

READING

Questions 1 – 10:

This passage is adapted from David Malouf, "The Valley of Lagoons." ©2006 by David Malouf. The narrator remembers his childhood in Australia in the 1950s.

Line Braden McGowan had been my best friend since I was five years old. We started school on the same day, sharing a desk and keeping pace with one another through pot-hooks and the alphabet, time tables, cursive, and those scrolled and curlicued capitals demanded by our Queensland State School copybooks. We dawdled to and from school on our own circuitous route. Past the Vulcan
5 Can Company, where long shiny cut-offs of raw tin were to be had, which we carted off in bundles to be turned into aids of our own devising, past the crushing-mill where we got sticks of sugar cane to chew. Narrow gauge lines ran to the mill from the many outlying farms, and you heard at all hours in the crushing season the noise of trundling, and the shrill whistle of the engine as a line of carts approached a crossing, and rumbled through or clanked to a halt.

10 In the afternoons after school and in the holidays, we played together in the paddocks and canebreaks of the McGowans' farm, being, as the mood took us, explorers, pirates, commandos, bushrangers, scouts on the track of outlaws.

Usually we had a troop of the McGowan dogs with us, who followed out of doggy curiosity and sometimes, in the belief that they had got the scent of what the game was, moiled around us or
15 leapt adventurously ahead. But for the most part they simply lay and watched from the shade, till we stretched out beside them and let the game take its freer form of untrammelled thinking-aloud that was also, with its range of wild and rambling surmise, the revelation—even to ourselves, though we were too young as yet to know it—of bright, conjectural futures we would have admitted to no one else.

20 "You two are weird," Braden's brother Stuart told us, having caught on his way to the bails some extravagant passage of our talk.

Stuart was four years older. He and the eldest of the three brothers, Glen, had farm work to do in the afternoons after school. Braden in those days was still little and free to play.

They were rough kids, the McGowans.

25 I had come late into a family of girls, two sisters who, from the beginning, had made a pet of me. Going over to the McGowans' was an escape to another world. Different laws were in operation there from the ones I was used to. Old Mr. McGowan had a different notion of authority from the one my father followed. Quiet but firmer. His sons, who were so noisy and undisciplined outside, were subdued in his presence. Mrs. McGowan, unlike my mother, had no interests beyond the piles
30 of food she brought to the table and the washing—her men's overalls and shirts and singlets, and the loads of sheets and pillowcases I saw her hoist out of the copper boiler when I came to collect Braden on Monday mornings.

She too had a softening influence on the boys. They might complain when she called them in from kicking a football round the yard, or working on a bike, to fetch in an armful of wood for the stove or to carry a basket of wet sheets to the line, and they squirmed when she tried to settle an upturned collar or hug them. But they did do what she asked in the end, and even submitted, with a good show of masculine reluctance, to hugging.

I liked the roughness and ease I found at the McGowans', but even more the formality, which was of a kind my parents would have wondered at and found odd, old-fashioned.

My sisters, Katie and Meg, were exuberantly opinionated. Our mealtimes were loud with argument in which we all talked over one another, our parents included, and the food itself was forgotten.

There was no arguing at the McGowans'. Glen and Stuart, rough and barefooted as they were, showed their hands before they were allowed to table, sat up straight, kept their elbows in.

They passed things without speaking. Barely spoke at all unless their father asked a question, or in response to a story he told, or to tell their mother how good the stew was in hope of a second helping.

I loved all this. When Braden began to have his own jobs to do after school, I stayed to help. I learned to milk, to clean out the bails, then stayed for the McGowans' early tea. I wanted to be one of them, or at least to be like them.

- Over the course of the passage, the main focus shifts from
 - portraying characters' typical activities to recounting an unusual event.
 - describing an important relationship to characterizing a family.
 - expressing a character's feelings to explaining the circumstances behind them.
 - illustrating a specific occurrence to reflecting on a family's influence.
- The passage indicates that while walking to and from school, Braden and the narrator
 - typically avoid certain parts of town.
 - generally prefer to take their time.
 - usually arrive late to their destination.
 - often try to meet up with other children.
- The narrator's use of the words "trundling," "shrill whistle," "rumbled," and "clanked" (line 10-12) mainly serves to
 - detail the process by which the crushing-mill typically operates.
 - establish why the narrator finds this environment intriguing.
 - contrast the noise of the crushing-mill with the silence of the farm.
 - evoke the industrial atmosphere of a location from the narrator's childhood.

4. The second paragraph (line 13-16) mainly serves to
- A. explain how the narrator and Braden became close friends.
 - B. emphasize the narrator and Braden's fascination with the farm.
 - C. present the narrator and Braden as active and imaginative.
 - D. depict how the narrator and Braden devise ways to avoid doing chores.
5. It can reasonably be inferred from the passage that the narrator and Braden have a friendship in which they
- A. help each other succeed at difficult subjects and tasks in school.
 - B. disagree with each other occasionally about how to approach their challenges.
 - C. amuse each other by urging their pets to participate in a variety of games.
 - D. trust each other with confessions about their personal hopes and dreams.
6. Which choice provides the best evidence for the answer to the previous question?
- A. line 1-5 ("We started . . . copybooks")
 - B. line 17-20 ("Usually . . . ahead")
 - C. line 20-25 ("But . . . else")
 - D. line 26-30 ("You . . . play")
7. The passage most strongly suggests that the narrator views the McGowan boys as people who
- A. would benefit from additional restrictions on their actions.
 - B. emulate the best qualities of their mother and father.
 - C. know how to demonstrate self-control when needed.
 - D. are unpredictable when confronted with unexpected situations.
8. As used in line 41, "collect" most nearly means
- A. save.
 - B. contain.
 - C. arrange.
 - D. meet.
9. The passage most strongly suggests that one difference between the narrator's household and the McGowans' is that the
- A. McGowans place a high value on their children displaying proper etiquette, whereas the narrator's parents find the idea of etiquette offensive.
 - B. McGowan children are expected to take responsibility for chores around the house, whereas the narrator and his sisters have few responsibilities at home.
 - C. narrator and his sisters are instructed to follow established rules, whereas the McGowan children need little prompting to adhere to traditional customs.
 - D. narrator's parents allow their children to share their honest perspectives on matters, whereas the McGowans expect their children to be more deferential.
10. In conjunction with line 52-54 ("Our . . . forgotten"), which choice provides the best evidence for the answer to the previous question?
- A. line 42 ("She . . . boys")
 - B. line 46-48 ("But . . . hugging")
 - C. line 58-60 ("Barely . . . helping")
 - D. line 61-62 ("When . . . help")

Questions 11-21:

Passage 1 is adapted from Alex S. Jones, "An Argument Why Journalists Should Not Abandon Objectivity." ©2009 by the President and Fellows of Harvard College. Passage 2 is adapted from Ryan McMaken, "'Objective Journalism' Has Always Been a Myth." ©2019 by Mises Institute.

Line **Passage 1**

Enemies of objectivity argue that because journalists must be free of bias to be objective, and because this is impossible, it follows that objectivity is a false ideal. As a group, journalists probably have more opinions than most, and it is very rare that a reporter starts working on a story
5 without having some notion as to what happened—in other words, a point of view. But objectivity does not require that journalists be blank slates free of bias. In fact, objectivity is necessary precisely because they are biased.

... [Journalists] Bill Kovach and Tom Rosenstiel describe what they call "the lost meaning of objectivity." As [they] point out, "In the original concept . . . the method is objective, not the
10 journalist." It was because journalists inevitably arrived with bias that they needed objectivity as a discipline to test that bias against the evidence so as to produce journalism that would be closer to truth.

They argue that the quickening of objectivity as the American journalistic standard was born of a desire to have a more scientific way of approaching news. . . . Scientists begin their research with
15 assumptions. They have expectations of what will happen, but they don't know what will happen. They have, in other words, their own opinions and beliefs—their point of view or even bias—about what is likely the truth, and they do their research to test those assumptions. Their objective, scientific inquiry is not one that is without bias, but one in which bias has to stand up to evidence and results.

20 This is the sensible and realistic approach to objectivity that might be termed *genuine objectivity*. It begins with the assumption that journalists have bias, and that their bias has to be tested and challenged by gathering facts and information that will either support it or knock it down.

Often, there is information that does both, and that ambiguity needs to be reported with the
25 same dispassion with which a scientist would report variations in findings that were inconclusive.

Passage 2

[The scientific] ideal remains quite popular among journalists. They continue to fancy themselves as experts at providing objective and balanced information on critical pieces of information and as the only ones who can be trusted with providing an unbiased viewpoint.

30 This philosophy, however, is faulty even at its most basic foundation. . . . [I]n recent decades, numerous cracks have shown up in the facade of scientific objectivity among even physical scientists. Thanks to the research in the fields of the “sociology of science” and the “economics of science,” there is increasing documentation illustrating what should have been obvious all along—namely that scientists are not immune to the effects of their own personal biases.

35 For example, scientists and researchers commonly assert that scientists are not meaningfully affected by the fact that, say, they receive large government grants or rely on certain public policies to make a living. Or, they insist that a scientist would not be diverted from a relentless pursuit of “truth,” even if the truth revealed were to call into question the theories on which that scientist has based his or her entire career. In other words, we’re told to believe that a scientist’s ego or material
40 needs has no effect on how he conducts himself. This is plausible, it is implied, because scientists are imbued with a special level of integrity and devotion to scientific inquiry.

Believing this, of course, requires a nearly heroic level of naivete as well as ignorance about the economic underpinnings of scientific research—or the social pressures under which scientists function.

45 There is no doubt that many scientists *try* to be objective. But this doesn’t mean they actually *are* objective.

On the other hand, scientists have a better claim to objectivity than journalists. In many fields, scientists are constrained by whether or not their scientific knowledge is actually useful. Prescription drugs either work or they don’t. New building materials and new chemical
50 solutions either work or they don’t.

Many physical scientists are thus limited in how they might indulge their biases by the successful application of their discoveries and conclusions.

Journalism has no such check on its own work, and thus we see the fundamental flaw in [the] attempt at making journalism “scientific.” There’s no practical measure of whether or not a news story has been communicated scientifically or not.

11. As used in line 2, “free of” most nearly means

- A. uninterested in.
- B. unworthy of.
- C. uninfluenced by.
- D. unaware of.

12. Which choice best supports the idea that Jones (Passage 1) believes that journalists have a responsibility to do their jobs even if there is conflicting information that may remain unresolved?

- A. line 4-7 (“As a . . . view”)
- B. line 12-15 (“It was . . . truth”)
- C. line 22-24 (“Their . . . results”)
- D. line 29-31 (“Often . . . inconclusive”)

13. The sentences in line 7-9, Passage 1 (“But . . . biased”) mainly serve to

- A. criticize a familiar idea in order to analyze the significance of emerging research regarding that idea.
- B. challenge an understanding of a concept in order to introduce a new perspective about that concept.
- C. summarize the steps of a scientific method in order to discuss improvements to that method.
- D. consider the implications of a belief in order to demonstrate the widespread cultural influence of that belief.

14. In Passage 1, the journalists Kovach and Rosenstiel draw an explicit distinction between a

- A. characteristic of an individual and a characteristic of a process.
- B. goal of a particular professional and a goal of an ordinary citizen.
- C. source of a belief and the increasing popularity of that belief.
- D. conclusion about the past and a reasonable expectation of the future.

15. According to Passage 1, the concept of genuine objectivity is based on the expectation that journalists

- A. will strive to inform the public about the true state of affairs.
- B. will be guided by evidence in confronting their biases.
- C. can be trusted to provide an unbiased viewpoint on most topics.
- D. struggle to overcome external influences related to their stories.

16. As used in line 35, “critical” most nearly means

- A. severe.
- B. humbling.
- C. derogatory.
- D. crucial.

17. Based on Passage 2, with which claim about objectivity would McMaken most likely agree?

- A. Although objectivity is impossible, people in some fields pursue it more successfully than do people in other fields.
- B. Although objectivity is difficult to achieve, it has become more possible in the present than it was in the past.
- C. Although objectivity is a goal common to many disciplines, it can actually prove to be dangerous in certain circumstances.
- D. Although objectivity is commendable, it should not be pursued to the exclusion of other worthy goals.

18. Which statement best describes the relationship between the two passages?

- A. Passage 2 criticizes the motives of people who approve of the views discussed in Passage 1.
- B. Passage 2 challenges the ultimate possibility of an outcome analyzed in Passage 1.
- C. Passage 2 clarifies the historical context of the ideas examined in Passage 1.
- D. Passage 2 confirms the accuracy of the research conclusions summarized in Passage 1.

