrow in the Battle Think on Me*. I'll consider a third after I read the French translation of the final volume of *Your Face Tomorrow*, although at more than thirteen hundred pages, I'll probably balk at that as well.

But I digress, as usual.

In one of his essays, Mariás suggests that his work deals as much with what didn't happen as with what happened. In other words, most of us believe we are who we are because of the decisions we've made, because of events that shaped us, because of the choices of those around us. We rarely consider that we're also formed by the decisions we didn't make, by events that could have happened but didn't, or by our lack of choices, for that matter.

More than fifty years ago, on a gloomy day when hope followed my shrimp of an ex-husband out the door, or so I thought at the time, my friend Hannah led me by the hand to a bookstore owned by one of her relatives. The relative, a second cousin once removed, had opened the bookstore as a lark, a ground-floor store with an inadequate picture window in a distressed building off a main street and no foot traffic. There were more stupid stuffed toys than there were books, and everything was covered with dust. The bookstore had as much chance of making it as I did.

Yet of all things, the flint that sparked a flame in my soul was the huge, darkly stained oak desk where the owner sat. To a practically penniless twenty-year-old divorcée, sitting behind such a desk so grand, so luxurious—something to aspire to. I needed grandeur in my life.

Hannah told her relative he should hire me, and he informed her that he wanted to hire someone with more experience and, just as important, with more class. He spoke as if I weren't there, as if I were invisible, as if his face were hidden behind a perforated printout. Hannah, my champion, wouldn't accept defeat. She explained that I loved books and read constantly, that I knew more about them than he ever would, and, just as important, that I could dust and clean and scrub and mop. He'd have the cleanest bookstore in the city, I piped up, the most sparkling, a diamond. I would rid it of its acrid and musty odor. He pretended to mull over the offer before deciding to hire me for the time being (still talking to Hannah and not me), until he could bring in someone else to be the face of the bookstore.

What I didn't know at the time was that the first face he offered the job to belonged to a pretty girl whose family was so classy that they immigrated to Brazil and one of their scions had recently become the governor of São Paulo. The girl left without ever showing her countenance in the bookstore. The second didn't show up either; she married and no longer needed or wished to be employed.

Had either of these women made an appearance,  
 60 my life would have been altogether different. I didn't  
 realize how the fate of those two had influenced mine  
 until a few years ago when the owner mentioned it in  
 passing. He hadn't thought for a moment that I could  
 do the job. He credited my success to his diligent  
 65 training.

I worked for the paperback dilettante for  
 fifty years, and mine was the only face anyone  
 associated with my bookstore.

1

Which choice best describes the passage?

- A) A character relates an anecdote and analyzes its applications to another character's life.
- B) A character relates to a friend an important chapter from a third character's life.
- C) An observation about an author's work leads into a personal narrative that supports that observation.
- D) The plot of a work of fiction is summarized, and that work's relationship to its author's life is considered.

2

What does the narrator imply about her own narrative style?

- A) She likes to rely heavily on a recurring phrase.
- B) She has a tendency to go off on tangents.
- C) She uses dialogue to reveal characters' thoughts.
- D) She admits to using extreme exaggerations.

3

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

- A) Line 7 ("But I . . . usual")
- B) Lines 10-13 ("In other . . . around us")
- C) Lines 17-21 ("More than . . . relatives")
- D) Lines 27-28 ("The bookstore . . . did")

4

What can reasonably be inferred about Hannah's motive in taking the narrator to apply for the job in the bookstore?

- A) She is trying to take the narrator's mind off the breakup of her marriage.
- B) She wants the job for herself.
- C) She suspects that the narrator will not keep the job for long.
- D) She thinks the narrator will improve the store's image.

5

The description of the bookstore (lines 21-28) creates an impression of

- A) intellectualism.
- B) playfulness.
- C) age and disuse.
- D) disuse and mellowness.

6

In the passage, the narrator equates the bookstore's chances for success with her own

- A) prospects for the future.
- B) fondness for literature.
- C) romantic aspirations.
- D) physical appearance.

