

The New York City Department of Education  
**Specialized High Schools Admissions Test**  
Grade 8

**General Directions**

This test consists of 100 questions across two subjects, English Language Arts and Mathematics.

**PART 1 — ENGLISH LANGUAGE ARTS**  
**50 QUESTIONS**

Questions 1-50

**PART 2 — MATHEMATICS**  
**50 QUESTIONS**

Questions 51-100

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**Planning Your Time**

- For practice tests with the timer enabled, your test session will end after 180 minutes.
- In a computer adaptive test (CAT), you must answer every question. For Math and stand-alone revising and editing questions, you will not be able to return to a question once you have advanced to the next question.
- ELA Reading Comprehension and Revising & Editing passage sets only:
  - For each passage set (a text and its related questions), you can return to the questions within the set and alter your responses; however, once you advance forward from the last question of that set, you will be unable to return to any questions in the set or change your answers.
- Do not spend too much time on any one question. If you are unsure, choose the response you think is best.
- You must complete the subject area you started with before moving on to the next subject area. Once you submit a subject area, you will be unable to return to it.

**English Language Arts**  
**READING COMPREHENSION**

**DIRECTIONS:** Read each of the following texts and answer the related questions. As needed, you may use the online notepad tool or write on the scrap paper given to you to take notes. You should reread relevant parts of each text, while being mindful of time, before selecting the **best** answer for each question. Base your answers only on the content within the text.

## A Memory Revolution

1 A high school senior logs on to a computer at the library to double-check the application due date listed on a college admissions website. Nearby, a librarian helps a group of biology students use a database to search for recent studies about mammals. In the past few decades, the Internet has become an integral component of daily life for many people. The seemingly limitless power of search engines made the Internet search extremely common, and today people increasingly rely on the Internet's vast accumulation of sources to access all types of information. Scientists are beginning to examine how this reliance is modifying the strategies people use to store and prioritize information in their mind.

### **A Dependable and Valuable Asset**

2 Psychologist Benjamin Storm from the University of California, Santa Cruz, and researchers Sean Stone and Aaron Benjamin devised an experiment to study students' tendency to depend on the Internet for facts. To begin, the scientists divided sixty participants into multiple groups, including an "Internet" group and a "memory" group, and placed them in front of computers. The Internet group was required to use the search engine Google to answer eight challenging trivia questions. In contrast, participants in the memory group were permitted to use only their personal knowledge to answer the questions. In the second round, the researchers administered notably easier questions. This time, they allowed each group the option of using Google as they answered. Their results showed that 83 percent of the Internet group continued to consult Google in the second round, while only 63 percent of the memory group chose to do so.

3 People's growing inclination to rely on the Internet in order to retrieve information, particularly facts and figures, is called cognitive offloading. Canadian researcher Evan F. Risko and British researcher Sam Gilbert, who have written extensively about the topic, say a similar process has been taking place for centuries. In the past, people used resources like encyclopedias to assist their memories; however, today the Internet, serving as a vast extended memory, allows people to digitally access and retrieve much larger volumes of information. Consequently, people's minds are free for other cognitive feats, such as connecting data, learning new information, or solving problems.

### **Filing Information Away**

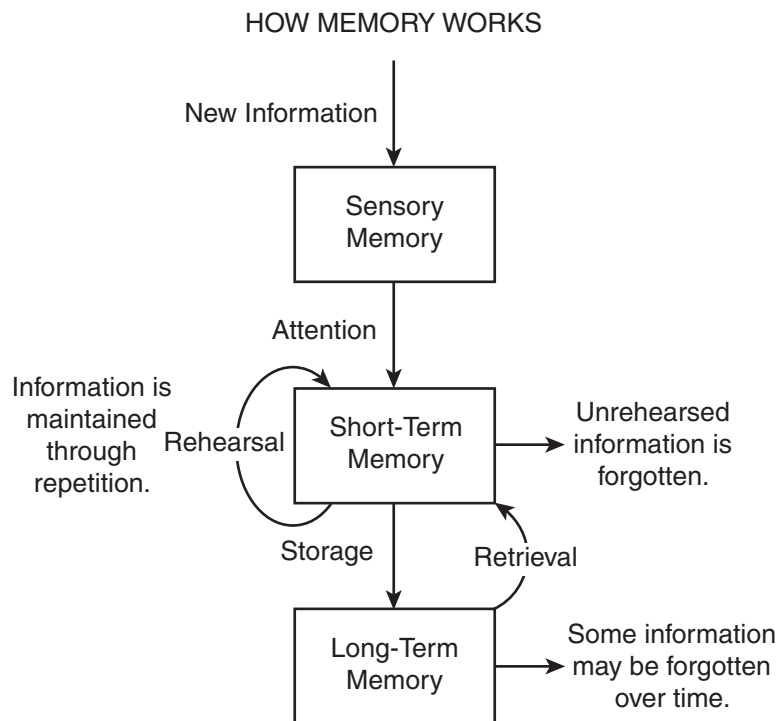
4 The use of the Internet also appears to be modifying the strategies people use to store information in their mind. Researchers Betsy Sparrow from Columbia University, Jenny Liu from the University of Wisconsin-Madison, and Daniel Wegner from Harvard University conducted several studies to discover how people efficiently manage their information intake.

5 To begin, the researchers examined how people evaluate which information deserves their effort to remember. For this experiment, participants read forty trivia facts, such as "An ostrich's eye is bigger than its brain," and typed the statements into a computer file. Half the participants had been previously told the file would be saved, while half believed it would be erased. Next, the participants wrote down every fact they could recall. Those who believed the information would be erased and no longer available could recall 40 percent more facts than those who thought the information would be saved.

6 In another experiment, the same researchers tested the ability of study participants to remember where to access information. For this trial, participants read and typed trivia statements, which they saved in folders with generic names such as "Facts" and "Items." After spending ten

minutes writing down all the facts they could recall from memory, participants were asked which folder contained a particular fact based on a keyword. For example, "Which folder has the fact about ostriches?" Overall, participants recalled the information's location more often than the content itself, correctly identifying 49 percent of the folders for specific facts while remembering only 23 percent of the actual trivia. The researchers concluded that our memory is adapting to the Internet age by prioritizing where to locate information even when the specific details are forgotten. According to Sparrow, the Internet has become an important form of transactive memory, an external source of the recollections and associative networks that constitute memory.

7 As the Internet's resources continue to expand our "external" memory, some question whether the process may cause people to depend too heavily on technology. However, Steven Pinker, a professor of psychology at Harvard University, says, "Knowledge is increasing exponentially; human brainpower and waking hours are not. Fortunately, the Internet and information technologies are helping us manage, search and retrieve our collective intellectual output at different scales, from Twitter and previews to e-books and online encyclopedias. Far from making us stupid, these technologies are the only things that will keep us smart."



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The details in paragraph 3 about cognitive offloading convey a central idea of the passage by

- A. suggesting that reliance on the Internet for information is inevitable.
- B. demonstrating how the methods used to store and find information have changed over time.
- C. explaining how encyclopedias and the Internet are similar sources of information.
- D. implying that more information can be understood now than ever before.

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How do the details about the experiment described in paragraph 5 convey a central idea of the passage?