19. Based on Passage 2, McMaken would most likely believe that journalists who follow the “more scientific way” (line 17), as described in Passage 1, may

- A. discount evidence that undermines their opinions.
- B. expose political influence shaping their research.
- C. represent an elitist movement in their profession.
- D. exaggerate the challenges of objective investigation.

20. Based on Passage 1, Jones would most likely respond to McMaken’s claim in line 39-43, Passage 2 (“Thanks . . . biases”) by

- A. conceding that current research has changed the way that scientists are perceived.
- B. agreeing that scientists may hold a personal perspective regarding their work.
- C. arguing that the scientific method demonstrates an overall lack of bias in research.
- D. suggesting that the effects of a lack of objectivity in science are not fully understood.

21. Which choice from Passage 1 provides the best evidence for the answer to the previous question?

- A. line 2-4 (“Enemies . . . ideal”)
- B. line 10-11 (“Journalists . . . objectivity”)
- C. line 11-12 (“As they . . . journalist”)
- D. line 20-22 (“They . . . assumptions”)

Questions 22-31:

This passage is adapted from Terri Cook, "Wormholes May Limit Landslides." ©2015 by American Geosciences Institute.

Line Emma Harrison, a graduate student at the University of Pennsylvania, had gone to northeastern Puerto Rico's Luquillo Mountains, which rise steeply from sea level up to 1,075 meters in elevation, to look into why erosion rates aren't as high as it seems they should be. Uplifted between about 37 million and 28 million years ago, this range is the first barrier on the island encountered by the prevailing easterly winds, which carry moisture from the Caribbean Sea. The resulting orographic effect¹ produces copious rainfall, exceeding 5 meters per year at higher elevations, where a dense rainforest thrives. "With the amount of precipitation [the area] gets, you should be eroding the range at a much quicker rate," Harrison explains. Whereas erosion rates in the Luquillos range from about 0.05 to 0.18 millimeters per year depending on elevation, rates are typically much higher in other high-precipitation tropical environments, she says; the mountains of Taiwan, for example, lose between 2.2 and 8.3 millimeters per year.

At the Luquillo Critical Zone Observatory—one of 10 such National Science Foundation-funded observatories focused on studying the so-called critical zone between the treetops and the base of weathered rock—researchers like Harrison are working to understand why these mountains are still as high as they are. Intrigued by the abundance and prodigious activity of endogeic worms² at her field site, Harrison wondered whether their presence could influence weathering in the Luquillos. Previous studies had found that landslides account for most of the erosion in the lush, tropical and steep environment of the Luquillos, and that removing earthworms from an experimental plot in the mountains greatly increased surface runoff and the downhill transport of fine organic matter.

20 What were the earthworms doing to the soil to create such a difference? Along with undergraduate Aria Kovalovich, Harrison constructed several clear earthworm nests that were thin enough to allow the team to observe worm tunneling in two dimensions. After placing endogeic worms and soil native to the Luquillos in the nests, the researchers stored them in a dark room, pulling them out once per day to photograph the worms' progress. Using image-processing software, the researchers then quantified changes in the amounts of material excavated in the tunnels from day to day. After two weeks, they also measured the nests' bulk densities and their permeability to water.

On average, the soil in the experimental nests was compacted by 4.3 percent, the team reported. "It's very rare to see [levels of] compaction like that," Harrison says. "It was really surprising; we had

30 actually thought that there would be an increase in the volume of the soil," she adds, because worms are often observed to churn up and aerate soils.

There could be several reasons for the compaction, Harrison explains. First, as the earthworms burrow, they push the dirt surrounding the tunnels together, reducing pore space between soil particles. In addition, when soil particles are ingested and later excreted by worms, the particles
35 tend to be compacted, she says. The soil is also compacted when earthworm tunnels collapse.

Based on the experiments, the researchers concluded that earthworms are significant biological agents that actively restructure the Luquillo soils, and that the worms' tunnel networks increase the rate at which precipitation filters through the soil. This allows water to drain more rapidly from the clay-rich surface where landslides most frequently occur. The end result, according to the team's
40 hypothesis, is fewer landslides and a slower rate of erosion in the Luquillo Mountains.

22. According to the passage, the location of the Luquillo Mountains in northeastern Puerto Rico is important because it

- A. enables the Luquillos to support an unusually diverse array of earthworms.
- B. leads to the Luquillos' receiving an especially large amount of precipitation.
- C. ensures that the Luquillos are shielded from the effects of the prevailing winds.
- D. protects the Luquillos from the high erosion rates seen in other areas of the island.

23. As used in line 10, "should" is best understood as

- A. expressing an expectation.
- B. acknowledging an obligation.
- C. indicating a condition.
- D. signaling an intention.

24. In the first paragraph, the author refers to the mountains of Taiwan primarily to

- A. offer a counterexample that emphasizes the variability in the erosion rate in the Luquillos.
- B. provide a comparison that illustrates the relatively low erosion rate in the Luquillos.
- C. highlight the erosion rate typically found in mountains that are taller than the Luquillos.
- D. show a contrast between the erosion rate in mountain ranges with low rainfall and the erosion rate in the Luquillos.

25. Based on the passage, which choice best describes the scientific understanding of erosion in the Luquillo Mountains before Harrison conducted her experiment?

- A. Scientists had data indicating that erosion in the Luquillos encourages the proliferation of earthworms but did not know why erosion had this effect.
- B. Scientists had a theory that erosion rates in the Luquillos are influenced by the activity of animals but did not know which ones.
- C. Scientists had reason to believe that earthworms contribute to reduced erosion in the Luquillos but did not know how they contributed.
- D. Scientists had evidence suggesting that erosion in the Luquillos varies with precipitation but did not know the extent of the variation.

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

- A. line 1-7 (“Emma . . . Sea”)
- B. line 9-15 (“With . . . year”)
- C. line 16-20 (“At the . . . are”)
- D. line 22-28 (“Previous . . . difference”)

27. As used in line 33, “progress” most nearly means

- A. activity.
- B. maturation.
- C. improvement.
- D. increase.

28. According to the passage, how do endogeic worms indirectly promote soil compaction?

- A. Empty spaces in the soil are eliminated when their tunnels cave in.
- B. Their body weight compresses the soil beneath them as they move.
- C. Rainwater that runs through their tunnels melds soil particles together.
- D. Dense surface clay sticks to their bodies and gets carried underground.

29. Which finding, if true, would best support the conclusions of Harrison’s team as presented in the passage?

- A. The orographic effect that occurs in the Luquillos does not occur in most high-precipitation tropical mountain ranges.
- B. The density of the soil in the Luquillos is approximately the same as that found in most high-precipitation tropical mountain ranges.
- C. The tunnels made by endogeic worms in the Luquillos are smaller than those typically found in high-precipitation tropical mountain ranges.
- D. The endogeic worms common in the Luquillos are typically absent from high-precipitation tropical mountain ranges.

30. Based on the passage, if endogeic worms were removed from the Luquillos, one likely result would be that

- A. landslides would become less frequent but more intense than they currently are.
- B. rainwater would remain at the soil surface for longer than it currently does.
- C. soil particles would be separated by less pore space than they currently are.
- D. the soil surface would contain more clay than it currently does.

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

- A. line 42-44 (“First . . . particles”)
- B. line 46-47 (“The soil . . . collapse”)
- C. line 51-53 (“This . . . occur”)
- D. line 53-54 (“The end . . . Mountains”)

Questions 32-41:

This passage and figure 1 are adapted from Kartik Hosanagar, *A Human's Guide to Machine Intelligence: How Algorithms Are Shaping Our Lives and How We Can Stay in Control*. ©2019 by Kartik Hosanagar. Many commercial websites make automated purchase recommendations to users based on past behavior on the sites.

Line In Chris Anderson's book *The Long Tail*, he suggested that the main effect of automated recommendations would be to help people move from the world of hits to a world of niches—obscure products that are closer to our individual preferences but never get our attention in mainstream markets.

5 Like many others, I thought the idea made sense—up until the spring of 2006, when a PhD class I was teaching forced me to reconsider the notion entirely.

We were discussing the design of personalization algorithms used by Netflix, Amazon, and other online firms. Daniel Fleder, one of my students, asked if the design of common algorithms might not actually do the opposite—that is, reduce the diversity of items we consume. He suggested that
10 collaborative filtering algorithms might be biased toward popular, rather than obscure, items because they recommend items based on what others are consuming.

Fleder's question intrigued me, and that summer we launched what became a series of studies on how algorithmic recommendations affect product discovery, and whether they aid or hurt niche products. In the first study I did with Fleder, we argued that because common recommendation
15 algorithms promote products based on past sales and ratings ("people who bought X also bought Y"), they cannot recommend products that have only limited historical data, even if these products were likely to be rated favorably. That would skew the recommendations toward already popular products. We developed simulations of several commonly used recommendation algorithms to test the theory, and they indeed demonstrated that these algorithms can create a rich-get-richer effect
20 for popular items.

To further test the theory, in a second study with Dokyun Lee at Carnegie Mellon University, we ran an experiment in partnership with a leading online retailer in Canada. A control group of about 500,000 users made purchase decisions without any exposure to algorithmic recommendations. A second group of 100,000 users was shown recommendations of the "people who bought X also
25 bought Y" variety whenever they visited a product page.

We found, as expected, that recommendations increased purchases across multiple product categories, ranging from apparel and appliances to toys and video games. But purchase diversity is where the results got interesting. For the control group, the bottom 40 percent of products (in terms of the frequency with which the products are purchased) generated roughly 5 percent of purchases

30 made on the site, and the bottom 80 percent about 37 percent of purchases. The market share of niche products was even lower under recommendations. For example, the bottom 80 percent of products now generated only 27 percent of purchases.

In addition to market share, we also looked at absolute sales of the products. Surprisingly, we found that the total sales of niche items went up. How is it possible that they were selling more at
 35 the same time that their market share was decreasing?

The answer to the puzzle lies in the fact that the sales for all items—niche as well as blockbuster—are greater under recommendations. Personalized recommendations help consumers discover many relevant items, and so they purchase far more than they did in the absence of recommendations. Although both niche and blockbuster items were purchased more, the gains
 40 were far greater for popular products than niche ones. As a result, niche sellers might notice that sales have risen, and individuals might notice they are consuming more esoteric items than before. But niche products are losing overall market share (and potentially consumer mindshare) under algorithmic recommendations.

Figure 1

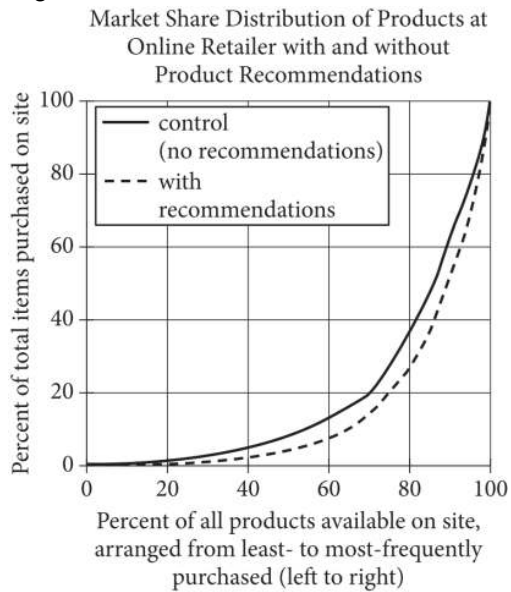


Figure 2

Average Number of Items Viewed or Purchased from Online Retailer’s Website, by Type of Recommendation Provided to Users

Type of recommendation provided	Average number of items viewed		Average number of items purchased	
	number	% increase from control	number	% increase from control
“People who viewed this item also viewed”	11.50	11%	2.46	0.8%
“People who purchased this item also purchased”	10.38	0.5%	2.56	5%
Control (no recommendation provided)	10.32	-	2.44	-

32. Which claim about product personalization algorithms can most reasonably be inferred from the passage?

- A. They are more popular in the United States than they are in other countries.
- B. They require a critical threshold of information in order to work.
- C. They encourage consumers to share their favorite products with others.
- D. They were designed by online businesses to simplify purchase decisions for their customers.

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

- A. line 9-12 (“We were . . . consume”)
- B. line 12-15 (“He suggested . . . consuming”)
- C. line 18-23 (“In the . . . favorably”)
- D. line 28-30 (“To further . . . Canada”)

34. As used in line 20, “promote” most nearly means

- A. raise.
- B. improve.
- C. accelerate.
- D. advertise.

35. As used in line 25-26, “demonstrated” most nearly means

- A. illustrated.
- B. declared.
- C. objected.
- D. instructed.