7

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

- A) Lines 25-27 ("There were . . . dust")
- B) Lines 27-28 ("The bookstore . . . did")
- C) Lines 29-31 ("Yet . . . sat")
- D) Lines 31-34 ("To a . . . life")

8

As used in line 38, "class" most nearly means

- A) division.
- B) grade.
- C) refinement.
- D) structure.

9

Which choice provides the best evidence for the conclusion that the bookstore owner initially ignored the narrator?

- A) Lines 35-38 ("Hannah . . . class")
- B) Lines 38-40 ("He spoke . . . printout")
- C) Lines 40-41 ("Hannah . . . defeat")
- D) Lines 41-44 ("She explained . . . mop")

**Questions 10-18 are based on the following passage and supplementary material.**

This passage is adapted from Kathleen D. Vohs, "It's Not 'Mess.' It's Creativity." ©2013 by The New York Times Company.

Messy or tidy—which is better?

Historically, the evidence has favored the tidy camp. The anthropologist Mary Douglas noted  
 Line almost 50 years ago a connection between clean,  
 5 open spaces and moral righteousness. More recently, psychologists have shown that the scent of citrus cleaning products is enough to raise people's ethical standards and promote trust. Conversely, in another study, people were found to associate chaotic  
 10 wilderness with death.

But if messiness is so bad, why do so many people tolerate, and even embrace, it?

Not long ago, two of my colleagues and I speculated that messiness, like tidiness, might serve a  
 15 purpose. Since tidiness has been associated with upholding societal standards, we predicted that just being around tidiness would elicit a desire for convention. We also predicted the opposite: that being around messiness would lead people away  
 20 from convention, in favor of new directions.

We conducted some experiments to test these intuitions, and our hunches were borne out.

For our first study, we arranged rooms in our laboratory to look either tidy, with books and papers  
 25 stacked and orderly, or messy, with papers and books strewn around haphazardly. Then we invited 188 adults to visit our laboratory individually, ostensibly for a consumer-choice study. Each subject was assigned to either a messy or a tidy room, where he  
 30 or she was shown a menu from a deli that made fruit smoothies. The smoothies were said to come with a "boost" (added ingredients) from which there were three options to choose—a health, wellness or vitamin boost.

We created two versions of the menu. Half of the subjects saw a menu that had the word "classic" highlighting the health boost option, whereas the other half saw the health boost highlighted by the word "new." Then our subjects made their choices.  
 35

As predicted, when the subjects were in the tidy room they chose the health boost more often—almost twice as often—when it had the "classic" label: that is, when it was associated with convention. Also as predicted, when the subjects were in the messy  
 40 room, they chose the health boost more often—more  
 45

than twice as often—when it was said to be “new”: that is, when it was associated with novelty. Thus, people greatly preferred convention in the tidy room and novelty in the messy room.

50 Given that divergence from the status quo is the essence of ingenuity, we conducted a second experiment to test whether messiness fostered creativity.

Forty-eight research subjects came individually to  
55 our laboratory, again assigned to messy or tidy rooms. This time, we told subjects to imagine that a Ping-Pong ball factory needed to think of new uses for Ping-Pong balls, and to write down as many ideas as they could. We had independent judges rate the  
60 subjects’ answers for degree of creativity, which can be done reliably.

When we analyzed the responses, we found that the subjects in both types of rooms came up with about the same number of ideas, which meant they  
65 put about the same effort into the task. Nonetheless, the messy room subjects were more creative, as we expected. Not only were their ideas 28 percent more creative on average, but when we analyzed the ideas that judges scored as “highly creative,” we found a  
70 remarkable boost from being in the messy room—these subjects came up with almost five times the number of highly creative responses as did their tidy-room counterparts.