- A. They suggest that the act of repeating information by typing it on a keyboard may improve a person's memory.
- B. They explain that a person will forget information faster if the information is considered unimportant.
- C. They indicate that a person may start to forget details when the amount of information becomes overwhelming.
- D. They suggest that memory is affected by whether a person expects to have access to the information in the future.

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Read this sentence from paragraph 7.

**As the Internet's resources continue to expand our "external" memory, some question whether the process may cause people to depend too heavily on technology.**

How does the sentence contribute to the structure and development of ideas in the passage?

- A. It presents a claim about the risks of relying on the Internet that prompted the research described in paragraphs 2 and 6.
- B. It contrasts a disadvantage of relying on the Internet with the benefits of Internet use that are described in paragraphs 2 and 6.
- C. It signals a shift from a neutral viewpoint in paragraphs 2 and 6 to a presentation of an argument and a counterargument.
- D. It introduces a counterargument and marks a transition from an optimistic tone in paragraphs 2 and 6 to a cautious tone as the counterargument is developed.

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The study described in paragraph 6 influenced researchers' ideas about memory in the digital age by

- A. highlighting instances when organizing detailed information made it easier to remember.
- B. confirming that keywords can be remembered more easily than large amounts of information.
- C. identifying a shift in focus from remembering specific information to knowing where to find it.
- D. emphasizing that remembering a basic idea is more important than storing detailed information.

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How does the diagram provide additional support for the topic presented in the passage?

- A. It reveals why human brains must adapt to obtaining information from the Internet as opposed to other sources.
- B. It indicates how people can use the Internet to help improve their long-term recollection of information.
- C. It shows how study participants' brains distinguished between important and unimportant details.
- D. It depicts the idea that repetition and rehearsal are necessary to recall information when tools such as search engines are unavailable.

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Which evidence from the passage is **most** relevant to the claim in paragraph 7 that “ ‘far from making us stupid, these technologies are the only things that will keep us smart’ ”?

- A. the revelation that most people opted to use the Internet to answer relatively easy trivia questions rather than relying on their own brainpower (paragraph 2)
- B. the assertion that the storage of information on the Internet frees people to focus on higher-order tasks such as problem solving (paragraph 3)
- C. the connection between how people organize information in their mind and their ability to recall that information (paragraph 5)
- D. the description of transactive memory as an expansive external source that people can use to store information (paragraph 6)

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The effect of the Internet on a person's memory is illustrated in the passage through the presentation of studies that

- A. examine how the use of search engines changes the way people evaluate and store information for future access.
- B. highlight the difference between the capacity of the Internet and the ability of the human brain to locate information.
- C. compare the type of information that can be obtained from the Internet with the type of information that is stored in the human brain.
- D. emphasize the ease of obtaining information through search engines rather than remembering it without assistance.

**There are no more questions for this passage set.**

Use the review button  to return to any questions about the passage you have just read.

Once you select the blue arrow  at the top of this screen, you will **not** be able to return to any questions about this passage.

*In 1903 brothers Wilbur and Orville Wright conducted experiments related to flying machines. These experiments would eventually lead to air travel becoming a reliable form of transportation.*

## Excerpt from “How We Made the First Flight”

by Orville Wright

1 During the night of December 16, 1903, a strong cold wind blew from the north. When we arose on the morning of the 17th, the puddles of water, which had been standing about camp since the recent rains, were covered with ice. The wind had a velocity of 10 to 12 meters per second (22 to 27 miles an hour). We thought it would die down before long, and so remained indoors the early part of the morning. But when ten o'clock arrived, and the wind was as brisk as ever, we decided that we had better get the machine out and attempt a flight. We hung out the signal for the men of the Life Saving Station.<sup>1</sup> We thought that by facing the flyer into a strong wind, there ought to be no trouble in launching it from the level ground about camp. We realized the difficulties of flying in so high a wind, but estimated that the added dangers in flight would be partly compensated for by the slower speed in landing.

### Final Preparations

2 We laid the track on a smooth stretch of ground about one hundred feet north of the new building. The biting cold wind made work difficult, and we had to warm up frequently in our living room, where we had a good fire in an improvised stove made of a large carbide<sup>2</sup> can. By the time all was ready, J. T. Daniels, W. S. Dough and A. D. Etheridge, members of the Kill Devil<sup>3</sup> Life Saving Station; W. C. Brinkley of Manteo, and Johnny Moore, a boy from Nags Head,<sup>4</sup> had arrived.

3 We had a “Richard” hand anemometer with which we measured the velocity of the wind. Measurements made just before starting the first flight showed velocities of 11 to 12 meters per second, or 24 to 27 miles per hour. . . .

### Audacity—and Calculation

4 Wilbur having used his turn in the unsuccessful attempt on the 14th, the right to the first trial now belonged to me. After running the motor a few minutes to heat it up, I released the wire that held the machine to the track, and the machine started forward in the wind. Wilbur ran at the side of the machine, holding the wing to balance it on the track. Unlike the start on the 14th, made in a calm, the machine, facing a 27-mile wind, started very slowly. Wilbur was able to stay with it till it lifted from the track after a forty-foot run. One of the Life Saving men snapped the camera for us, taking a picture just as the machine had reached the end of the track and had risen to a height of about two feet. The slow forward speed of the machine over the ground is clearly shown in the picture by Wilbur’s attitude. He stayed along beside the machine without any effort.

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<sup>1</sup>**Life Saving Station:** one of the rescue stations along the Atlantic coastline that provided assistance to mariners in distress

<sup>2</sup>**carbide:** a very hard material composed of carbon and other heavy metals

<sup>3</sup>**Kill Devil:** the town of Kill Devil Hills in eastern North Carolina

<sup>4</sup>**Nags Head:** a town in eastern North Carolina

## **Flight**

5 The course of the flight up and down was exceedingly erratic, partly due to the irregularity of the air, and partly to lack of experience in handling this machine. The control of the front rudder was difficult on account of its being balanced too near the center. This gave it a tendency to turn itself when started; so that it turned too far on one side and then too far on the other. As a result the machine would rise suddenly to about ten feet, and then as suddenly dart for the ground. A sudden dart when a little over a hundred feet from the end of the track, or a little over 120 feet from the point at which it rose into the air, ended the flight. As the velocity of the wind was over 35 feet per second and the speed of the machine over the ground against this wind ten feet per second, the speed of the machine relative to the air was over 45 feet per second, and the length of the flight was equivalent to a flight of 540 feet made in calm air. This flight lasted only 12 seconds, but it was nevertheless the first in the history of the world in which a machine carrying a man had raised itself by its own power into the air in full flight, had sailed forward without reduction of speed and had finally landed at a point as high as that from which it started.

From "How We Made the First Flight" by Orville Wright—Public Domain/Federal Aviation Administration

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How does paragraph 1 introduce the idea that the Wright brothers knew that their flight attempt was risky?

- A. through the mention of a signal to notify lifesaving experts that the flight attempt was about to begin
- B. by providing specific details about the speed of the wind and the Wright brothers' response to the windy conditions
- C. by suggesting that a slower landing would be necessary at the end of the flight in order to maintain safety
- D. through the indication that the Wright brothers waited indoors for most of the morning because of the poor weather

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Read this sentence from paragraph 4.