36. A marketing executive argues that the studies discussed in the passage provide evidence that product recommendation algorithms benefit only sellers of popular products. Is the executive correct?

- A. No, because automated recommendations help increase purchases of less popular items as well as more popular items.
- B. No, because automated recommendations were designed to increase sales of less popular products.
- C. Yes, because automated recommendations increase the range of popular items viewed by customers.
- D. Yes, because automated recommendations increase sales of the most frequently purchased items.

37. In line 57-58, the phrase in parentheses (“and . . . mindshare”) serves mainly to

- A. provide an alternative explanation for the results described in the passage.
- B. offer a likely reason for the unanticipated results examined in the passage.
- C. suggest a potential effect beyond those directly discussed in the passage.
- D. acknowledge the limitations of the research methods presented in the passage.

38. Which statement is best supported by the data presented in figure 1?

- A. More products were available to purchase for the control group than were available to the group receiving recommendations.
- B. The percentage of total items purchased both with and without recommendations was similar for the 20 percent least frequently purchased items.
- C. The difference in the percentage of total items purchased between the control group and the group receiving recommendations increased as the cost of items increased.
- D. Nearly 40 percent of the items purchased by the control group came from the top 95 percent of most frequently purchased items.

39. Which statement on the effect of recommendations on niche products is best supported by the passage and data presented in figure 1?

- A. Algorithmic recommendations reduce the likelihood that a shopper will purchase a niche product over a popular product.
- B. The overall market share for niche products will increase with consistent use of algorithmic recommendations.
- C. Algorithmic recommendations increase purchase diversity in multiple product categories.
- D. The total number of sales, for both niche and popular products, will not change with algorithmic recommendations.

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

- A. line 30-34 (“A control . . . page”)
- B. line 35-37 (“We found . . . games”)
- C. line 38-41 (“For the . . . purchases”)
- D. line 41-44 (“The market . . . purchases”)

41. According to figure 2, the average number of items purchased in the “people who purchased this item also purchased” group was

- A. 2.44.
- B. 2.46.
- C. 2.56.
- D. 10.38.

Questions 42-52:

This passage is adapted from Maria Temming, “How Ancient Oceans of Magma May Have Boosted Earth’s Oxygen Levels.” ©2019 by Society for Science & the Public.

Line We may have ancient magma oceans to thank for Earth’s breathable air.

Shortly after the planet’s formation about 4.5 billion years ago, the mantle somehow became much richer in oxygen than it was originally. That rock began leaking molecules like carbon dioxide and water into the oxygen-poor atmosphere—helping to jump-start conditions suitable for life some
5 2 billion years before the Great Oxidation Event, when the amount of molecular oxygen in the atmosphere skyrocketed.

The cause of that chemical transition in the mantle has been a mystery. Now, new lab experiments suggest that chemical reactions involving iron in early Earth’s magma oceans tipped the chemical balance of the mantle in favor of more oxygen-rich compounds, researchers report.

10 “This is more than a chemical curiosity. . . . It’s profoundly important because it really sets the stage for all of Earth’s subsequent evolution,” says Jonathan Tucker, a geochemist at the Carnegie Institution for Science in Washington, D.C., who was not involved in the work. “The oxidation state of the Earth, and planets in general, is a very, very important factor controlling habitability.”

Early in Earth’s history, the planet was pummeled by planetesimals [small solid bodies formed
15 from accumulating dust], which could have created oceans of molten rock that dipped hundreds of kilometers deep into the mantle. Scientists have suspected that intense pressure in such magma oceans forced oxygen-containing ferrous iron to split into two different kinds of iron: one richer in oxygen, called ferric iron, and oxygen-free metal iron. This heavy metallic iron would have sunk into the Earth’s core, leaving the mantle dominated by more oxygen-rich ferric iron.

20 To test that idea, geochemists at the University of Bayreuth in Germany performed lab experiments that simulated conditions about 600 kilometers deep inside a magma ocean. While heating synthetic mantle material to thousands of degrees Celsius, the researchers used anvils to crush the molten samples with pressures up to more than 20 gigapascals.

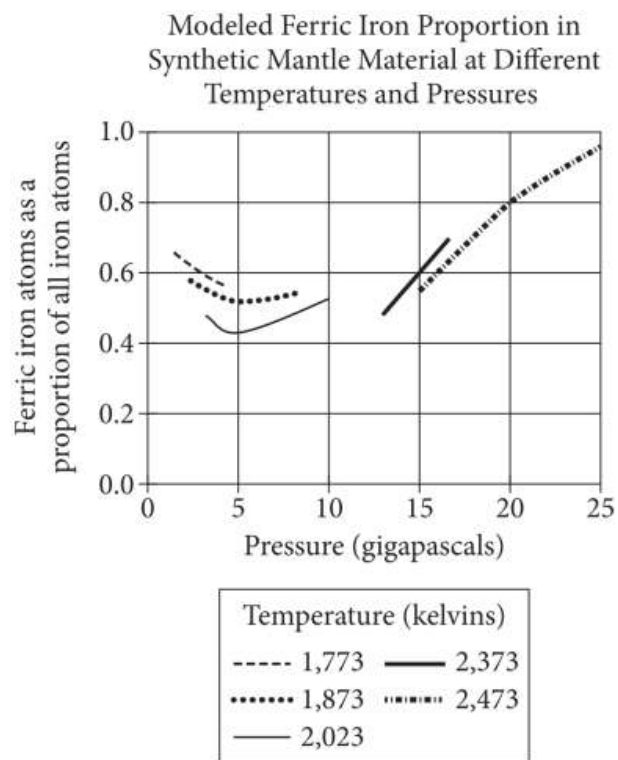
“That’s the equivalent of putting the entire mass of the Eiffel Tower on an object the size of a
25 golf ball,” says Katherine Armstrong, now at the University of California, Davis.

Armstrong and colleagues measured the amounts of ferrous and ferric iron in samples before and after exposure to these extreme conditions. No matter how much ferrous iron was originally in the rock, at the highest pressures 96 percent of the iron in the final product was the oxygen-rich ferric iron.

30 That finding indicates that deep in a magma ocean, ferric iron is more stable, Armstrong explains. Any ferrous iron at those depths would be liable to decompose into ferric iron, shedding metallic iron that would sink to the core.

These results are “pretty convincing” evidence that the chemical breakdown of ferrous iron in magma oceans could have helped boost the relative abundance of oxygen in the early Earth’s mantle, Tucker says. But it’s not yet clear whether this chemical process was the only one that contributed to the uptick of oxygen in early Earth’s atmosphere, he adds.

Afu Lin, a mineral physicist at the University of Texas at Austin who wasn’t involved in the work, similarly finds the decomposition of ferrous iron a plausible explanation for Earth’s oxygen-rich atmosphere. Researchers could help validate this account, he says, by searching for chemical signatures of the process in early Earth rocks and superdeep diamonds from the mantle.



Adapted from Katherine Armstrong et al., “Deep Magma Ocean Formation Set the Oxidation State of Earth’s Mantle.” ©2019 by American Association for the Advancement of Science.

42. Which choice best supports the idea that Armstrong and colleagues' hypothesis about ferrous iron decomposition in early Earth's magma may have implications beyond its effect on the oxygen content in early Earth's mantle?

- A. line 3-5 ("Shortly . . . originally")
- B. line 9-10 ("The cause . . . mystery")
- C. line 45-47 ("These . . . says")
- D. line 47-49 ("But . . . adds")

43. As used in line 13, "curiosity" most nearly means

- A. investigation.
- B. oddity.
- C. eagerness.
- D. trinket.

44. The main purpose of the fourth paragraph (line 13-18) is to

- A. consider other fields of study that might be affected by the researchers' results.
- B. detail the level of progress that had been achieved before the current study.
- C. convey the importance of understanding the phenomenon explored in the research.
- D. acknowledge that the results of the research do not entirely explain the phenomenon being studied.

45. Based on the passage, which finding, if true, would most likely call into question the explanation for the levels of ferric iron in Earth's mantle put forth by Armstrong and colleagues?

- A. The amount of oxygen-containing molecules in the atmosphere before the Great Oxidation Event was much higher than was initially believed.
- B. The pressures in the ancient magma oceans were insufficient to result in the processes investigated in the laboratory.
- C. The pressures deep inside the ancient mantle changed more frequently than scientists had originally estimated.
- D. Reactions that form ferric iron can occur in conditions similar to those found beneath the ancient mantle.

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

- A. line 5-8 ("That . . . skyrocketed")
- B. line 10-12 ("Now . . . report")
- C. line 19-22 ("Early . . . mantle")
- D. line 22-25 ("Scientists . . . iron")

47. The main purpose of the seventh paragraph (line 32-34) is to

- A. illustrate the extreme conditions in the simulation by describing a hypothetical situation.
- B. explain the challenges the researchers faced by using an analogy that references well-known objects.
- C. attempt to clarify a common misconception about mantle pressure through an example.
- D. suggest that the pressures used in previous studies were inaccurate by demonstrating their unlikelihood.

48. Based on the passage, the design of the lab experiments performed by Armstrong and colleagues helped to rule out which potential explanation for their findings?

- A. At high pressures, differences in the proportion of ferric iron produced by the experiments could be attributed to differences in the initial amount of ferrous iron added to the synthetic mantle.
- B. At high pressures, differences in the initial temperature of the ferrous iron could affect the rate that ferric iron was able to stabilize within the experimental mantle material.
- C. The magnitude of the change in pressure during the experiments might have influenced the speed at which the ferrous iron converted to create ferric iron in the synthetic mantle.
- D. Changes in the concentration of ferric iron could result from variations in ferrous iron that was gathered from multiple sources.

49. As used in line 45, “boost” most nearly means

- A. inspire.
- B. adjust.
- C. increase.
- D. publicize.

50. Which statement about the proportion of ferric iron is best supported by the data in the graph?

- A. The lowest proportion of ferric iron was produced at a temperature of 2,373 kelvins and between 10 and 15 gigapascals of pressure.
- B. When 5 gigapascals of pressure was applied, the proportion of ferric iron was higher at a temperature of 2,023 kelvins than at 1,873 kelvins.
- C. The greatest proportion of ferric iron was produced at a temperature of 2,473 kelvins and 25 gigapascals of pressure.
- D. When 15 gigapascals of pressure was applied, the proportion of ferric iron was higher at a temperature of 2,473 kelvins than at 2,373 kelvins.

51. Based on the graph, which statement best represents the findings about the proportion of ferric iron created at different temperatures and different pressures?

- A. As pressure increased, the proportion of ferric iron decreased at 1,773 kelvins but increased at 2,473 kelvins.
- B. The proportion of ferric iron increased with rising pressure only when applied at 2,473 kelvins.
- C. Similar proportions of ferric iron occurred at 2,473 kelvins and at 1,773 kelvins as long as the pressure remained under 10 gigapascals.
- D. An increase in pressure always produced an increase in the proportion of ferric iron at every temperature applied.

52. Based on the passage, which statement best explains the data presented in the graph regarding the proportion of ferric iron measured at 5 gigapascals of pressure and at 20 gigapascals of pressure?

- A. There was a higher proportion of ferric iron at 20 gigapascals of pressure than at 5 gigapascals of pressure, because the proximity of the oxygen and iron molecules increased the chances that they were able to react.
- B. There was a lower proportion of ferric iron at 20 gigapascals of pressure than at 5 gigapascals of pressure, because oxygen atoms were able to escape into the atmosphere from the ferrous iron in the synthetic mantle.
- C. There was a higher proportion of ferric iron at 5 gigapascals of pressure than at 20 gigapascals of pressure, because a greater amount of metal iron was able to sink through the synthetic mantle material in moderate conditions.
- D. There was a lower proportion of ferric iron at 5 gigapascals of pressure than at 20 gigapascals of pressure, because ferrous iron was able to withstand the stress of the lower pressure without converting to two kinds of iron.

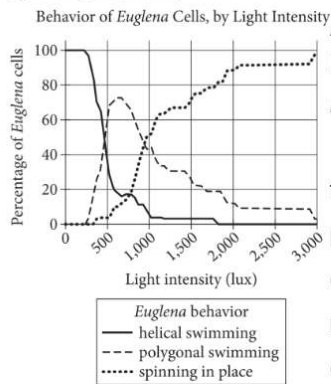
WRITING

Questions 1 – 11:

Polygonal Pond Swimming

The swimming 1 habits of *Euglena*—single-celled organisms commonly found in lakes and ponds—are well documented. Propelled by their whiplike flagellum, the oblong-shaped *Euglena* are known to swim through the water in a helical, or spiral-like, forward 2 motion, recently. Though researchers at Stanford University discovered a new behavior in *Euglena*'s repertoire. The organisms were observed swimming in polygonal patterns, such 3 as triangles pentagons and squares. This behavior, the researchers believe, is vital to the navigation and survival of these photosynthetic organisms.