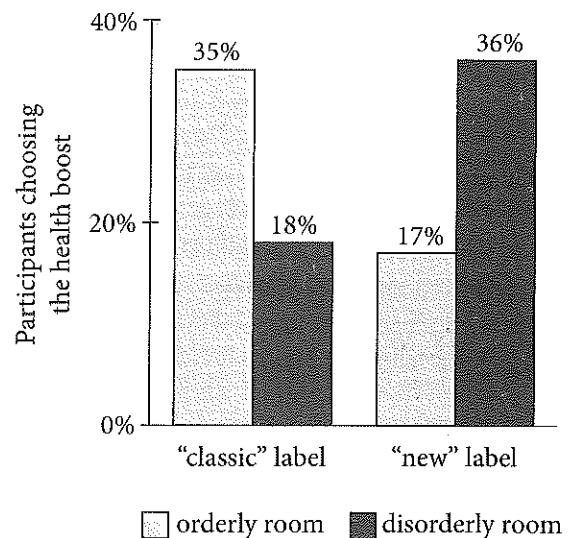
(These results have been confirmed by  
75 independent researchers at Northwestern University, who found that subjects in a messy room drew more creative pictures and were quicker to solve a challenging brainteaser puzzle than subjects in a tidy room.)

80 Our findings have practical implications. There is, for instance, a minimalist design trend taking hold in contemporary office spaces: out of favor are private walled-in offices—and even private cubicles.

Today’s office environments often involve desk  
85 sharing and have minimal “footprints” (smaller office space per worker), which means less room to make a mess.

At the same time, the working world is abuzz about cultivating innovation and creativity,  
90 endeavors that our findings suggest might be hampered by the minimalist movement. While cleaning up certainly has its benefits, clean spaces might be too conventional to let inspiration flow.

Participants’ Choice of Health Boost Option Grouped by Menu Label



Adapted from Kathleen D. Vohs et al., “Physical Order Produces Healthy Choices, Generosity, and Conventionality, Whereas Disorder Produces Creativity.” ©2013 by Kathleen D. Vohs et al.

10

As used throughout the passage, “convention” most nearly means

- A) formality.
- B) resolution.
- C) custom.
- D) regulation.

11

As used in line 8, “promote” most nearly means

- A) advocate.
- B) publicize.
- C) endorse.
- D) encourage.

1

12

Based on the passage, one assumption the author made when evaluating the results of the Ping-Pong balls experiment is that

- A) subjects felt more relaxed in the neat laboratory rooms.
- B) each new idea was the result of a similar amount of exertion.
- C) highly creative ideas would be less likely to succeed on a mass-market scale.
- D) the independent judges considered the messiness of the subjects' environment.

13

Which choice best supports the idea that the state of order in an environment has a pronounced effect on the upper edge of the range of creativity?

- A) Lines 59-61 (“We . . . reliably”)
- B) Lines 62-64 (“When . . . ideas”)
- C) Lines 65-67 (“Nonetheless . . . expected”)
- D) Lines 69-73 (“we found . . . counterparts”)

1

14

In lines 74-79, the reference to the Northwestern University study serves mainly to

- A) provide additional support for the findings of the author's second study.
- B) broaden the range of perspectives presented in the discussion.
- C) offer an example of an experiment with findings applicable to daily life.
- D) respond to arguments against the findings of the author's first study.

15

Based on the passage, which claim would the author most likely make about companies that follow the minimalist design trend?

- A) They are likely to be groundbreakers in innovation.
- B) They are less likely to value open spaces in the workplace.
- C) Their employees are less likely to exhibit originality.
- D) Their employees' performance on collaborative projects is likely to improve.

16

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

- A) Lines 50-53 (“Given . . . creativity”)
- B) Lines 80-83 (“There . . . cubicles”)
- C) Lines 84-85 (“Today’s . . . footprints”)
- D) Lines 88-91 (“At the . . . movement”)

17

According to the graph, what percentage of participants in the disorderly room chose the health boost when it was labeled “classic”?

- A) 17%
- B) 18%
- C) 35%
- D) 36%

18

Which statement about participants in the author’s first study is best supported by the data in the graph?

- A) Participants in the disorderly room were equally likely to choose the “classic” health boost as to choose the “new” health boost.
- B) Participants in the orderly room were around twice as likely to choose the “new” health boost as were those in the disorderly room.
- C) Participants in the disorderly room were equally likely to choose the vitamin boost as to choose the wellness boost.
- D) Participants in the disorderly room were around twice as likely to choose the “new” health boost as were those in the orderly room.