**Wilbur having used his turn in the unsuccessful attempt on the 14th, the right to the first trial now belonged to me.**

The sentence contributes to the development of ideas in the excerpt by

- A. demonstrating the challenge of the extreme winter conditions during the flight.
- B. revealing how many tries it took for Wilbur Wright to finally get the machine to take flight.
- C. demonstrating that both Orville and Wilbur Wright were eager to pilot what could potentially be the first flight.
- D. suggesting a sense that both brothers felt confident they would soon succeed in completing the first flight.

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The photograph mentioned in paragraph 4 is significant because it

- A. documents that the machine rose into the air as soon as the tethering wire was released.
- B. provides proof of the critical moment the machine took flight.
- C. documents that the wind reduced the speed of the plane at the start of the flight.
- D. provides proof that the pilot had to gradually increase the height of the plane in the air.

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How do the details in paragraph 5 about the uneven nature of the flight convey a central idea of the excerpt?

- A. by explaining how the flawed design of the machine caused it to turn unpredictably in the air and brought the first flight by a person to an abrupt end
- B. by indicating that the difficulty in controlling the flight was caused by the rudimentary instruments of the machine and the inexperience of the pilot
- C. by explaining how the pilot and the plane overcame adverse conditions in order to complete the first piloted flight
- D. by indicating that the gradual change in wind velocity created an extreme environment in which to maneuver the plane and maintain its flight

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Read this sentence from paragraph 5.

**As the velocity of the wind was over 35 feet per second and the speed of the machine over the ground against this wind ten feet per second, the speed of the machine relative to the air was over 45 feet per second, and the length of the flight was equivalent to a flight of 540 feet made in calm air.**

How does the sentence help convey Orville Wright’s perspective about this first flight?

- A. It suggests that he was frustrated by the poor flying conditions on the day of the flight.
- B. It emphasizes that he believed the flight was successful despite its short distance.
- C. It provides a comparison between flight distances under calm and high wind conditions.
- D. It highlights the importance of such calculations in the success of future flights.

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Which sentence from the excerpt **best** supports the idea that the Wright brothers had to adapt their plans for the flight in order to accommodate the weather conditions?

- A. “When we arose on the morning of the 17th, the puddles of water, which had been standing about camp since the recent rains, were covered with ice.”  
(paragraph 1)
- B. “We realized the difficulties of flying in so high a wind, but estimated that the added dangers in flight would be partly compensated for by the slower speed in landing.”  
(paragraph 1)
- C. “After running the motor a few minutes to heat it up, I released the wire that held the machine to the track, and the machine started forward in the wind.”  
(paragraph 4)
- D. “The course of the flight up and down was exceedingly erratic, partly due to the irregularity of the air, and partly to lack of experience in handling this machine.”  
(paragraph 5)

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The use of chronological structure contributes to the development of ideas in the excerpt by

- A. outlining the actions that the Wright brothers took to prepare for and successfully complete the first flight.
- B. identifying the primary factors that allowed the Wright brothers to overcome obstacles and achieve the first flight.
- C. showing how the Wright brothers applied lessons learned from their previous flight attempts to accomplish the first flight.
- D. demonstrating how the Wright brothers analyzed the impact of wind velocity to identify the ideal conditions for the first flight.

**There are no more questions for this passage set.**

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## Wolves of the Sea

- 1 The cool and misty landscape of the Great Bear Rainforest can be found along the coast of British Columbia, Canada, and its nearby islands, from Vancouver Island to the Alaskan border. Within this protected area, wolves roam the forests, islands, and beaches. When biologist Chris Darimont began to study these wolves, he wanted to confer with local First Nations groups, as aboriginal Canadians are known, in order to learn what they knew about these wolves. He spoke with Chester Starr, an elder of the Heiltsuk Nation that has occupied the Great Bear Rainforest for thousands of years. What Starr had to say about the wolves changed Darimont's perception of the animals.
- 2 Starr asked Darimont which wolves he and his team were going to study—the timber wolves (mainland wolves) or the coastal wolves on the islands. The question took Darimont by surprise. Biologists had always believed that the wolves that are sometimes spotted swimming between islands and eating salmon are the same wolves that live on the mainland. Darimont was intrigued by Starr's classification of the wolves as two different groups. At first, he was hesitant to accept the idea. The distances between the mainland and the islands are small, less than a mile. Why would the wolves on the islands be any different from the wolves on the mainland? To find out, Darimont and his research team studied the wolves on the islands and in the densely forested territory of the Great Bear Rainforest for ten years.
- 3 Throughout the study, Darimont recorded several significant, observable differences between the "sea wolves," as they are nicknamed, and the mainland wolves. Compared with the mainland wolves, the sea wolves are smaller in size and are strong swimmers. In 1996 sea wolves were spotted on an island nearly eight miles from any other land formation. While mainland wolves almost exclusively eat meat, such as deer and elk, and teach their young to hunt for land animals, sea wolves get as much as 90 percent of their nutrition from the sea and teach their young to dig for clams and to catch fish. Sea wolves regularly swim between islands and have been known to sneak up on a seal sunning itself on a rock and make a leaping attack from the water. Some salmon-eating mainland wolves come and go from the islands with the fish-spawning season, but the sea wolves are full-time island residents. Darimont suspects that some sea wolves live their entire life on the islands.
- 4 The sea wolves displayed not only physical and behavioral differences but also genetic variations from the mainland wolves. After collecting and analyzing the DNA in 800 samples of gray fur and wolf waste, researchers could produce hard biological evidence that sea wolves had genetic markers that made them distinct from the mainland wolves. A genetic marker is a variation in a DNA sequence that can be used to identify individuals or a species because it is passed down to offspring. Darimont hypothesizes that a change in habitat led to the eventual genetic differences between sea wolves and mainland wolves. Many years ago, loss of habitat and food sources forced some mainland wolves out to the islands. They learned to eat everything from kelp and fish eggs to the remains of sea creatures that washed up on the beach. Wolves living on the islands and mainland wolves became more isolated and rarely mated with each other. Over time the two types of wolves became more distinct.
- 5 It turned out that Chester Starr was right all along. "It sounded totally bizarre at first," admits Darimont, "that there could be two versions of the species." But he now realizes that this skepticism "definitely reflected my ignorance of indigenous knowledge at the time." Learning to

trust the wisdom of the Heiltsuk people opened Darimont up to knowledge accumulated over millennia and positioned him so that he could gather new scientific evidence about one of British Columbia's most elusive species, the sea wolf.

### Wolves of the Sea

**1** The cool and misty landscape of the Great Bear Rainforest can be found along the coast of British Columbia, Canada, and its nearby islands, from Vancouver Island to the Alaskan border. Within this protected area, wolves roam the forests, islands, and beaches. When biologist Chris Darimont began to study these wolves, he wanted to confer with local First Nations groups, as aboriginal Canadians are known, in order to learn what they knew about these wolves. He spoke with Chester Starr, an elder of the Heiltsuk Nation that has occupied the Great Bear Rainforest for thousands of years. What Starr had to say about the wolves changed Darimont's perception of the animals.