Bioengineer Alan Tsang was the first to notice changes in *Euglena*'s behavior when the organisms were exposed to varying degrees of 4 light intensity. Light intensity is measured in lux. As Tsang and his team documented in their 2018 study, when they exposed a sample of *Euglena* cells to low intensities of light (under 400 lux), most of the cells displayed helical swimming. When the cells were exposed to between 500 and 1,000 lux, however, the percentage of cells exhibiting polygonal swimming peaked at 5 around 10 percent. Finally, when exposed to 3,000 lux, almost all *Euglena* cells 6 were documented swimming helically and spinning in place.



Adapted from Alan C. H. Tsang, Amy T. Lam, and Ingmar H. Riedel-Kruse, "Polygonal Motion and Adaptable Phototaxis via Flagellar Beat Switching in the Microswimmer *Euglena gracilis*." ©2018 by Alan C. H. Tsang, Amy T. Lam, and Ingmar H. Riedel-Kruse.

[1] As the researchers explain, polygonal swimming is what allows a *Euglena* cell to navigate and thrive in its surroundings. [2] This behavior enables the photosynthetic organism 7 to seek by its perfect habitat—one that's neither too dim nor too bright. [3] In an ideal light environment, such as a comfortably shaded pond, the *Euglena* cell swims forward. [4] As the cell swims, it both spirals and rolls along its long axis, with its light-sensing eyespot rotating along with it, surveying a full 360 degrees above and below the organism. [5] When it encounters a less ideal light environment, such as a 8 sunny spot that's a place of danger in the water, the cell's eyespot sends feedback to the flagellum, and the cell makes a quick turn. [6] The *Euglena* cell then continues forward, turning each time the eyespot rotates back into the bright light. [7] If the light intensity is too extreme, though, the cell's light sensor gets overloaded, causing the cell to spin in place, unable to 9 elude the damaging effects of the intense light. 10

The research team's findings are both intriguing and significant— 11 especially since *Euglena* are so common. As Tsang points out, knowledge of *Euglena*'s navigation may someday help engineers design microscopic devices that operate with similar feedback mechanisms. In other words, the microorganisms of today may serve as effective models for the microrobots of tomorrow.

1.

- A. NO CHANGE
- B. habits—of *Euglena*, single-celled organisms
- C. habits, of *Euglena*, single-celled organisms,
- D. habits of *Euglena*, single-celled organisms—

2.

- A. NO CHANGE
- B. motion. Recently, though,
- C. motion, recently though,
- D. motion, recently though

- 3.
- A. NO CHANGE
 - B. as, triangles pentagons,
 - C. as, triangles pentagons
 - D. as triangles, pentagons,
4. Which choice most effectively combines the sentences at the underlined portion?
- A. light-intensity-measuring
 - B. light intensity, by which it's measured in
 - C. light intensity, which is measured in
 - D. light intensity, and that's measuring
5. Which choice most accurately represents the information in the graph?
- A. NO CHANGE
 - B. under 40 percent.
 - C. just over 70 percent.
 - D. exactly 90 percent.
6. Which choice most accurately represents the information in the graph?
- A. NO CHANGE
 - B. were observed spinning in place.
 - C. alternated between helical and polygonal swimming.
 - D. increased the rate of their polygonal swimming.

- 7.
- A. NO CHANGE
 - B. seeking into
 - C. to seek out
 - D. seeking of
- 8.
- A. NO CHANGE
 - B. dangerously sunny spot
 - C. hazardously dangerous spot in the sun
 - D. dangerously sunny and bright spot
- 9.
- A. NO CHANGE
 - B. allude the damaging effects
 - C. allude the damaging affects
 - D. elude the damaging affects
10. The writer wants to add the following sentence to this paragraph.
- It follows this polygonal swimming behavior—going straight, turning, going straight again—until the cell eventually finds more suitable light conditions.
- The best placement for the sentence is
- A. after sentence 3.
 - B. after sentence 4.
 - C. after sentence 5.
 - D. after sentence 6.
11. Which choice provides the best transition from this sentence to the rest of the paragraph?
- A. NO CHANGE
 - B. and not just to biologists.
 - C. not to mention entirely unexpected.
 - D. even if there are at least 800 different species of Euglena.

walking with a Strandbeest

On a beach in the Netherlands, a strange, many-legged creature—nimble as a crab but big as a school bus—scuttles across the windswept sand. This “Strandbeest” (or “beach animal”) is the brainchild of Dutch artist and engineer Theo Jansen. Though its skeleton is made of plastic and its energy flows from the wing-like sails that crest its back, when the wind blows and sets the Strandbeest in motion, it’s hard to believe that Jansen’s kinetic sculpture is not, at least a little bit, alive.

12 Such uncanny animation did not come easily for the first of Jansen’s Strandbeests. When Jansen began his project in 1990, an early challenge he faced was teaching his creations to walk. Built from plastic PVC pipes and tape, the first Strandbeests could wiggle 13 its legs in the air, but when the creatures were placed upright, the complex, double-jointed limbs seized up and the Strandbeests crumpled to the ground. To solve this problem, Jansen drew on the lessons of evolutionary theory. Running a computer algorithm that simulated natural selection, 14 Jansen found the crucial ratio he had sought. This ratio determined the 15 prizewinning proportions for the legs, allowing the beests to walk—and walk they did.

Each year, Jansen built creatures better adapted to their beach environment than the previous versions. Some grew wider, with more legs, to keep from toppling 16 over, others added sails, allowing them to move autonomously in the wind. Some even developed “nerves,” long plastic tubes that extended like the snouts of anteaters, to sense the water’s edge and tell the creature to retreat. 17 When Jansen first conceived of the project, he envisioned the Strandbeests shoveling sand into barriers that would guard against rising sea levels. At the summer’s end, Jansen dismantled his creations, making way for the next generation.

Even after forty iterations, Jansen has barely wavered in the materials he 18 uses. It’s what Jansen does with such low-tech supplies that 19 will be making these sculptures both technical and artistic marvels. As they lumber their way, like walking trellises, against a flat backdrop of 20 sky. The Strandbeests seem designed to be photographed. However, Jansen claims he was never interested in beauty: “I was interested in survival . . . [but] as with nature—the better the functioning, often, the more beautiful the result.”

[1] Jansen envisions his creatures someday roaming the beaches in “herds,” proliferating and “living their own lives,” even after he’s gone. [2] Jansen has started publishing the “genetic codes” of some of his sculptures online. [3] Since then, Strandbeests have 21 manifested from the workshops and 3-D printers of fascinated builders around the globe. [4] Thus, the species lives on. 22

12. Which choice most effectively establishes the main topic of the paragraph?

- A. NO CHANGE
- B. Jansen’s Strandbeests were off to a promising start.
- C. Perhaps, above all, the lifelike appearance of the Strandbeests is due to their inherent imperfections.
- D. When discussing the evolution of his Strandbeests, Jansen speaks in terms of “epochs” and “periods,” marking the major developments of his “species.”

13.

- A. NO CHANGE
- B. their
- C. it’s
- D. they’re

- 14.
- A. NO CHANGE
 - B. the crucial ratio Jansen had sought was found.
 - C. what Jansen found was the crucial ratio he had sought.
 - D. Jansen's crucial ratio, which he had sought, was found.

- 15.
- A. NO CHANGE
 - B. maximum
 - C. supreme
 - D. optimal

- 16.
- A. NO CHANGE
 - B. over
 - C. over;
 - D. over:

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

- A. Kept, because it provides readers with important background information about the Strandbeests' origins.
- B. Kept, because it explains why the Strandbeests needed to develop "nerves" to sense the water's edge.
- C. Deleted, because it contradicts the sentence that comes after it.
- D. Deleted, because it distracts readers from the main idea of the paragraph.

18. The writer is considering revising the underlined portion to the following.

uses: cloth, nylon ties, plywood, and plenty of plastic tubes.

Should the writer make this revision?

- A. Yes, because it provides specific details that set up the information in the next sentence.
- B. Yes, because it clarifies how Strandbeests have evolved over the years.
- C. No, because it repeats information already mentioned in the passage.
- D. No, because it interrupts the discussion of the Strandbeests' technical and artistic appeal.

- 19.
- A. NO CHANGE
 - B. had made
 - C. made
 - D. makes

- 20.
- A. NO CHANGE
 - B. sky; the
 - C. sky, and the
 - D. sky, the

21. Which choice from Passage 1 provides the best evidence for the answer to the previous question?

- A. NO CHANGE
- B. cast forth
- C. emerged
- D. spewed

22. The writer plans to add the following sentence to the paragraph.

While such a thing is still not possible, the beests have begun multiplying in a different way.

To make the paragraph most logical, the sentence should be placed

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

Questions 23-33 are based on the following passage.

Crossing Cultures, Crossing Genres in Independent Publishing

While most books marketed to the general public are sold by large corporate publishing houses, 23 independent publishers play an important role in the literary ecosystem too. Independent publishers are small or medium-sized presses. Independent presses often specialize in publishing works in historically less profitable genres, including international fiction, poetry, and those that defy traditional categorization. Not beholden to a corporate vision or the mandates of shareholders, independent publishers often have the freedom and courage to take on works that larger publishers might not want to take a chance on. As a result, independent presses provide a 24 space—within the publishing industry, for literary voices that might otherwise not reach readers.

Europa Editions, a publisher based in the United States and the United Kingdom, 25 focuses on bringing international novels in translation to English language audiences. While many of the authors are well acclaimed in their home countries, Europa's publications are often the first English translations of the novels to reach anglophone readers. Commenting on Europa's mission, 26 as cofounder Sandro Ferri says, his publishing house was "born with the intention to create bridges between cultures." To that end, Europa has published works from twenty-nine different countries. One of its 27 undertakings that has been among its most successful publishing ventures has been Italian author Elena Ferrante's Neapolitan quartet. Already popular in Italy, Ferrante's novels about the friendship between two young women in postwar Naples 28 resonates with readers across the Atlantic as well. By 2018, Europa's translations of the four-volume series had sold two million copies in the US, and the original novels had been turned into a television show.

While Europa concentrates on international literature, Minnesota-based Graywolf Press has invested in several books that 29 experiment with form and genre—a choice that has proven popular among critics and readers alike. 30 Moreover, one such work is Claudia Rankine's *Citizen: An American Lyric*. Published in 2014 and the winner of several major literary awards, Rankine's book uses a combination of poetry, prose, and photography to reflect on the experiences of African Americans in the twenty-first century. Jeff Shotts, the Graywolf editor who 31 will be working with Rankine on the manuscript for *Citizen*, notes that while publishing such innovative works can be financially risky, 32 the publisher tries "to be a full-support service as much as possible in order to keep our cherished writers writing."

The niches that presses like Europa and Graywolf have carved out for themselves are good news for authors and book lovers alike. 33 Through a variety of initiatives, such as contests and calls for submissions, independent publishers can find authors with unique and valuable perspectives.

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

- A. independent publishers—small or medium-sized presses—play an important role in the literary ecosystem too.
- B. playing an important role in the literary ecosystem as well, independent publishers are small or medium-sized presses.
- C. an important role is also played by small or medium-sized presses in the literary ecosystem; these are independent publishers.
- D. in the literary ecosystem, small or medium-sized presses, also known as independent publishers, also play an important role.

24.

- A. NO CHANGE
- B. space within the publishing industry
- C. space, within the publishing industry
- D. space: within the publishing industry

25. Which choice best sets up the sentence that follows in the paragraph?

- A. NO CHANGE
- B. was founded by the same publishers that started Rome's Edizioni E/O publishing house.
- C. features crime novels from a variety of countries in its Europa World Noir series.
- D. has published such best-selling novels as Muriel Barbery's *The Elegance of the Hedgehog*.

26.

- A. NO CHANGE
- B. when cofounder Sandro Ferri says
- C. which cofounder Sandro Ferri says,
- D. cofounder Sandro Ferri says

27.

- A. NO CHANGE
- B. most fruitful and successful book publishing
- C. most successful
- D. projects that has proven to be one of its most fruitful

28.

- A. NO CHANGE
- B. has resonated
- C. have resonated
- D. is resonating

29.

- A. NO CHANGE
- B. experiment, with form and genre,
- C. experiment with: form and genre,
- D. experiment with form and genre;

30.