**Questions 19-27 are based on the following passages.**

Passage 1 is adapted from Nancy Stamp, "Restoring Tomato Flavor." ©2013 by The Scientist. Passage 2 is adapted from Ferris Jabr, "Creating Tastier and Healthier Fruits and Veggies with a Modern Alternative to GMOs." ©2014 by Scientific American.

**Passage 1**

Tomatoes are the #1-selling fruit or vegetable in the world today. Yet consumers complain about blandness of supermarket tomatoes and yearn for the old-timey summer-fresh, off-the-vine taste.

Tomato taste is a unique combination of five tastants—sweet, sour, salty, bitter, and savory (umami) compounds—as well as the aroma of volatiles, many from the breakdown of the carotenoid pigments, such as the bright red antioxidant lycopene. The modern tomato plant was bred to produce more fruit, diluting the relatively fixed amount of nutrients and tastants the plant has to offer. But that is only part of the story.

Researchers at the University of California, Davis, recently discovered that a genetic mutation that occurred about 70 years ago, and was then selected by breeders for its effect of causing tomatoes to ripen uniformly, came at the cost of less sugar and carotenoids in the fruit. Breeders also grew gas-able fruit, cultivars that respond well to ethylene to trigger ripening during postharvest, thus allowing tomatoes to be picked while still green. However, it is difficult to gauge when green tomatoes have matured to the point of forming the seed gel so rich in acid and umami. If picked too soon, the fruit will not ripen well.

Even for the mature green tomatoes, postharvest ethylene gassing by itself cannot fully substitute for the flavor developed by true vine ripening. For example, green fruit receives most of its sugar from leaves but also has chloroplasts that, when bathed in sunshine, can make more sugar directly within the fruit. Picked and stored fruit, of course, is stored in the dark, and thus neither receives nor produces sugar. And because tomatoes are a delicate fruit, they are also bred for a tougher (and distasteful) skin to withstand picking, packing, and transport. The final nail in the flavor coffin is refrigeration. Despite knowing it ruins the taste by reducing the volatiles so crucial for good flavor, wholesalers and retailers refrigerate tomatoes to prolong shelf life during distribution.

**Passage 2**

Horticultural scientist Harry Klee is determined to rescue the industrial tomato from its current gustatory doldrums. Through a series of large taste tests, he has evaluated nearly 200 varieties of heirloom tomatoes—older cultivars preserved by small groups of farmers and gardeners and sold at some grocery stores and farmers markets.

Heirlooms are known for their vibrant colors and fantastic flavor, but their skin easily cracks and scars, they often go soft quickly, and they come from plants that do not make enough fruit to meet the demands of large commercial farmers.

In his research, Klee has learned that many heirlooms are tastier than standard supermarket tomatoes not because they have more sugar but because they are chock-full of a much more complex component of flavor: pungent chemicals known as volatile organic compounds that waft off plants and into our nostrils (think freshly cut grass or the alluring smell of citrus). In a 2012 study Klee and his colleagues discovered that people actually enjoy a tomato with moderate levels of sugar if it contains enough of an aromatic compound named geranial. Klee suspects that geranial and other volatiles not only give a tomato its scent but also magnify the fruit's innate sweetness. In follow-up studies, he created tomatoes that lacked geranial and other fragrant molecules. People did not like them. If a tomato had average to high sugar levels but no volatiles, volunteers did not perceive it as sweet.

Lately, Klee has been trying to make hybrid plants that give growers and consumers the best of both tomato worlds, old and new. In the past three years he and his colleagues have mated the most delicious heirlooms they could find with modern conventional tomatoes to create crossbreeds that yield well, are firm and smooth-skinned, and taste great. Klee routinely stocks up on cheap electric toothbrushes, which he and his team use to gently but thoroughly rattle tomato flowers, gathering the pollen that falls off in test tubes so they can play matchmaker. All the while, the breeders have been using hole punches to collect bits of leaves and analyze the plants' DNA, looking for genetic patterns that correspond to high levels of volatiles, for instance, or flawless skin. "Genetic analysis has definitely informed crossing decisions," Klee says. "Our work has really accelerated in the last couple of years with the emergence of the tomato genome sequence."