**2** Starr asked Darimont which wolves he and his team were going to study—the timber wolves (mainland wolves) or the coastal wolves on the islands. The question took Darimont by surprise. Biologists had always believed that the wolves that are sometimes

The details in paragraph 1 contribute to a central idea of the passage by showing that Darimont

- A. believed the Great Bear Rainforest was an ideal location to study wolves in their natural habitat because it is a protected area.
- B. values different perspectives, because the information that Starr provided influenced the focus of Darimont's research.
- C. thought the Great Bear Rainforest would provide opportunities to study different groups of wolves because the area includes forests and islands.
- D. understands the importance of respecting local community members, because Darimont sought permission from an elder of the Heiltsuk Nation before starting his research.

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Why does the author include details about the conversation between Starr and Darimont in paragraph 2?

- A. to explain why Starr had closely observed the relationship between the two groups of wolves Darimont wanted to study
- B. to show that Darimont was hoping to work with Starr and to study both groups of wolves in the area
- C. to highlight that Darimont was unfamiliar with the area and expected Starr to help him find wolves to study
- D. to emphasize that the question asked by Starr caused Darimont to review his initial assumption about the wolves

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Read this sentence from paragraph 4.

**After collecting and analyzing the DNA in 800 samples of gray fur and wolf waste, researchers could produce hard biological evidence that sea wolves had genetic markers that made them distinct from the mainland wolves.**

The phrase “hard biological evidence” conveys that the goal of the research team was to

- A. develop a procedure in order to ensure their study yielded plentiful data about the wolves.
- B. seek definitive scientific proof of the number of wolf species present in the area of the study.
- C. conduct a study to evaluate multiple theories about the diets of different wolf species.
- D. discover if the new data would provide information different from that of previous studies.

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The author uses the word “admits” in paragraph 5 **most likely** to

- A. note that Darimont’s genetic research verified a theory based solely on field observations.
- B. imply that Darimont’s study was disappointing because the conclusion that he reached was not original.
- C. emphasize that Darimont’s study ultimately confirmed an idea that he had initially doubted.
- D. highlight that Darimont’s results led him to draw a conclusion from his research that his team did not agree with.

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2 Starr asked Darimont which wolves he and his team were going to study—the timber wolves (mainland wolves) or the coastal wolves on the islands. The question took Darimont by surprise. Biologists had always believed that the wolves that are sometimes

Which sentence from the passage **best** supports the idea that sea wolves had successfully adapted to living on the islands?

- A. "While mainland wolves almost exclusively eat meat, such as deer and elk, and teach their young to hunt for land animals, sea wolves get as much as 90 percent of their nutrition from the sea and teach their young to dig for clams and to catch fish." (paragraph 3)
- B. "Sea wolves regularly swim between islands and have been known to sneak up on a seal sunning itself on a rock and make a leaping attack from the water." (paragraph 3)
- C. "Darimont suspects that some sea wolves live their entire life on the islands." (paragraph 3)
- D. "Darimont hypothesizes that a change in habitat led to the eventual genetic differences between sea wolves and mainland wolves." (paragraph 4)

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How did a change in habitat **most** affect the wolf population of the Great Bear Rainforest over time?

- A. It caused some of the wolves to learn new hunting techniques in order to catch increasingly scarce prey.
- B. It caused the wolves to form smaller packs and eventually separate, establishing distinct territories.
- C. It caused some of the wolves to gradually become a new, genetically distinct species as they adapted behaviorally.
- D. It caused the wolves to adapt their diet as different food sources became available in the area.

**There are no more questions for this passage set.**

Use the review button  to return to any questions about the passage you have just read.

Once you select the blue arrow  at the top of this screen, you will **not** be able to return to any questions about this passage.

## Ode to Fireworks

In autumn my mother drove us to the edge of the field  
where the fair was set up year after year:  
the carousel, the bumper cars, the long, low sheds  
filled with prizewinning animals.

- 5 We—my sister, my cousin, and I—were ready for bed,  
already in our pajamas. This was a treat we waited  
all year for. We waited in the darkness  
for the first low, dull *thwumps*, like someone  
beating an old, filthy rug hung on a wash line.
- 10 Then we counted the seconds between the lightning  
and thunder, as we also used to do, until the sky  
lit up: red, blue, green, gold. In my mind's eye  
I can still see the straggly, ancient oak whose branches  
reached up past the exhibition halls, silhouetted
- 15 against the spectrum of stars that cascaded behind it.

It was one thing to look up into the sky  
and imagine yourself in it or to make out pictures  
among the clouds, which my sister liked to do.

- No, I would tell her, that cloud  
20 does *not* look like an elephant, a hat, an umbrella.  
But it was another thing to see  
the sky at night written upon  
with those jewels. (We lived in the country:  
night was *night*.) All around us, crickets
- 25 stridulated in the stubble of what had been  
somebody's cornfield, their song rising and falling.  
You could smell winter on the air's edge.

Now, in the city, when the sky dips into shadow  
at New Year's or on the Fourth of July, I find myself  
30 craning my neck upward at odd moments.

- The city sky is always lit up. This is where we live now,  
and it is how we live now, awash in light  
of every hue. Everything is a constant celebration:  
picking up washing at the cleaner's or stopping by
- 35 the corner market for a loaf of heavy bread.  
And the music around me is the music of people,  
their voices rising and falling in a hundred languages.  
But beneath the yellowish glow deep in the sky  
of all our city lights pelting out into the universe,
- 40 I remember the feel of the pickup truck bumping  
across the ridged field, as I kept waiting for those  
childhood bursts, watching as they escorted us home.

Ode to Fireworks

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It was one thing to look up into the sky  
and imagine yourself in it or to make out pictures

The comparison in lines 8–9 of the poem is used to convey

- A. the muffled pounding of explosions in the distance.
- B. the way lightning streaks through the clouds.
- C. the echoes of thunder on an autumn night.
- D. the glow of sparks falling from the sky.

Ode to Fireworks

In autumn my mother drove us to the edge of the field where the fair was set up year after year: the carousel, the bumper cars, the long, low sheds filled with prizewinning animals.

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- 10 Then we counted the seconds between the lightning and thunder, as we also used to do, until the sky lit up: red, blue, green, gold. In my mind’s eye I can still see the straggly, ancient oak whose branches reached up past the exhibition halls, silhouetted
- 15 against the spectrum of stars that cascaded behind it.

It was one thing to look up into the sky and imagine yourself in it or to make out pictures

Read lines 22–23 from the poem.

**the sky at night written upon  
with those jewels.**

What does the word choice in these lines convey about the speaker?

- A. The speaker values material possessions.
- B. The speaker imagines that the fireworks are magical.
- C. The speaker believes that the country setting is distinctive.
- D. The speaker cherishes the memory of seeing fireworks as a child.

Ode to Fireworks

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It was one thing to look up into the sky and imagine yourself in it or to make out pictures

The use of italics on the word "*night*" in line 24 is most likely intended to emphasize the

- A. sense of mystery in the darkness.
- B. sense of absolute darkness.
- C. speaker's fear of night.
- D. speaker's certainty about that night.

Ode to Fireworks

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What is the purpose of the repeated words “rising and falling” in lines 26 and 37?