- A. NO CHANGE
- B. Consequently,
- C. However,
- D. DELETE the underlined portion, adjusting the capitalization as needed.

31.

- A. NO CHANGE
- B. worked
- C. will have worked
- D. is working

32. Which quotation from Jeff Shotts's 2016 interview with Literary Hub best supports a main idea of the paragraph?

- A. NO CHANGE
- B. "Graywolf and our titles exist in the same marketplace as countless, more commercial publishers and their titles."
- C. larger publishers adhere to "a publishing model that doesn't seem aware of its own history."
- D. Citizen and Graywolf's other cross-genre books have created a "blazing level of excitement among readers."

33. The writer wants a conclusion that summarizes the main idea of the passage. Which choice best accomplishes this goal?

- A. NO CHANGE
- B. Across oceans and genres, independent publishers help readers connect to interesting, daring, and vital works of literature.
- C. Nevertheless, readers should take care not to overlook the many important books released every year by large-scale publishers.
- D. Other small presses such as Dorothy, which publishes primarily works by female authors, similarly aim to push the literary marketplace in new directions.

Questions 34-44 are based on the following passage.

Cycles of Change: Making Dockless Bikes Work

With the success of public bike-sharing programs that let users rent bicycles from designated docking stations throughout a city, dozens of private companies have launched dockless bike-sharing 34 programs, therefore riders can pick up and drop off bikes anywhere they choose using GPS trackers and digital locks. Dockless bikes can benefit city residents by taking them where trains and buses cannot, but they can also 35 incur costly repairs that hurt company profits. To avoid chaos, companies and city planners must work together; only by cooperating can they ensure that dockless bikes improve—rather than hinder—residents' quality of life.

At their best, dockless bike-sharing programs integrate seamlessly and unobtrusively into a city's commuter 36 ecosystem, they provide a transit option as reliable as it is versatile. They're ideal for "first mile/last mile" transit gaps, which are the parts of a trip between one's home and the nearest transit stop. Moreover, because a program using dockless bikes is easier to implement 37 than that of a program using docked bikes, companies can introduce a new program rapidly, expanding transit options. For example, just eighteen months after its 2017 Seattle debut, one dockless bike company had served more than a third of the city's population.

The free-floating flexibility of dockless bikes can be a liability, 38 however, if companies launch a program without considering a city's existing transit landscape. A common issue 39 is clutter, when the supply of bicycles exceeds demand, or if there aren't enough places to park the bikes, they can overwhelm a city. This happened in Dallas, where 18,000 bikes were introduced in under six months; the result was a surplus of bicycles strewn across sidewalks and clogging curbs. Though dockless systems can be launched rapidly, it takes careful planning to guarantee their long-term viability.

Cooperation is essential. According to transportation researcher Dana Yanocha, 40 "It can really come down to cities creating relationships with these private companies, and making sure that the private companies are aligning with the goals of the city." One way for cities to minimize chaos is to 41 consider enacting a permit structure. For example, they could consider the one Seattle enacted in 2017. The city capped bike numbers during initial rollout of dockless bike-sharing programs 42 and then, after a trial period—gradually allowed fleets to grow while also introducing new bike parking spots. Likewise, the city of Austin mandated that companies equip dockless bikes with "lock-to" technology, which requires riders to lock the bikes to racks as opposed to 43 discarding them haphazardly. As these examples show, cities and private companies, working together, can 44 use dockless bikes to alleviate crowding issues on popular train and bus routes.

34.

- A. NO CHANGE
- B. programs in which riders can
- C. programs, and riders can also
- D. programs, riders can

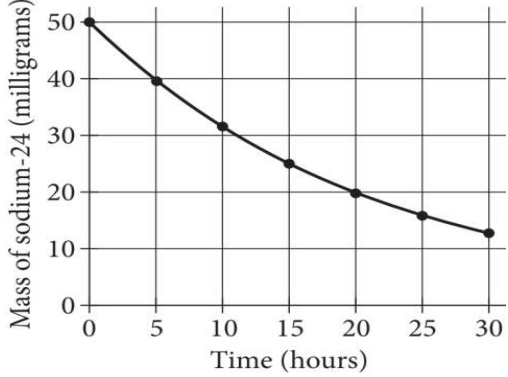
35. Which choice establishes one of the passage's central ideas?

- A. NO CHANGE
- B. prove difficult to ride in inclement weather.
- C. become a nuisance without proper regulation.
- D. interfere with the popularity of existing docked systems.

- 36.
- A. NO CHANGE
 - B. ecosystem, this provides
 - C. ecosystem, providing
 - D. ecosystem; providing
- 37.
- A. NO CHANGE
 - B. than for
 - C. than compared to
 - D. than
- 38.
- A. NO CHANGE
 - B. additionally,
 - C. for instance,
 - D. in other words,
- 39.
- A. NO CHANGE
 - B. is clutter:
 - C. is: clutter,
 - D. is clutter
40. Which quotation from an interview with Yanocha best supports the main claim of the passage?
- A. NO CHANGE
 - B. “We’ve seen dockless bike shar[ing] really play out in a variety of locations across the world.”
 - C. “Some companies that initially came out providing dockless bikes are now moving into providing dockless e-scooters.”
 - D. “Vandalism and theft have been a really big problem for bike shar[ing].”
41. Which choice most effectively combines the sentences at the underlined portion?
- A. enact a permit structure that considers, for example,
 - B. consider enacting a permit structure such as, for example,
 - C. enact, after consideration, a permit structure similar to
 - D. consider a permit structure like
- 42.
- A. NO CHANGE
 - B. and then, after a trial period,
 - C. and then, after a trial period
 - D. and—then after a trial period
- 43.
- A. NO CHANGE
 - B. discarding them at random and tossing them haphazardly.
 - C. discarding or tossing the dockless bikes at random.
 - D. randomly discarding them in a haphazard manner.
44. The writer wants an effective concluding sentence that restates the main claim of the passage. Which choice best accomplishes this goal?
- A. NO CHANGE
 - B. achieve their vision of helping city dwellers rely less on car travel.
 - C. maintain healthy, mutually profitable business partnerships with one another.
 - D. solve the problems of dockless bikes and offer residents a convenient new transit option.

MATH NO CALCULATOR

1.



The graph models the radioactive decay of the sodium-24 in a sample over time. According to the graph, at 5 hours, which of the following is closest to the mass, in milligrams, of the sodium-24 in this sample?

- A. 25
- B. 31
- C. 40
- D. 50

2.

$$|x + 3| = 6$$

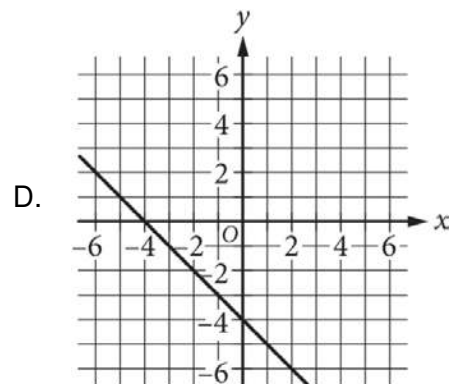
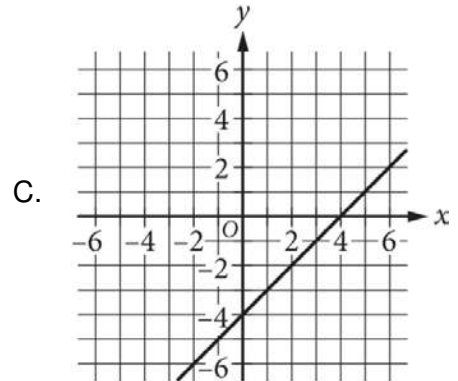
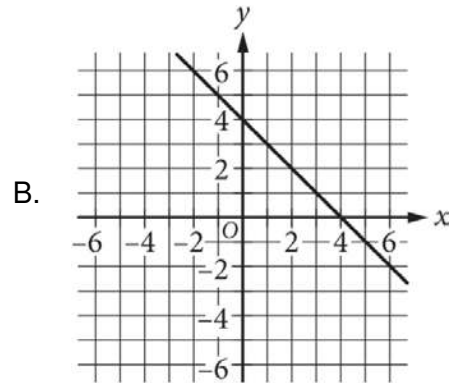
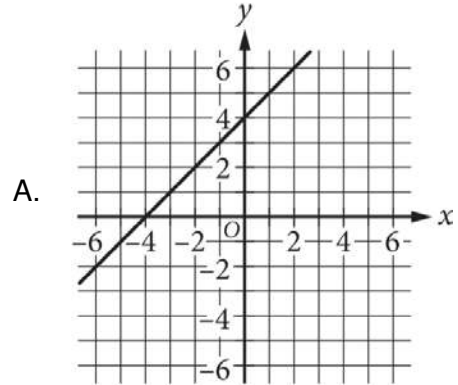
What is the positive solution to the given equation?

- A. 2
- B. 3
- C. 9
- D. 18

3.

$$y = 4 - x$$

What is the graph of the given equation?



4.

$$y = 7 - 4x$$
$$15x - 4y = 3$$

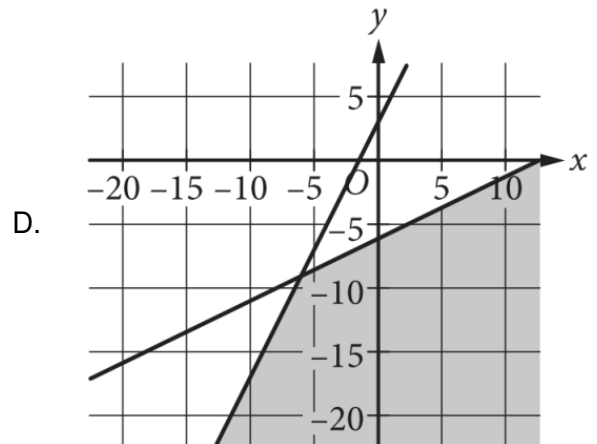
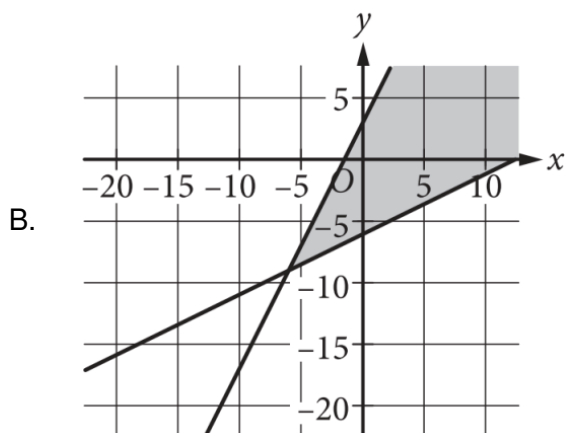
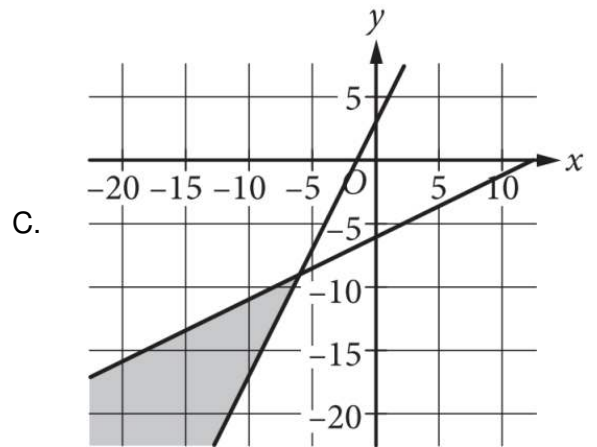
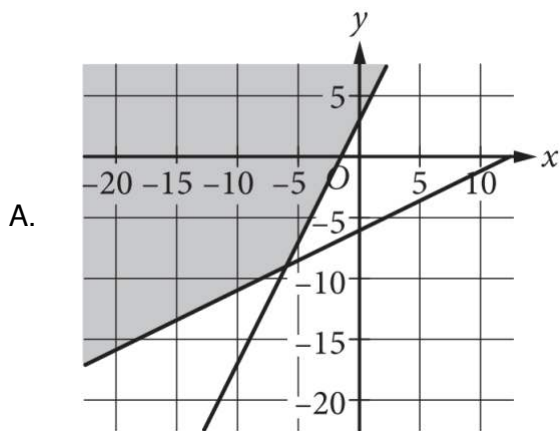
What is the solution (x, y) to the given system of equations?

- A. $(-31, 131)$
- B. $(-1, 11)$
- C. $(1, 3)$
- D. $(1, 11)$

5.

$$y \leq 2x + 3$$
$$y \geq 0.5x - 6$$

In which graph does the shaded region represent all solutions to the given system of inequalities?