19

The main purpose of Passage 1 is to

- A) examine the techniques used for enhancing the taste of modern tomatoes.
- B) identify several influences on the physical appearance of modern tomatoes.
- C) discuss key phases of the process used to distribute modern tomatoes.
- D) describe some of the factors contributing to the blandness of modern tomatoes.

20

In the context of Passage 1, lines 5-13 serve to

- A) highlight how best to cultivate modern tomatoes.
- B) emphasize the hardiness and variety of modern tomato plants.
- C) establish a link between the taste and the breeding of modern tomatoes.
- D) raise concerns about the nutritional value of the modern tomato.

21

As used in line 12, “fixed” most nearly means

- A) stable.
- B) immobile.
- C) repaired.
- D) obsessive.

22

Passage 1 supports which claim about the modern tomato industry?

- A) It employs breeding practices that result in visually unappealing produce.
- B) It creates a long-lasting product at the cost of flavor.
- C) It supports researchers who try to improve the taste of its produce.
- D) It enhances the quality of its produce by mimicking natural processes.

23

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

- A) Lines 14-19 (“Researchers . . . fruit”)
- B) Lines 19-22 (“Breeders . . . green”)
- C) Lines 33-35 (“Picked . . . sugar”)
- D) Lines 38-42 (“Despite . . . distribution”)

24

As used in line 53, “meet” most nearly means

- A) assemble.
- B) confront.
- C) satisfy.
- D) introduce.

25

The description in Passage 2 of Klee’s most recent research indicates that it is based on the assumption that

- A) both customers and producers will benefit from improvements in the quality of conventional tomatoes.
- B) moderate to high levels of sugar will make tomatoes more appetizing to humans than will any other feature.
- C) consumers have little interest in produce that contains high levels of volatiles.
- D) organically grown tomatoes are superior to genetically modified versions.



26

In Passage 2, Klee's description of his crossbreeding efforts suggests that recent scientific advances have helped to increase the

- A) potential quality of the products available to the public.
- B) number of research studies that have applications beyond agriculture.
- C) funding of investigations to reexamine previous findings.
- D) frequency of debates concerning the value of genome analysis.

27

Which statement best describes the relationship between the two passages?

- A) Passage 2 describes scientific research that is designed to address an issue identified in Passage 1.
- B) Passage 2 explains a modern approach that exposes the shortcomings of a claim made in Passage 1.
- C) Passage 2 discusses a significant exception to the generalizations highlighted in Passage 1.
- D) Passage 2 criticizes a controversial scientific method used to justify the main argument in Passage 1.

Questions 28-37 are based on the following passage.

This passage is adapted from US Secretary of State George C. Marshall, "The Marshall Plan." Delivered June 5, 1947, at Harvard University, two years after the end of the Second World War.

In considering the requirements for the rehabilitation of Europe, the physical loss of life and the visible destruction of cities, factories, mines, and  
 Line 5 railroads were correctly estimated, but it has become obvious during recent months that this visible destruction was probably less serious than the dislocation of the entire fabric of the European economy.

The farmer has always produced the foodstuffs  
 10 to exchange with the city dweller for the other necessities of life. This division of labor is the basis of modern civilization. At the present time it is threatened with breakdown. The town and city industries are not producing adequate goods to  
 15 exchange with the food-producing farmer. Raw materials and fuel are in short supply. Machinery is lacking or worn out. The farmer or the peasant cannot find the goods for sale which he desires to purchase. So the sale of his farm produce  
 20 for money which he cannot use seems to him an unprofitable transaction. He, therefore, has withdrawn many fields from crop cultivation and is using them for grazing. He feeds more grain to stock and finds for himself and his family an ample  
 25 supply of food, however short he may be on clothing and the other ordinary gadgets of civilization. Meanwhile people in the cities are short of food and fuel. So the governments are forced to use their foreign money and credits to procure these  
 30 necessities abroad. This process exhausts funds which are urgently needed for reconstruction. Thus a very serious situation is rapidly developing which bodes no good for the world. The modern system of the division of labor upon which the exchange of  
 35 products is based is in danger of breaking down.

The truth of the matter is that Europe's requirements for the next three or four years of foreign food and other essential products—  
 40 principally from America—are so much greater than her present ability to pay that she must have substantial additional help, or face economic, social, and political deterioration of a very grave character.