- A. to create a distinction between solitude and meaningful interaction
- B. to demonstrate a connection between the speaker's past and present
- C. to emphasize the speaker's attention to the surrounding sounds
- D. to compare the fireworks to common sights and sounds

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15

It was one thing to look up into the sky and imagine yourself in it or to make out pictures

Read lines 41–42 from the poem.

**I kept waiting for those childhood bursts, watching as they escorted us home.**

How does this memory affect the speaker?

- A. The speaker believes it is impossible to ever return to a place in the past.
- B. The speaker is still amused by the impatience felt during fireworks displays.
- C. The speaker now regrets abandoning the rural way of life.
- D. The speaker feels a sense of comfort when reflecting on the past.

Ode to Fireworks

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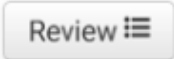
**15** against the spectrum of stars that cascaded behind it.


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The fireworks in the poem represent the speaker's

- A. wish to return to a simpler way of living.
- B. bittersweet feelings about leaving the past behind.
- C. high expectations for everyday life.
- D. reflections on past interactions with relatives.

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*The narrator's summer job is collecting marine specimens in Puget Sound, Washington. In this excerpt, he is looking for specimens in the mudflats before daybreak. Mudflats, or flats, are coastal landforms created when sediment and silt from tides are deposited as the tides recede.*

## Excerpt from *The Highest Tide*

by Jim Lynch

- 1 I rounded the oyster beds, to the far side. . . . It was low tide by then, and I saw the water hesitating at its apex, neither leaving nor returning, patiently waiting for the gravitational gears to shift. Dozens of anxious clams started squirting in unison like they did whenever vibrating grains of sand warned them predators were approaching. I stopped and waited with them, to actually see the moment when the tide started returning with its invisible buffet of plankton for the clams, oysters, mussels and other filter feeders. It was right then, ankle deep in the Sound, feet numbing, eyes relaxed, that I saw the nudibranch.
- 2 In all my time on the flats I'd never seen one before. I'd read about them, sure. I'd handled them at aquariums but never in the wild, and I'd never even seen a photo of one this stunning. It was just three inches long but with dozens of fluorescent, orange-tipped hornlike plumes jutting from the back of its see-through body that appeared to be lit from within.
- 3 Nudibranchs are often called the butterflies of the sea, but even that understates their dazzle. Almost everything else in the northern Pacific is dressed to blend with pale surroundings. Nudibranchs don't bother, in part because they taste so lousy they don't need camouflage to survive. But also, I decided right then, because their beauty is so startling it earns them a free pass, the same way everyday life brakes for peacocks, parade floats. . . .
- 4 The dark mudflats loomed like wet, flattened dunes stretching deep into Skookumchuck Bay in front of our house. From a distance, they looked too barren to support sea life. Up close, they still did, unless you knew where to find the hearty clams, worms and tiny creatures that flourish in mud. . . . I'm not sure why I decided to take a look. It was still an hour before sunrise, and I knew exactly what the bars<sup>1</sup> looked like in the moonlight, but for some reason, I couldn't resist.
- 5 I heard it long before I saw it. It was an exhale, a release of sorts, and I instantly wondered if a whale was stranded again. We had a young minke<sup>2</sup> stuck out there two summers prior, and it made similar noises until the tide rose high enough for rescuers to help free it. . . . I looked for a hulking silhouette but couldn't find one. I waited, but there were no more sounds. Still, I went toward what I thought I'd heard, avoiding stepping into the mud until I had to. I knew the flats well enough to know I could get stuck just about anywhere. The general rule was you didn't venture out past the shells and gravel with an incoming tide. I sank up to my knees twice, and numbing water filled my boots.
- 6 . . . I kept stepping toward the one sound I'd heard, a growing part of me hoping I'd find nothing at all. When I stopped to rest and yank up my socks, my headlamp crossed it. My first thought? A giant octopus.

---

<sup>1</sup>**bars:** sandbars

<sup>2</sup>**minke:** species of small whale

7 Puget Sound has some of the biggest octopi in the world. They often balloon to a hundred pounds. Even the great Jacques Cousteau<sup>3</sup> himself came to study them. But when I saw the long tubular shape of its upper body and the tangle of tentacles below it, I knew it was more than an octopus. I came closer, within fifty feet, close enough to see its large cylindrical siphon<sup>4</sup> quiver. I couldn't tell if it was making any sounds at that point, because it was impossible to hear anything over the blood in my ears. . . .

8 The creature's body came to a triangular point above narrow fins that lay flat on the mud like wings, but it was hard to be sure exactly where it all began or ended, or how long its tentacles truly were, because I was afraid to pry my eyes off its jumble of arms for more than half a second. I didn't know whether I was within reach, and its arms were as big around as my ankle and lined with suckers the size of half-dollars. If they even twitched I would have run. So, I was looking at it and not looking at it while my heart spangled my vision. I saw fragments, pieces, and tried to fuse them in my mind but couldn't be certain of the whole. I knew what it had to be, but I wouldn't allow myself to even think the two words. Then I gradually realized the dark shiny disc in the middle of the rubbery mass was too perfectly round to be mud or a reflection.

9 It was too late to smother my scream. Its eye was the size of a hubcap.

From THE HIGHEST TIDE by Jim Lynch. Copyright © 2005 by Jim Lynch. Used by permission of Bloomsbury USA. All rights reserved.

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<sup>3</sup>**Jacques Cousteau:** renowned French oceanographer

<sup>4</sup>**siphon:** tube-like organ that is used for drawing in or removing fluids

*The narrator's summer job is collecting marine specimens in Puget Sound, Washington. In this excerpt, he is looking for specimens in the mudflats before daybreak. Mudflats, or flats, are coastal landforms created when sediment and silt from tides are deposited as the tides recede.*

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In paragraph 3, the phrase “the butterflies of the sea” conveys the idea that

- A. nudibranchs do not have to work as hard as other animals to survive in the ocean.
- B. nudibranchs have colorful features that make them stand out.
- C. nudibranchs are delicate and have trouble adapting to their environment.
- D. nudibranchs are rare and difficult to find in the ocean.

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Read these sentences from paragraph 4.

**I'm not sure why I decided to take a look. It was still an hour before sunrise, and I knew exactly what the bars looked like in the moonlight, but for some reason, I couldn't resist.**

The sentences contribute to the overall structure of the excerpt by

- A. introducing the mysterious creature that the narrator discovers.
- B. indicating a shift from the narrator recalling the past to the narrator reflecting on the present.
- C. establishing a struggle with fear that the narrator must overcome.
- D. building tension through indicating that the narrator is going to see something unexpected.

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The narrator's actions in paragraph 5 reveal that he is

- A. expecting to see the familiar sight of a stranded minke.
- B. confident about exploring farther into the mudflats.
- C. unconcerned about becoming stuck in the mudflats.
- D. determined to discover the source of the sound.

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How does the setting affect the plot of the excerpt?

- A. The darkness of the mudflats before sunrise causes the narrator to pay close attention to his surroundings.
- B. The rugged terrain of the mudflats makes it more difficult for the narrator to do his job.
- C. The slow return of the tide along the mudflats forces the narrator to be patient during his journey.
- D. The barren appearance of the mudflats creates a sense of mystery that unsettles the narrator.