6. $f(t) = 0.17t + 2.54$

The given function f models the annual worldwide production of avocados, in millions of metric tons, t years after 2000. According to the function, by how many millions of metric tons did the annual worldwide production of avocados increase from 2010 to 2011?

- A. 0.17
- B. 2.54
- C. 2.71
- D. 4.24

7. Which equation has no solution?

- A. $4(x + 1) = x + 4$
- B. $4(x + 1) = x + 1$
- C. $4(x + 1) = 4x + 4$
- D. $4(x + 1) = 4x$

8. The function f is defined by $f(x) = (x - 1)(x + 1)(x + 2)$. Which of the following is NOT an x -intercept of the graph $y = f(x)$ in the xy -plane?

- A. $(-2, 0)$
- B. $(-1, 0)$
- C. $(1, 0)$
- D. $(2, 0)$

9. Which expression is equivalent to $16^{\left(\frac{1}{2}x\right)}$?

- A. 4^x
- B. 8^x
- C. $8x$
- D. $16\sqrt{x}$

10. Trapezoid ABCD is similar to trapezoid PQRS. The length of each side of trapezoid PQRS is 3 times the length of its corresponding side of trapezoid ABCD. The area of trapezoid ABCD is 6 square centimeters. What is the area, in square centimeters, of trapezoid PQRS?

- A. 9
- B. 18
- C. 54
- D. 216

11. The function f is defined by $f(x) = (x + 1)^2 - 9$. In the xy -plane, the graph of which of the following equations has no x -intercepts?

- A. $y = f(x - 2)$
- B. $y = f(x + 2)$
- C. $y = f(x) - 11$
- D. $y = f(x) + 11$

12. $x^2 - 10x + y^2 - 6y = 30$

In the xy -plane, the graph of the given equation is a circle. What is the area of this circle?

- A. 8π
- B. 15π
- C. 46π
- D. 64π

13.
$$\frac{x^2+x}{x+5}$$

The given expression can be rewritten as $A + \frac{20}{x+5}$, where A is a polynomial. Which of the following represents A?

- A. $x - 4$
- B. $x + 4$
- C. $x^2 + x$
- D. $x^2 + x - 20$

14.
$$\frac{1}{C} = \frac{1}{d} + \frac{1}{e} + \frac{1}{f}$$

An electric circuit contains three capacitors in a particular arrangement. The given equation relates the equivalent capacitance C of the arrangement to d, e, and f, the capacitances of the individual capacitors. Which equation correctly gives C in terms of d, e, and f?

- A. $C = d + e + f$
- B. $C = \frac{def}{d+e+f}$
- C. $C = \frac{d+e+f}{def}$
- D. $C = \frac{def}{de+df+ef}$

15. The cost of renting a bicycle is \$8 for the first hour plus \$4 for each additional hour. Which of the following functions gives the cost $C(h)$, in dollars, of renting the bicycle for h hours, where h is a positive integer?

- A. $C(h) = 8h - 4$
- B. $C(h) = 8h + 12$
- C. $C(h) = 4h + 8$
- D. $C(h) = 4h + 4$

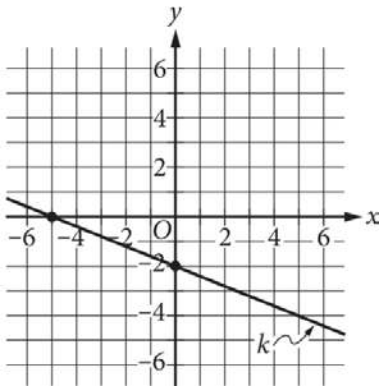
16.
$$5r = 3(r + 1)$$

What value of r is the solution to the given equation?

17.
$$(3x)^2 - 4(3x) - 12 = 0$$

What is the positive solution to the given equation?

18.



Line k is shown in the xy -plane. Line j (not shown) is perpendicular to line k . What is the slope of line j ?

19. In the xy -plane, the graph of $y = (-14)\left(\frac{1}{2}\right)^x + k$, where k is a constant, has a y -intercept of $(0, 2)$. What is the value of k ?

20. The perimeter of a square inscribed in a circle is 30 inches. The radius of the circle is $x\sqrt{2}$ inches. What is the value of x ?

MATH CALCULATOR

1. $k(x) = 260x$

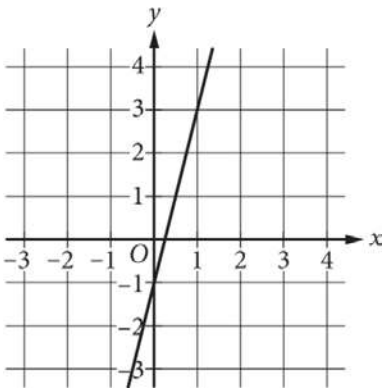
The function gives the total amount $k(x)$, in dollars, Kayla earned after working x weeks at a bookstore. What is the total amount Kayla earned, in dollars, after working 10 weeks at the bookstore?

- A. 2,600
- B. 2,610
- C. 2,626
- D. 2,860

2. The function f is defined by $f(x) = x + 4$. What is the value of $f(x)$ when $x = 5$?

- A. 9
- B. 5
- C. 4
- D. 1

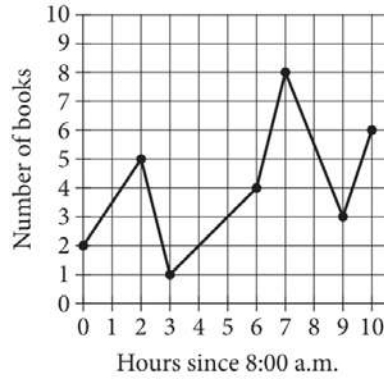
3.



What is an equation of the graph shown?

- A. $y = -4x - 1$
- B. $y = -4x + 1$
- C. $y = 4x - 1$
- D. $y = 4x + 1$

4.



What is the minimum number of books in the book drop recorded during this time?

- A. 5
- B. 4
- C. 3
- D. 1

5.

$$\sqrt{m^2} = \sqrt{64^2}$$

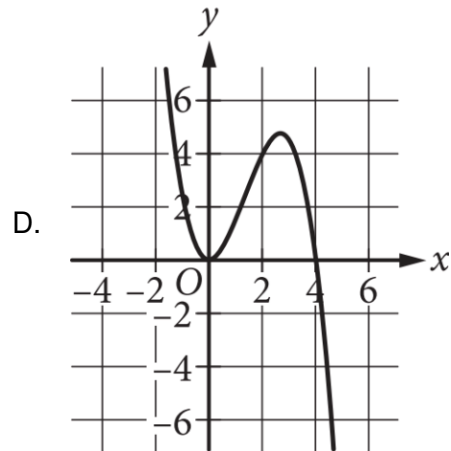
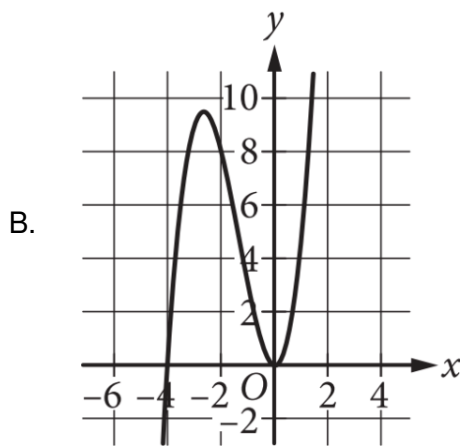
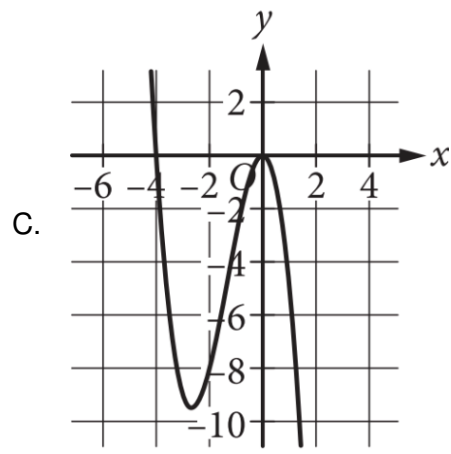
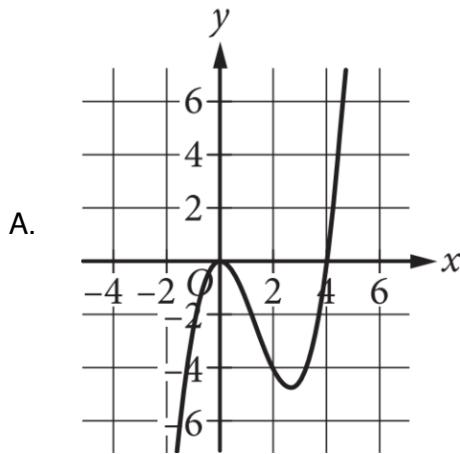
What is the positive solution to the given equation?

- A. 4
- B. 8
- C. 16
- D. 64

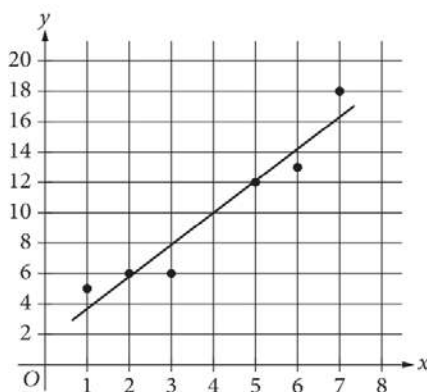
6.

x	-4	-1	1
$f(x)$	0	3	5

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



7.



The scatterplot shows the relationship between two variables, x and y . A line of best fit for the data is also shown. For $x = 4$, which of the following is closest to the y -value predicted by the line of best fit?

- A. 10
- B. 12
- C. 14
- D. 16

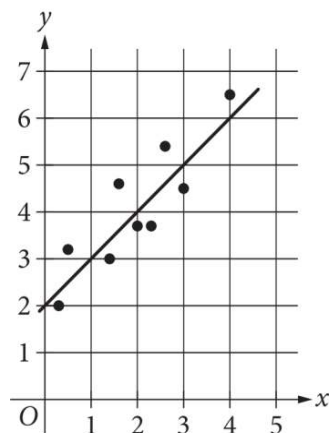
8. In a group of 8 children, 2 have freckles and 6 do not have freckles. If one of the 8 children is selected at random, what is the probability of selecting a child who has freckles?

- A. 0.25
- B. 0.33
- C. 0.50
- D. 0.75

9. The ratio of Jupiter's diameter to Saturn's diameter is approximately 1.2 to 1. The diameter of Jupiter is 143,000 kilometers. What is the diameter, to the nearest ten thousand kilometers, of Saturn?

- A. 24,000
- B. 83,000
- C. 120,000
- D. 170,000

10. In the given scatterplot, a line of best fit for the data is shown.



Which of the following is an equation for the line of best fit?

- A. $y = x$
- B. $y = 2x$
- C. $y = 1 + x$
- D. $y = 2 + x$

11.

x	$f(x)$
0	13
10	9
25	3

For the linear function f , the table shows three values of x and their corresponding values of $f(x)$. Which equation defines f ?

- A. $f(x) = -4x + 13$
- B. $f(x) = -2x + 13$
- C. $f(x) = -\frac{5}{2}x + 13$
- D. $f(x) = -\frac{2}{5}x + 13$

12.

$$2 - x^2 - x^2 - 2$$

Which of the following is equivalent to the given expression?

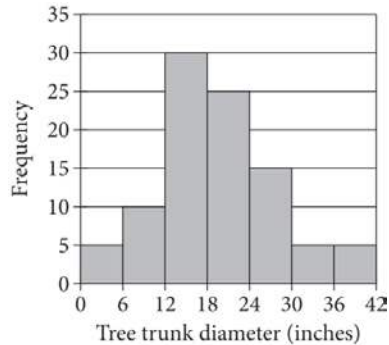
- A. 0
- B. 2
- C. $-x^2$
- D. $-2x^2$

13. A data set consists of 100 values. The least value is 30, and the greatest two values are 80 and 125. If the value 125 is removed from the original data set to create a new data set with 99 values, which statement must be true?

- A. The means of the two data sets will be the same.
- B. The mean of the new data set will be less than the mean of the original data set.
- C. The medians of the two data sets will be the same.
- D. The median of the new data set will be less than the median of the original data set.

Questions 14 and 15 refer to the following information.

A forestry department measures tree trunk diameter, in inches, at a constant height from the ground for each tree growing in a certain area. The data for 95 of these trees are summarized in the histogram. The first bar represents trees with a trunk diameter less than 6 inches. The second bar represents trees with a trunk diameter of at least 6 inches but less than 12 inches, and so on.