The remedy lies in breaking the vicious circle and restoring the confidence of the European people in the economic future of their own countries and of Europe as a whole. The manufacturer and the farmer throughout wide areas must be able and willing to exchange their products for currencies the continuing value of which is not open to question.

It is logical that the United States should do whatever it is able to do to assist in the return of normal economic health in the world, without which there can be no political stability and no assured peace. Our policy is directed not against any country or doctrine but against hunger, poverty, desperation, and chaos. Its purpose should be the revival of a working economy in the world so as to permit the emergence of political and social conditions in which free institutions can exist. Such assistance, I am convinced, must not be on a piece-meal basis as various crises develop. Any assistance that this Government may render in the future should provide a cure rather than a mere palliative.

It would be neither fitting nor efficacious for this Government to undertake to draw up unilaterally a program designed to place Europe on its feet economically. This is the business of the Europeans. The initiative, I think, must come from Europe. The role of this country should consist of friendly aid in the drafting of a European program and of later support of such a program so far as it may be practical for us to do so. The program should be a joint one, agreed to by a number of, if not all, European nations.

28

In the passage, Marshall states that the death and obvious physical ruin caused in Europe by the war

- A) were more extensive than world leaders had expected.
- B) are difficult to quantify because they are unprecedented in scale.
- C) had been properly taken into account in planning for reconstruction.
- D) may be the most serious of all the factors affecting postwar life.

29

A significant contrast that Marshall draws in discussing the fundamental nature of an economy is between

- A) rural and urban production.
- B) raw materials and finished goods.
- C) town residents and city residents.
- D) domestic and foreign resources.

30

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

- A) Lines 4-8 ("it has . . . economy")
- B) Lines 9-12 ("The farmer . . . civilization")
- C) Lines 36-42 ("Europe's . . . character")
- D) Lines 50-54 ("It is . . . peace")

31

Based on the passage, there were insufficient resources for rebuilding Europe after the war in part because European governments were

- A) spending too much money on transportation improvements.
- B) focused unduly on strengthening their devalued currencies.
- C) compelled to purchase essential goods from other countries.
- D) grossly ineffective as a result of widespread corruption.

1

32

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

- A) Lines 13-16 (“The town . . . supply”)
- B) Lines 27-31 (“Meanwhile . . . reconstruction”)
- C) Lines 46-49 (“The manufacturer . . . question”)
- D) Line 68 (“The initiative . . . Europe”)

33

What main effect do the phrases “very serious,” “bodes no good,” and “danger of breaking down,” used in lines 32-35, have on the tone of Marshall’s description of the situation?

- A) The phrases create a pessimistic tone that calls attention to the situation’s hopelessness.
- B) The phrases create an indecisive tone that reinforces the situation’s uncertain outcome.
- C) The phrases create an earnest tone that emphasizes the critical nature of the situation.
- D) The phrases create an exhausted tone that reflects international weariness with the situation.

34

In the passage, Marshall indicates that achieving sound economic conditions in Europe requires

- A) a ban on importing foreign products.
- B) a reestablishment of citizens’ confidence.
- C) a change in governmental leaders.
- D) an adoption of a new type of currency.

1

35

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

- A) reversal.
- B) reinstatement.
- C) repayment.
- D) response.

36

In context, Marshall’s use of the words “cure” and “palliative” (line 63) suggests that the assistance provided by the United States must

- A) address each new problem as it arises.
- B) heal all who have suffered injuries.
- C) be thorough and comprehensive.
- D) focus on individuals rather than nations.

37

It can most reasonably be inferred from the passage that Marshall believes the United States should

- A) provide food, machinery, and fuel to European farmers.
- B) be frugal in its plans to revive the European economy.
- C) help resolve additional European crises as they develop.
- D) defer to the Europeans in deciding on appropriate solutions.

**Questions 38-47 are based on the following passage and supplementary material.**

This passage is adapted from Elizabeth Pennisi, "Seagrasses Partner with Clams to Stay Healthy." ©2012 by American Association for the Advancement of Science.