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Which sentence from paragraph 5 supports the idea that the narrator is taking a risk?

- A. "It was an exhale, a release of sorts, and I instantly wondered if a whale was stranded again."
- B. "I looked for a hulking silhouette but couldn't find one."
- C. "I waited, but there were no more sounds."
- D. "I knew the flats well enough to know I could get stuck just about anywhere."

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Read this sentence from paragraph 6.

**I kept stepping toward the one sound I'd heard, a growing part of me hoping I'd find nothing at all.**

How do the narrator's actions develop a central idea of the excerpt?

- A. The narrator's concern about the origin of the noise shows dedication to helping preserve sea life in the mudflats.
- B. The narrator's curiosity about the sea life in the mudflats outweighs any fear about the situation.
- C. The narrator's knowledge about a variety of sea life encourages a search for more specimens to study.
- D. The narrator's eagerness about new specimens of sea life outweighs the reality that the area is an unlikely place to find them.

*The narrator's summer job is collecting marine specimens in Puget Sound, Washington. In this excerpt, he is looking for specimens in the mudflats before daybreak. Mudflats, or flats, are coastal landforms created when sediment and silt from tides are deposited as the tides recede.*

Excerpt from *The Highest Tide*

by Jim Lynch

**1** I rounded the oyster beds, to the far side. . . . It was low tide by then, and I saw the water hesitating at its apex, neither leaving nor returning, patiently waiting for the gravitational gears to shift. Dozens of anxious clams started squirting in unison like they did whenever vibrating grains of sand warned them predators were approaching. I stopped and waited with them, to actually see the moment when the tide started returning with its invisible buffet of plankton for the clams, oysters, mussels and other filter feeders. It was right then, ankle

Read these sentences from paragraph 8.

**So, I was looking at it and not looking at it while my heart spangled my vision. I saw fragments, pieces, and tried to fuse them in my mind but couldn't be certain of the whole.**

The sensory language “spangled my vision,” “I saw fragments, pieces,” and “tried to fuse them in my mind” conveys the narrator’s

- A. extreme excitement about making a great discovery.
- B. reluctant acceptance that he needs to leave the mudflats.
- C. terrified confusion about the creature in the mudflats.
- D. sudden concern about his personal safety.

*The narrator's summer job is collecting marine specimens in Puget Sound, Washington. In this excerpt, he is looking for specimens in the mudflats before daybreak. Mudflats, or flats, are coastal landforms created when sediment and silt from tides are deposited as the tides recede.*

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The author develops the narrator's point of view when the narrator sees the creature by

- A. describing the narrator's movements as he approaches the creature.
- B. emphasizing the odds of finding the creature in an area inhabited by a rival species.
- C. showing the narrator's growing realization of the creature's identity.
- D. comparing the size of the creature to the size of a vehicle.

**There are no more questions for this passage set.**

Use the review button  to return to any questions about the passage you have just read.

Once you select the blue arrow  at the top of this screen, you will **not** be able to return to any questions about this passage.

**English Language Arts**  
**REVISING/EDITING PART A**

**DIRECTIONS:** Read the text or texts that follow and answer the related questions. You will be asked to improve the writing quality of each text and to correct errors so that each text follows the conventions of standard written English. You should reread relevant parts of each text, while being mindful of time, before selecting the **best** answer for each question.

## Martial Arts for the Mind and Body

(1) The martial arts blend a series of physical movements with strategic mental discipline so that practitioners can defend themselves, physically defeat an opponent, or both. (2) Historians are unsure of exactly when and where martial arts were first used. (3) Martial arts have been practiced by several different societies for many centuries. (4) Martial arts such as karate, kung fu, tae kwon do, and judo are still taught and practiced as methods of self-defense, but they offer students more than that. (5) The study of martial arts can provide students with a way to enhance their mental discipline as well as their physical fitness.

(6) Discipline, focus, and respect are important qualities for everyone to have. (7) However, for most people these qualities are not innate; they must be learned and practiced. (8) The study of martial arts can provide an opportunity to develop these skills. (9) Students are rewarded for their dedication by passing tests and advancing to higher ranks or levels. (10) For example, in a typical tae kwon do class, students learn discipline by diligently practicing moves, improve focus by listening carefully, and demonstrate respect by bowing to the instructor and following directions.

(11) For teenagers, martial arts classes provide a safe and structured environment for gaining physical skills, building confidence, and enjoying a sense of community. (12) A lot of teens go through hard situations as they try to do well in school and in life. (13) A martial arts class can provide teens with a physical outlet for stress while also challenging them mentally.

(14) Participating in a martial arts program also helps children and teens focus on self-improvement rather than on competition. (15) Progressing through levels of achievement involves mastering more physically demanding techniques. (16) It requires students to take responsibility and be accountable for achieving set goals. (17) Students gain confidence and experience companionship with other students who are progressing through the ranks.

(18) Adults who practice martial arts can experience many of the same benefits that younger people do, but perhaps the greatest of these is health and fitness. (19) Adult martial arts students often see changes in their body within weeks of beginning a program.

(20) For people interested in studying a martial art, there are many ways to learn and practice.

(21) In addition to private studios, community recreation centers often offer low-cost or free martial arts classes. (22) There are even online videos that introduce students to the basic concepts.

(23) People should study martial arts.

### Martial Arts for the Mind and Body

(1) The martial arts blend a series of physical movements with strategic mental discipline so that practitioners can defend themselves, physically defeat an opponent, or both. (2) Historians are unsure of exactly when and where martial arts were first used. (3) Martial arts have been practiced by several different societies for many centuries. (4) Martial arts such as karate, kung fu, tae kwon do, and judo are still taught and practiced as methods of self-defense, but they offer students more than that. (5) The study of martial arts can provide students with a way to enhance their mental discipline as well as their physical fitness.

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What is the **best** way to combine sentences 2 and 3?

- A. Historians, who are unsure of exactly when and where martial arts were first used, know that martial arts have been practiced by several different societies for many centuries.
- B. While historians are unsure of exactly when and where martial arts were first used, they do know that martial arts have been practiced by several different societies for many centuries.
- C. Because historians know that martial arts have been practiced by several different societies for many centuries, they are unsure of exactly when and where martial arts were first used.
- D. Martial arts have been practiced by several different societies for many centuries, and historians are unsure of exactly when and where martial arts were first used.

### Martial Arts for the Mind and Body

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Where should sentence 10 be moved to improve the organization of the second paragraph (sentences 6–10)?

- A. to the beginning of the paragraph (before sentence 6)
- B. between sentences 6 and 7
- C. between sentences 7 and 8
- D. between sentences 8 and 9

### Martial Arts for the Mind and Body

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Which revision of sentence 12 **best** maintains the formal style established in the passage?

- A. A lot of teens have to put up with difficult things while trying to do well in school and in life.
- B. Many teenagers deal with tough situations as they try to stay on top of their studies and do well in life.
- C. Many teenagers encounter challenges as they work to succeed both academically and personally.
- D. A lot of teens face problems as they work to keep up with their schoolwork and find personal success.

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Which transitional phrase should be added to the beginning of sentence 17?