14. Approximately what percentage of these trees have a trunk diameter less than 6 inches?

- A. 2.6%
- B. 5.3%
- C. 10.5%
- D. 15.8%

15. Which of the following is a possible value for the median trunk diameter, in inches, of these trees?

- A. 10
- B. 15
- C. 20
- D. 25

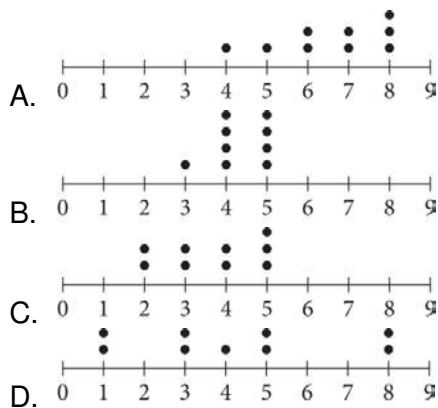
16. The three candidates who ran for a city council position in Memphis in 2015 received a total of 14,705 votes. The ratio of votes for the first candidate to votes for the second candidate was approximately 4 to 1. The ratio of votes for the first candidate to votes for the third candidate was approximately 100 to 13. Based on this information, which of the following is closest to the number of votes received by the first candidate?

- A. 1,911
- B. 3,676
- C. 10,656
- D. 14,601

17. Kai went on a bike ride. During the first mile of his bike ride, he rode at a constant speed, s . After the first mile of his ride, Kai increased his speed by 100%. Which of the following expressions represents the speed Kai rode his bike after the first mile, in terms of s ?

- A. s
- B. $s + 1$
- C. $1.5s$
- D. $2s$

18. Which of the following dot plots represents the data set with the greatest standard deviation?



Questions 19 and 20 refer to the following information.

A state representative wants to increase the amount of driving practice time required before a student can earn a driver's license. The representative surveyed a random sample of 50 from the 250 students taking the driver's education class at Jefferson High School. The survey reported that 62% of students taking the class agree that driving practice time should be increased, with an associated margin of error of 5%.

19. Based on the results of the survey, how many of the students surveyed agree with the proposed change?

- A. 19
- B. 31
- C. 124
- D. 155

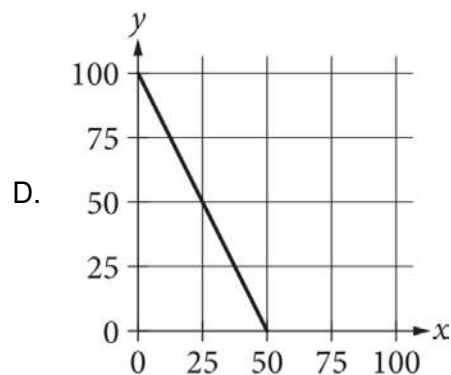
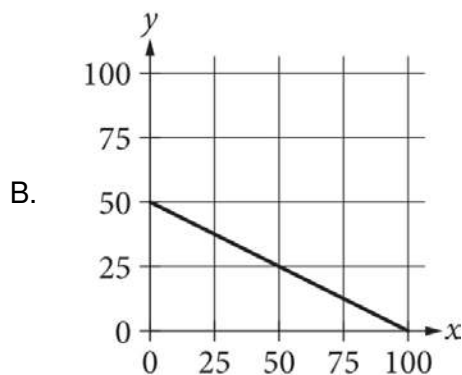
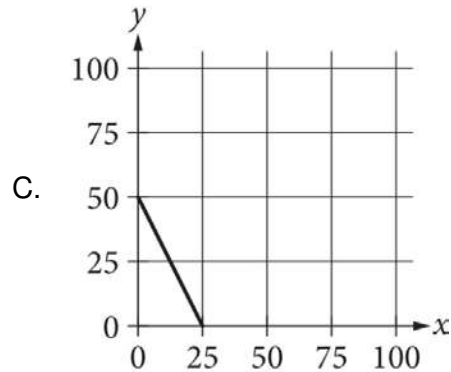
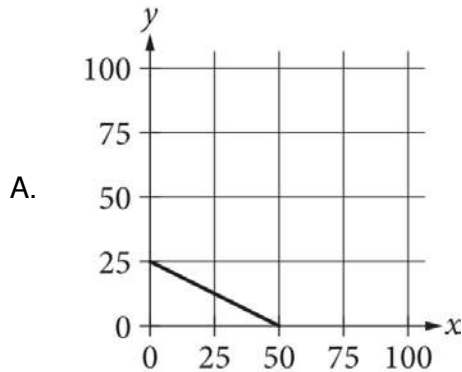
20. Which of the following populations can the results of the survey at Jefferson High School be extended to?

- A. Students at any US high school
- B. Students taking a driver's education class at any US high school
- C. Students at Jefferson High School
- D. Students taking a driver's education class at Jefferson High School

21. Which quadratic equation has exactly one distinct real solution?

- A. $x^2 + 4x + 16 = 0$
- B. $x^2 - 8x - 16 = 0$
- C. $x^2 - 6x - 16 = 0$
- D. $x^2 - 8x + 16 = 0$

22. In a school debate club, each student earns 2 credits if they participate in a debate and lose, and 4 credits if they participate in a debate and win. A student receives an award after earning 100 credits. The credits needed for the award can be modeled by the equation $2x + 4y = 100$, where x is the number of times a student participated in a debate and lost, and y is the number of times the student participated in a debate and won. Which graph represents this situation?



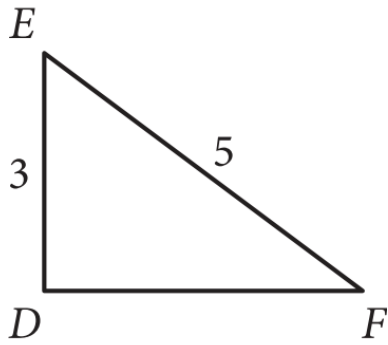
23. Rectangle X has a length of 12 centimeters (cm) and a width of 2.5 cm. Right triangle Y has a base of 10 cm. The area of rectangle X is three times the area of right triangle Y. What is the height, in cm, of right triangle Y?

- A. 1
- B. 2
- C. 3
- D. 6

24. According to a 2008 study, there were five known subspecies of tigers, including the Amur and Bengal, living in the wild. Scientists estimated that there were a total of 4,000 tigers in the wild. Of these, 450 were Amur tigers and x were Bengal tigers. Which inequality represents all possible numbers of tigers in the wild in 2008 that belonged to the Bengal tiger subspecies?

- A. $5x \geq 4000$
- B. $\frac{x}{5} \geq 4000$
- C. $1 \leq x \leq 3547$
- D. $3547 < x \leq 4000$

25.



Which of the following additional pieces of information provides enough information to prove whether triangle DEF is a right triangle?

- I. The measure of angle D
- II. The length of segment DF

- A. I only
- B. II only
- C. Either I or II
- D. Neither I nor II

26. According to a model, if 100 people see a sequence of three letters, 87 of them will recall this sequence immediately after seeing it. The model predicts that this number will decrease by 14% of the number the previous second for each second that passes. Which function represents this model, where $f(t)$ is the predicted number of people who will recall the sequence after t seconds have passed?

- A. $f(t) = 14(0.87)^t$
- B. $f(t) = 87(0.14)^t$
- C. $f(t) = 87(0.86)^t$
- D. $f(t) = 87(1.14)^t$

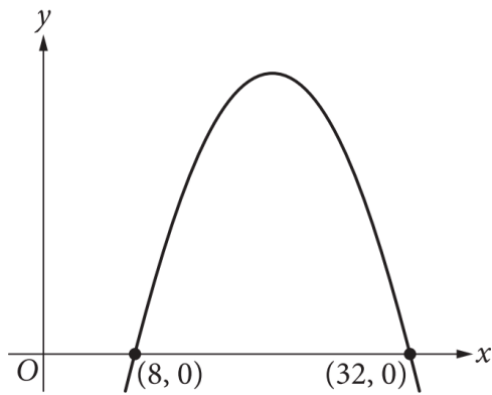
27. One of the two linear equations in a system is $-6x + 7y = -6$. The system has no solution. Which equation could be the second equation in this system?

- A. $6x - 7y = 0$
- B. $-\frac{21x}{4} + \frac{49y}{8} = -\frac{21}{4}$
- C. $-\frac{21x}{4} - 14y = 0$
- D. $6x - 7y = 6$

28. A cottonwood tree had a trunk diameter of 2.00 inches at the time it was planted. The tree had a trunk diameter of 22.24 inches x years after it was planted. The equation $0.64x + 2 = 22.24$ represents this situation. Which statement is the best interpretation of $0.64x$ in this context?

- A. The total increase of the tree's trunk diameter x years after it was planted
- B. The tree's trunk diameter x years after it was planted
- C. The maximum trunk diameter of the tree over its lifetime
- D. The total increase of the tree's trunk diameter each year after it was planted

29.



The graph of the equation $y = -x^2 + 40x - 256$ is shown. Which of the following equivalent forms of the equation shows the maximum value of y as a constant or coefficient?

- A. $y = -(x - 8)(x - 32)$
- B. $y = -(x - 20)^2 + 144$
- C. $y = -x(x - 40) - 256$
- D. $y = -x^2 + 8(5x - 32)$

30. If $\frac{x-3}{7} = \frac{x-3}{9}$, the value of $x - 3$ is between which of the following pairs of values?

- A. -7 and -9
- B. -1 and 1
- C. 2.5 and 3.5
- D. 6.75 and 9.25

31. An object has a mass of 200 grams and a volume of 10 cubic centimeters. What is the density, in grams per cubic centimeter, of the object?

32. An artist decorates square plates using the same pattern of blue and green tiles, where the ratio of blue to green tiles is 3 to 2. For a certain plate, the artist uses 120 blue tiles and $20n$ green tiles. What is the value of n ?

33.

$$y = 3x + 9$$
$$y = -3x + 3$$

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

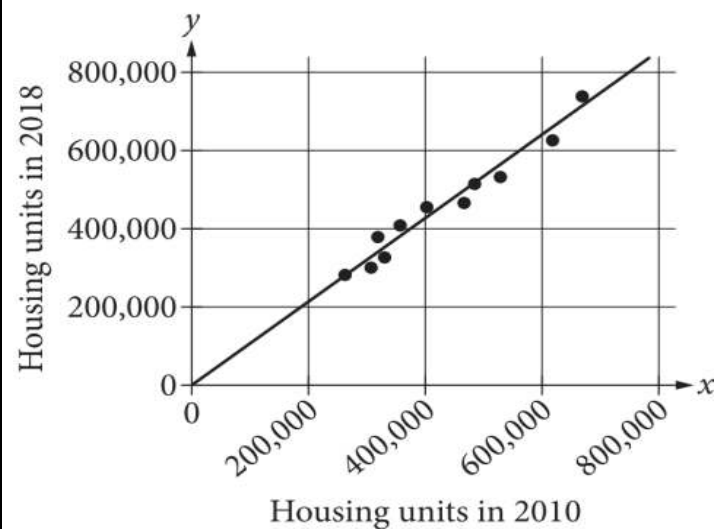
34. A circle has been divided into three nonoverlapping regions: I, II, and III. The area of region I is 4π square centimeters (cm^2), the area of region II is $12\pi cm^2$, and the area of region III is $16\pi cm^2$. If a point in the circle is selected at random, what is the probability of selecting a point that does not lie in region II? (Express your answer as a decimal or fraction, not as a percent.)

35. In 1980, the world population was 4.44 billion people. A model created at the time predicted that this population would grow at a rate of 0.076 billion people each year after 1980. In 2015, the world population was 7.35 billion people. What is the positive difference, in billions of people, between the actual world population in 2015 and the model's predicted world population in 2015?

36.
$$M(t) = 10 \left(\frac{1}{2}\right)^{\frac{t}{5730}}$$

The given function M models the mass of the radioactive isotope carbon-14 in a sample, in picograms, t years after the initial measurement. How much time, in years, does it take for the mass of carbon-14 in the sample to decrease to 5 picograms?

37.



The scatterplot shows the number of housing units in 2010 and 2018 for each of 11 US states. A line of best fit with equation $y = ax$, where a is a constant, is also shown. A point lies above this line if and only if it represents a state with an increase in housing units from 2010 to 2018 greater than 7%. What is the value of a ?

38. A circle in the xy -plane has its center at $(4, -5)$ and has a radius of 2. An equation of the circle is $x^2 - 8x + y^2 + 10y + c = 0$, where c is a constant. What is the value of c ?