Not much to look at and sometimes quite mucky, seagrass beds have been called the ugly ducklings of marine conservation. They lack the charisma of coral reefs, yet like reefs, these beds form a highly  
 Line 5 productive and diverse ecosystem, acting as the nursery for many kinds of fish as well as a home to sea turtles, manatees, and a host of other sea creatures. Seagrasses help cycle nutrients, and experts estimate they provide \$1.9 trillion in ecosystem  
 10 services per year worldwide. At the heart of seagrasses' success may be a small clam.

Seagrasses are saltwater flowering plants that grow along coasts and make up 0.2% of the ocean's ecosystems. They produce an amount of biomass  
 15 that beats that of the Amazonian rain forest and is on par with that of corn and sugarcane crops. Their roots and stems trap organic matter and sediment, causing buildups of rich mud that can be waist deep.

This muck is a potential threat to the grass: Decaying organic matter produces a lot of sulfide, creating what could be an unhealthy environment for plant roots. Researchers had assumed that the oxygen released from seagrass roots combined with enough  
 25 of the surrounding sulfide to neutralize this toxic element. Not so. "We found that in most seagrass beds, it's much more complex," marine ecologist Tjisse van der Heide says. "They have a trick to speed up oxidation" that relies on a symbiotic relationship  
 30 with bacteria that consume sulfides.

Van der Heide first began to suspect that seagrass depended on bacteria while doing fieldwork in Mauritania. He and his colleagues found thousands of 1-centimeter lucinid clams living among the  
 35 seagrass roots. Gills make up much of the clam's innards: That's where sulfide-oxidizing bacteria live. They sustain the clam by providing nutrients in much the way that zooxanthellae sustain coral.

Following up on their clam observation, the  
 40 researchers took 110 samples of seagrass beds with a 15-centimeter-wide tube that cut cores 20 centimeters deep into the sediment. They filtered out and weighed all the organisms in the sediment

and dried and weighed the seagrass in each core.  
 45 "The more bivalves we found in the core, the more seagrass we found in the core," suggesting a beneficial partnership, Van der Heide says.

Wondering if this cohabitation was unique to Mauritania, the researchers combed the literature for  
 50 studies describing the communities inside other seagrass beds, finding 84 covering tropic, subtropic, and temperate sites on six continents. Lucinid clams were found associated with 11 of 12 seagrass genera, the one exception being a seagrass that grew on  
 55 bare rock.

Next, Van der Heide explored the potential of this relationship in the lab. He grew seagrass alone, clams alone, and the two organisms together under different conditions, including one in which he and  
 60 his colleagues injected sulfide into the sediment semiweekly. On its own, the seagrass was able to process some of the sulfide, but sulfide gradually increased in concentration and interfered with seagrass growth. The clams alone got rid of the  
 65 introduced sulfide but didn't get any bigger. But both the clams and the seagrass thrived when together, getting rid of the sulfide and growing as well, Van der Heide's team reports. The roots seemed to provide the clams with more ready access to oxygen,  
 70 which "was necessary for the bivalves to consume that sulfide in an efficient manner," Van der Heide explains.

"The elegant experimental design provides compelling evidence for the benefits of the  
 75 interaction between seagrasses and the associated bivalve," says Carlos Duarte, a marine ecologist at the University of Western Australia in Perth.

Figure 1

Effect of Sulfide and Lucinid Clams on Seagrass Root Biomass

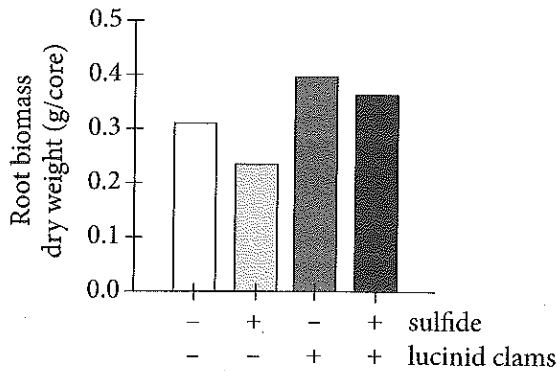
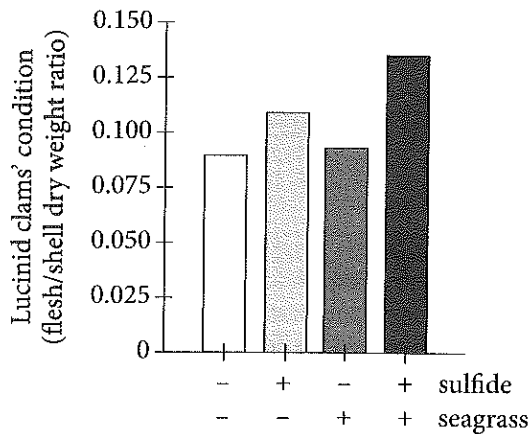