- A. Over time,
- B. In fact,
- C. Even so,
- D. For instance,

### Martial Arts for the Mind and Body

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Which sentence would **best** follow and support sentence 18?

- A. Adult students gain discipline, focus, self-control, and respect, which are qualities that help them advance in their careers.
- B. Many adults initially train in a martial art simply to get exercise without realizing that the training also helps develop other skills.
- C. The exercise involved in training helps people strengthen their heart, boost endurance, improve balance, and develop muscle tone.
- D. People who commit to training in the martial arts are usually concerned about improving their overall physical health.

### Martial Arts for the Mind and Body


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Which concluding sentence should replace sentence 23 to **best** support the topic presented in the passage?

- A. With so many ways to begin studying martial arts, people can easily discover how the skills needed to progress in rank may help them in life.
- B. By taking advantage of opportunities to practice martial arts, people can experience the satisfaction of achieving goals while also improving themselves.
- C. Because people are eager to reap the mental and physical benefits of studying martial arts, enrollment in martial arts courses has increased.
- D. While taking martial arts classes can improve health for both young people and adults, the effects are clearly more immediate for adults.

**There are no more questions for this passage set.**

Use the review button  to return to any questions about the passage you have just read.

Once you select the blue arrow  at the top of this screen, you will **not** be able to return to any questions about this passage.

## Moving through Mountains

(1) An age-old proverb says that necessity is the mother of invention. (2) Centuries of human ingenuity in the face of obstacles prove this to be true. (3) For many years the Swiss Alps, a mountain range spanning southern Switzerland and northern Italy, were such an obstacle. (4) Roads and railways had to navigate around the mountains or through winding tunnels inside the mountains, making the transportation of people and goods difficult and time-consuming. (5) In 2016 these burdens were eased with the completion of the Gotthard Base Tunnel.

(6) Construction of the high-speed railway tunnel began in 1996. (7) The tunnel was created through the use of tunnel-boring machines, which are giant drills with a flat rotating head called a cutter head. (8) Each of the tunnel-boring machines used during the construction of the tunnel was about the length of four football fields arranged end-to-end. (9) During the seventeen-year construction period, 28 million tons of rock were removed, enough to rebuild the Great Pyramid of Giza five times. (10) This massive construction project is reported to have cost \$12 billion. (11) After that, 4 million cubic meters of concrete, or enough concrete to build eighty-four Empire State Buildings, were used to construct and support the tunnel.

(12) In a few years, the high-speed railway will carry more than 250 freight trains and 55 passenger trains a day, with most traveling at speeds of around 100 to 125 miles per hour. (13) It will be faster for people to travel between northern and southern Europe. (14) The travel time between the European cities of Zurich, Switzerland, and Milan, Italy, will be reduced by an hour. (15) Many European leaders compare the Gotthard Base Tunnel to the Channel Tunnel, a 33-mile underwater tunnel that connects the United Kingdom and France. (16) While there is no roadway in the Channel Tunnel, people can drive their cars onto special trains that will carry vehicles through to the other side.

(17) Just as traffic congestion in major cities led to the construction of underground local transportation, natural formations, such as mountain ranges, have also sent people underground for faster, easier, and cheaper methods of transportation across larger areas. (18) There is renewed interest in constructing innovative methods of transportation that will help eliminate problems associated with traveling to and from certain areas.

### Moving through Mountains

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Which sentence should be added after sentence 5 to introduce the main topic of the passage?

- A. The construction of the Gotthard Base Tunnel was approved by Swiss voters in 1992 and was funded by tolls, fuel taxes, and government loans.
- B. Leaders from several European countries attended the opening ceremonies for the Gotthard Base Tunnel, a Swiss tunnel.
- C. The Gotthard Base Tunnel is the world's longest and deepest railway tunnel, stretching 35.5 miles straight through the base of the Swiss Alps.
- D. The Gotthard Base Tunnel continues to help reduce the number of freight trucks on the roadways in the Swiss Alps.

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Which sentence should be added to follow and support sentence 7?

- A. The tunnel-boring machine is helpful to tunnel builders in the modern era and has been an improvement over dynamite.
- B. These enormous tunnel-boring machines function somewhat like a cheese grater, with the cutter head grinding slowly through rock and stone.
- C. Engineers had considered making a tunnel under the mountains for many years, but it was impossible to do without modern tunnel-boring machines.
- D. Different types of cutter heads are used with tunnel-boring machines depending on the geology of the area where the tunnel is being created.

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Where should sentence 11 be moved in order to improve the organization of the second paragraph (sentences 6–11)?

- A. to the beginning of the paragraph (before sentence 6)
- B. between sentences 6 and 7
- C. between sentences 8 and 9
- D. between sentences 9 and 10

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Which sentence presents information that shifts away from the main topic of the third paragraph (sentences 12–16) and should be removed?

- A. sentence 13
- B. sentence 14
- C. sentence 15
- D. sentence 16

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Which transition phrase should be added to the beginning of sentence 18?

- A. Although the Gotthard Base Tunnel is mainly for freight trains,
- B. With the Gotthard Base Tunnel taking ten years to complete,
- C. Because of the successful completion of the Gotthard Base Tunnel,
- D. As the number of trains using the Gotthard Base Tunnel increases,

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Which concluding sentence should be added after sentence 18 to support the topic presented in the passage?

- A. There is proof that underground tunnels such as the Gotthard Base Tunnel are beneficial to the economy of the surrounding area.
- B. The Gotthard Base Tunnel is an extraordinary example of how human ingenuity and persistence can overcome great obstacles.
- C. The completion of the Gotthard Base Tunnel shows that people can work together to achieve important goals.
- D. The Swiss government is confident that the economic impact of the Gotthard Base Tunnel will be worth its construction cost.

**There are no more questions for this passage set.**

Use the review button  to return to any questions about the passage you have just read.

Once you select the blue arrow  at the top of this screen, you will **not** be able to return to any questions about this passage.

**English Language Arts**  
**REVISING/EDITING PART B**

**DIRECTIONS:** Read and answer the following questions. You will be asked to recognize and correct errors so that the sentences or short paragraphs follow the conventions of standard written English. As needed, you may use the notepad tool or write on the scrap paper given to you to take notes. You should reread relevant parts of the sentences or paragraphs, while being mindful of time, before selecting the **best** answer for each question.

Standalone Item 1

Which sentence contains an error in its construction and should be revised?

(1) Walking dogs, cleaning kennels, hand-feeding newborn kittens, and supporting the pet-adoption process, the animal shelter is looking for volunteers to help with a variety of tasks. (2) Working at the animal shelter is a great way for young people, especially those who aspire to care for and protect animals, to gain valuable work experience. (3) In addition to hands-on training with animal care, volunteers will learn important job skills, such as punctuality, responsibility, and personal initiative. (4) Caring for animals can also help volunteers develop empathy, which is the awareness and understanding of the feelings of others.

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

Standalone Item 2

Read this sentence.

In the Whispering Gallery of Grand Central Terminal, people whispering a message in one corner can be clearly heard in the opposite corner, regardless of surrounding noise, because the tiled archways send the sound through the environment.

Which revision to the words **send the sound through the environment** uses the most precise language?