Reading

Question	Answer	Question	Answer
1	B	27	A
2	B	28	A
3	D	29	D
4	C	30	B
5	D	31	C
6	C	32	B
7	C	33	C
8	D	34	D
9	D	35	A
10	C	36	A
11	C	37	C
12	D	38	B
13	B	39	A
14	A	40	D
15	B	41	C
16	D	42	D
17	A	43	B
18	B	44	C
19	A	45	B
20	B	46	D
21	D	47	A
22	B	48	A
23	A	49	C
24	B	50	C
25	C	51	A
26	D	52	D

Writing

Question	Answer	Question	Answer
1	A	23	A
2	B	24	B
3	D	25	A
4	C	26	D
5	C	27	C
6	B	28	C
7	C	29	A
8	B	30	D
9	A	31	B
10	D	32	D
11	B	33	B
12	A	34	B
13	B	35	C
14	A	36	C
15	D	37	D
16	C	38	A
17	D	39	B
18	A	40	A
19	D	41	D
20	D	42	B
21	C	43	A
22	A	44	D

No Calculator	
Question	Answer
1	C
2	B
3	B
4	C
5	B
6	A
7	D
8	D
9	A
10	C
11	D
12	D
13	A
14	D
15	D
16	$3/2, 1.5$
17	2
18	$5/2, 2.5$
19	16
20	$15/4, 3.75$

Calculator				
Question	Answer		Question	Answer
1	A		20	D
2	A		21	D
3	C		22	A
4	D		23	B
5	D		24	C
6	B		25	C
7	A		26	C
8	A		27	A
9	C		28	A
10	D		29	B
11	D		30	B
12	D		31	20
13	B		32	4
14	B		33	6
15	C		34	$5/8, .625$
16	C		35	$1/4, .25$
17	D		36	5730
18	D		37	$107/100, 1.07$
19	B		38	37

READING

Question	Correct Answer	Your Answer	Difficulty	Subscores/Cross-Test Scores
^	◇	◇	◇	
1	B	✓	■ ■ □	N/A
2	B	✓	■ □ □	N/A
3	D	✓	■ ■ □	Words in Context
4	C	✓	■ □ □	N/A
5	D	A	■ ■ □	N/A
6	C	A	■ ■ □	Command of Evidence
7	C	✓	■ □ □	N/A
8	D	✓	■ □ □	Words in Context
9	D	✓	■ ■ ■	N/A
10	C	✓	■ □ □	N/A
11	C	✓	■ □ □	Analysis in History/ Social Studies Words in Context
12	D	✓	■ ■ □	Analysis in History/ Social Studies Command of Evidence
13	B	✓	■ □ □	Analysis in History/ Social Studies
14	A	✓	■ ■ □	Analysis in History/ Social Studies
15	B	✓	■ ■ □	Analysis in History/ Social Studies
16	D	✓	■ □ □	Analysis in History/ Social Studies Words in Context
17	A	✓	■ ■ □	Analysis in History/ Social Studies
18	B	✓	■ ■ □	Analysis in History/ Social Studies
19	A	✓	■ ■ □	Analysis in History/ Social Studies
20	B	✓	■ ■ □	Analysis in History/ Social Studies
21	D	✓	■ ■ □	Analysis in History/ Social Studies
22	B	✓	■ ■ □	Analysis in Science
23	A	✓	■ □ □	Analysis in Science Words in Context
24	B	✓	■ ■ □	Analysis in Science
25	C	✓	■ ■ □	Analysis in Science

26	D	✓	■ ■ □	Analysis in Science
27	A	✓	■ □ □	Analysis in Science Words in Context
28	A	✓	■ ■ □	Analysis in Science
29	D	✓	■ ■ □	Analysis in Science Command of Evidence
30	B	✓	■ ■ □	Analysis in Science
31	C	✓	■ ■ □	Analysis in Science Command of Evidence
32	B	✓	■ ■ □	Analysis in History/ Social Studies
33	C	✓	■ ■ □	Analysis in History/ Social Studies
34	D	✓	■ □ □	Analysis in History/ Social Studies Words in Context
35	A	✓	■ □ □	Analysis in History/ Social Studies Words in Context
36	A	✓	■ ■ □	Analysis in History/ Social Studies
37	C	✓	■ □ □	Analysis in History/ Social Studies
38	B	✓	■ ■ □	Analysis in History/ Social Studies Command of Evidence
39	A	✓	■ ■ □	Analysis in History/ Social Studies Command of Evidence
40	D	✓	■ ■ □	Analysis in History/ Social Studies Command of Evidence
41	C	✓	■ □ □	Analysis in History/ Social Studies
42	D	C	■ ■ ■	Analysis in Science Command of Evidence
43	B	✓	■ ■ □	Analysis in Science Words in Context
44	C	✓	■ □ □	Analysis in Science
45	B	✓	■ ■ ■	Analysis in Science
46	D	✓	■ ■ □	Analysis in Science
47	A	✓	■ □ □	Analysis in Science
48	A	D	■ ■ ■	Analysis in Science
49	C	✓	■ □ □	Analysis in Science Words in Context
50	C	✓	■ □ □	Analysis in Science
51	A	✓	■ □ □	Analysis in Science Command of Evidence
52	D	✓	■ ■ ■	Analysis in Science Command of Evidence

WRITING

Question	Correct Answer	Your Answer	Difficulty	Subscores/Cross-Test Scores
^	◇	◇	◇	
1	A	✓	■ ■ □	Standard English Conventions
2	B	✓	■ □ □	Standard English Conventions
3	D	✓	■ □ □	Standard English Conventions
4	C	✓	■ □ □	Analysis in Science Words in Context Expression of Ideas
5	C	✓	■ □ □	Analysis in Science Command of Evidence Expression of Ideas
6	B	✓	■ □ □	Analysis in Science Command of Evidence Expression of Ideas
7	C	✓	■ □ □	Standard English Conventions
8	B	✓	■ □ □	Analysis in Science Words in Context Expression of Ideas
9	A	✓	■ ■ ■	Standard English Conventions
10	D	✓	■ ■ ■	Analysis in Science Expression of Ideas
11	B	✓	■ ■ □	Analysis in Science Expression of Ideas
12	A	✓	■ □ □	Expression of Ideas
13	B	✓	■ ■ □	Standard English Conventions
14	A	✓	■ ■ □	Standard English Conventions
15	D	✓	■ □ □	Words in Context Expression of Ideas
16	C	✓	■ ■ □	Standard English Conventions
17	D	✓	■ ■ □	Command of Evidence Expression of Ideas
18	A	✓	■ □ □	Command of Evidence Expression of Ideas
19	D	C	■ ■ □	Standard English Conventions
20	D	✓	■ ■ □	Standard English Conventions
21	C	✓	■ □ □	Words in Context Expression of Ideas
22	A	✓	■ ■ □	Expression of Ideas

23	A	✓	■ ■ □	Words in Context Expression of Ideas
24	B	✓	■ □ □	Standard English Conventions
25	A	✓	■ □ □	Command of Evidence Expression of Ideas
26	D	✓	■ □ □	Standard English Conventions
27	C	✓	■ ■ □	Words in Context Expression of Ideas
28	C	✓	■ ■ ■	Standard English Conventions
29	A	✓	■ ■ □	Standard English Conventions
30	D	✓	■ □ □	Expression of Ideas
31	B	✓	■ ■ □	Standard English Conventions
32	D	✓	■ ■ □	Command of Evidence Expression of Ideas
33	B	✓	■ □ □	Expression of Ideas
34	B	✓	■ □ □	Standard English Conventions
35	C	✓	■ ■ □	Analysis in History/ Social Studies Command of Evidence Expression of Ideas
36	C	✓	■ □ □	Standard English Conventions
37	D	✓	■ □ □	Standard English Conventions
38	A	✓	■ ■ ■	Analysis in History/ Social Studies Expression of Ideas
39	B	✓	■ ■ ■	Standard English Conventions
40	A	✓	■ ■ □	Analysis in History/ Social Studies Command of Evidence Expression of Ideas
41	D	✓	■ ■ □	Analysis in History/ Social Studies Words in Context Expression of Ideas
42	B	✓	■ □ □	Standard English Conventions
43	A	✓	■ ■ □	Analysis in History/ Social Studies Words in Context Expression of Ideas
44	D	✓	■ ■ □	Analysis in History/ Social Studies Expression of Ideas

MATH-NO CALCULATOR

Question	Correct Answer	Your Answer	Difficulty	Subscores/Cross-Test Scores
^	◇	◇	◇	
1	C	✓	■□□	Analysis in Science Passport to Advanced Math
2	B	✓	■□□	Passport to Advanced Math
3	B	✓	■□□	Heart of Algebra
4	C	✓	■ ■ □	Heart of Algebra
5	B	✓	■ ■ □	Heart of Algebra
6	A	✓	■ ■ □	Heart of Algebra
7	D	✓	■ ■ □	Heart of Algebra
8	D	✓	■ ■ □	Passport to Advanced Math
9	A	✓	■ ■ □	Passport to Advanced Math
10	C	✓	■ ■ ■	N/A
11	D	✓	■ ■ ■	Passport to Advanced Math
12	D	✓	■ ■ ■	N/A
13	A	✓	■ ■ ■	Passport to Advanced Math
14	D	✓	■ ■ ■	Analysis in Science Passport to Advanced Math
15	D	C	■ ■ ■	Heart of Algebra
16	3/2,1.5	✓	■ ■ □	Heart of Algebra
17	2	✓	■ ■ □	Passport to Advanced Math
18	5/2,2.5	✓	■ ■ □	Heart of Algebra
19	16	✓	■ ■ ■	Passport to Advanced Math
20	3.75,15/4	✓	■ ■ ■	N/A

MATH-CALCULATOR

Question	Correct Answer	Your Answer	Difficulty	Subscores/Cross-Test Scores
^	◇	◇	◇	
1	A	✓	■ □ □	Analysis in History/ Social Studies Heart of Algebra
2	A	✓	■ □ □	Heart of Algebra
3	C	✓	■ □ □	Heart of Algebra
4	D	✓	■ □ □	Problem Solving and Data Analysis
5	D	✓	■ □ □	Passport to Advanced Math
6	B	✓	■ □ □	Passport to Advanced Math
7	A	✓	■ □ □	Problem Solving and Data Analysis
8	A	✓	■ □ □	Problem Solving and Data Analysis
9	C	✓	■ □ □	Analysis in Science Problem Solving and Data Analysis
10	D	✓	■ □ □	Problem Solving and Data Analysis
11	D	✓	■ □ □	Heart of Algebra
12	D	✓	■ □ □	Passport to Advanced Math
13	B	✓	■ ■ □	Problem Solving and Data Analysis
14	B	✓	■ □ □	Analysis in Science Problem Solving and Data Analysis
15	C	✓	■ ■ □	Analysis in Science Problem Solving and Data Analysis
16	C	✓	■ ■ □	Analysis in History/ Social Studies Problem Solving and Data Analysis
17	D	✓	■ ■ □	Problem Solving and Data Analysis
18	D	✓	■ ■ □	Problem Solving and Data Analysis
19	B	✓	■ □ □	Analysis in History/ Social Studies Problem Solving and Data Analysis
20	D	✓	■ ■ □	Analysis in History/ Social Studies Problem Solving and Data Analysis

21	D	✓	■ ■ □	Passport to Advanced Math
22	A	✓	■ ■ □	Analysis in History/ Social Studies Heart of Algebra
23	B	A	■ ■ □	N/A
24	C	✓	■ ■ □	Analysis in Science Heart of Algebra
25	C	✓	■ ■ □	N/A
26	C	✓	■ ■ □	Analysis in History/ Social Studies Passport to Advanced Math
27	A	✓	■ ■ ■	Heart of Algebra
28	A	D	■ ■ ■	Analysis in Science Heart of Algebra
29	B	✓	■ ■ ■	Passport to Advanced Math
30	B	✓	■ ■ ■	Heart of Algebra
31	20	✓	■ □ □	Problem Solving and Data Analysis
32	4	✓	■ ■ □	Problem Solving and Data Analysis
33	6	✓	■ ■ □	Heart of Algebra
34	5/8, 625	✓	■ ■ □	Problem Solving and Data Analysis
35	1/4, 25	✓	■ ■ □	Analysis in History/ Social Studies Heart of Algebra
36	5730	✓	■ ■ □	Analysis in Science Passport to Advanced Math
37	107/100, 1.07	✓	■ ■ ■	Analysis in History/ Social Studies Problem Solving and Data Analysis
38	37	✓	■ ■ ■	N/A