Figure 2

Effect of Sulfide and Seagrass on Lucinid Clams' Condition



Adapted from Tjisse van der Heide et al., "A Three-Stage Symbiosis Forms the Foundation of Seagrass Ecosystems." ©2012 by American Association for the Advancement of Science.

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The main purpose of the passage is to

- A) describe a study showing how one species helps to limit the spread of another species.
- B) present research that reveals a mutually beneficial relationship between different species.
- C) explain how changing environmental conditions pose a threat to multiple species in an ecosystem.
- D) analyze the process by which one species can take over the ecological niche of another species.

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As used in line 15, "beats" most nearly means

- A) exceeds.
- B) subdues.
- C) strikes.
- D) counteracts.

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It can reasonably be inferred from the passage that sulfide accumulates around seagrass roots due to

- A) an overabundance of lucinid clams.
- B) the presence of sulfide-oxidizing bacteria.
- C) an excess of key root nutrients.
- D) the physical characteristics of the seagrass.

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

- A) Lines 14-16 ("They . . . crops")
- B) Lines 17-19 ("Their . . . deep")
- C) Lines 28-30 ("They . . . sulfides")
- D) Lines 33-35 ("He and . . . roots")

42. As used in lines 37 and 38, “sustain” most nearly means

- A) withstand.
- B) affirm.
- C) prolong.
- D) nourish.

43. Which choice provides the best evidence that Van der Heide was trying to determine whether seagrass and lucinid clams together respond differently to additional sulfide in the sediment than does either seagrass alone or lucinid clams alone?

- A) Lines 42-44 (“They . . . each core”)
- B) Lines 45-47 (“The more bivalves . . . says”)
- C) Lines 52-55 (“Lucinid . . . rock”)
- D) Lines 57-61 (“He grew . . . semiweekly”)

44. Which statement about the oxygen released by seagrass roots is best supported by information in the passage?

- A) It impedes the growth of sulfide-oxidizing bacteria in the gills of lucinid clams.
- B) It serves the same role for lucinid clams that zooxanthellae serve for coral.
- C) It is not sufficient to eliminate sulfide accumulation in the absence of lucinid clams.
- D) It becomes more concentrated as sediment builds up around seagrass roots.

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

- A) Lines 35-36 (“Gills . . . live”)
- B) Lines 37-38 (“They . . . coral”)
- C) Lines 61-64 (“On its . . . growth”)
- D) Lines 64-65 (“The clams . . . bigger”)

46. Which conclusion is best supported by the experimental results shown in figure 1?

- A) Sulfide had a positive effect on the root biomass of seagrass when lucinid clams were absent.
- B) Seagrass had a greater root biomass in the absence of lucinid clams and injected sulfide than when exposed to both lucinid clams and injected sulfide.
- C) The presence of lucinid clams had a positive effect on the root biomass of seagrass regardless of whether sulfide was present.
- D) Lucinid clams had a positive effect on the root biomass of seagrass in direct proportion to the concentration of sulfide in the sediment.

47. Regarding the claim that clams and seagrass “thrive when together” (line 66) in the experiment, which statement is best supported by the information in the two figures?

- A) The clams thrived more when seagrass was present than in any condition without seagrass.
- B) Increasing the quantity of sulfide when clams were present helped seagrass thrive.
- C) Decreasing the quantity of sulfide when seagrass was present helped clams thrive.
- D) The introduction of sulfide when both clams and seagrass were present benefited clams but not seagrass.

**STOP**

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