Drag the correct phrase into the box.

guide the sound waves in a specific direction

focus the sound waves to travel through the space

direct the sound waves to move along the curves of the arches

transfer the sound waves to a variety of different locations

In the Whispering Gallery of Grand Central Terminal, people whispering a message in one corner can be clearly heard in the opposite corner, regardless of surrounding noise, because the tiled archways

Standalone Item 3

Read this sentence.

Robert Cornelius is credited with taking the first, official selfie as a daguerreotype, an image recorded on a copper plate coated in silver, using a process that was more complicated than photos of today which are digitized or printed from film and do not require subjects to sit for nearly fifteen minutes to avoid blurring the image.

Which **two** edits should be made to correct the sentence?

Select the **two** correct answers.

- A. Delete the comma after **first**.
- B. Delete the comma after **daguerreotype**.
- C. Delete the comma after **silver**.
- D. Add a comma after **today**.
- E. Add a comma after **film**.

Standalone Item 4

What is the **best** way to combine the sentences?

- (1) Scientists now believe that Jupiter may have as many as seventy-nine moons.
- (2) One of Jupiter's moons is named Io.
- (3) Io has the greatest number of active volcanoes in the solar system.

- A. Io, which is one of Jupiter's moons, has the greatest number of active volcanoes in the solar system, and scientists now believe that Jupiter may have as many as seventy-nine moons.
- B. Scientists now believe that Jupiter may have as many as seventy-nine moons, and one of them is named Io, which has the greatest number of active volcanoes in the solar system.
- C. Scientists now believe that Jupiter may have as many as seventy-nine moons, including one named Io, which has the greatest number of active volcanoes in the solar system.
- D. Io, a moon with the greatest number of active volcanoes in the solar system, is one of Jupiter's moons, and scientists now believe that Jupiter may have as many as seventy-nine moons.

**MATHEMATICS**  
**IMPORTANT NOTES**

1. Formulas and definitions of mathematical terms and symbols are **not** provided.
2. Diagrams other than graphs are **not** necessarily drawn to scale. Do not assume any relationship in a diagram unless it is specifically stated or can be determined from the information given.
3. Assume that a diagram is in one plane unless the question specifically states that it is not.
4. Graphs are drawn to scale. Unless stated otherwise, you can assume relationships according to appearance. For example, lines on a graph that appear to be parallel can be assumed to be parallel. This is also true for concurrent lines, straight lines, collinear points, right angles, etc.

**DIRECTIONS:**

Solve each problem. Select the answer from the choices given or enter your answer in the space provided. When you are solving problems, you can use the online notepad tool or write on the scrap paper given to you.

Math Item 1

What is the prime factorization of 3,575?

- A.  $5 \cdot 11 \cdot 13$
- B.  $5^2 \cdot 11 \cdot 13$
- C.  $5 \cdot 715$
- D.  $5^2 \cdot 143$

Math Item 2

What is the value of  $z$  in  $\frac{x}{10} + \frac{y-x}{5} = \frac{z}{10}$ ?

- A. 1
- B. 5
- C.  $y$
- D.  $2y - x$

Math Item 3

Two sets, R and S, are described below. The sum of the elements in set R equals the sum of the elements in set S.

$$R = \{5, x, 3, 8\}$$

$$S = \{6, y, 4, 1\}$$

What is the value of  $x - y$ ?

- A.  $-7$
- B.  $-5$
- C.  $5$
- D.  $7$

Math Item 4

If  $x = \frac{1}{4}$ , what is the value of  $\frac{2}{2-x}$ ?

- A.  $\frac{3}{4}$
- B.  $\frac{8}{9}$
- C.  $1\frac{1}{7}$
- D.  $3\frac{1}{2}$

Math Item 5

In a school raffle, 1 out of every 25 students wins a prize. Each prize includes a randomly selected trading card from a set of 100 different cards, labeled C1 through C100, with each card equally likely to be chosen. If one student is selected at random, what is the probability that the student both wins a prize and receives Card C17?

Write an expression that represents the probability that a student wins the prize and receives Card C17.

Enter your answer in the space provided. Enter only your answer.

1	2	3	4	5			
6	7	8	9	0	+	-	$\sqrt{\quad}$
%	-	.	$\frac{\square}{\square}$	$\frac{\square\square}{\square}$	$\cdot$	$\div$	$\sqrt[n]{\quad}$
	$\square^\square$	( )	$\leq$	$<$	=	$>$	$\geq$
$\pi$							

Math Item 6

The cost of shipping a package is \$12, plus \$2 for each additional pound over 3 pounds. Which expression represents the total cost, in dollars, of shipping a package that weighs  $p$  pounds? Assume that  $p \geq 3$ .

- A.  $12 + 2(p + 3)$
- B.  $12 + 2(p - 3)$
- C.  $14p + 3$
- D.  $14p - 3$

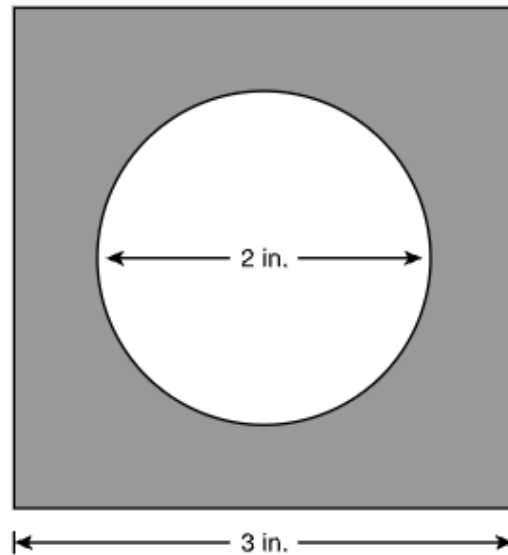
Math Item 7

A middle school library has a shelf with 40 books, each labeled with a different number from 201 to 240. One book is selected at random. What is the probability, as a **percentage**, of selecting book number 223?

Enter your answer in the space provided.

Math Item 8

A square metal plate has a side length of 3 inches. A circular hole with a diameter of 2 inches is cut out from the center of the plate.



What is the area of the shaded region, to the nearest hundredth of a square inch?

Enter your answer in the space.

Math Item 9

Let  $m$  be a negative integer and  $k$  be a positive integer.

Which of the expressions below must result in a **positive** value?

Select the **three** correct answers.

A.  $-m + k$

B.  $-m \cdot k$

C.  $m - k$

D.  $-k \cdot m$

E.  $\frac{m}{k}$

Math Item 10

$$2x + 11 > 3x + 9$$

For what values of  $x$  is the above inequality true?

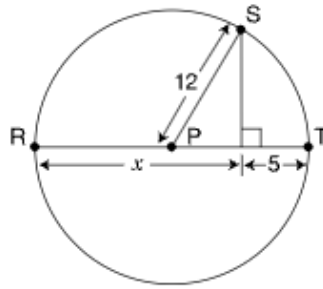
- A.  $x < 2$
- B.  $x > 2$
- C.  $x < 20$
- D.  $x > 20$

Math Item 11

In a scale drawing of a triangular park, the sides measure 5 inches, 7 inches, and 8 inches. The perimeter of the actual park is 25 miles. What is the actual length of the shortest side of the park?

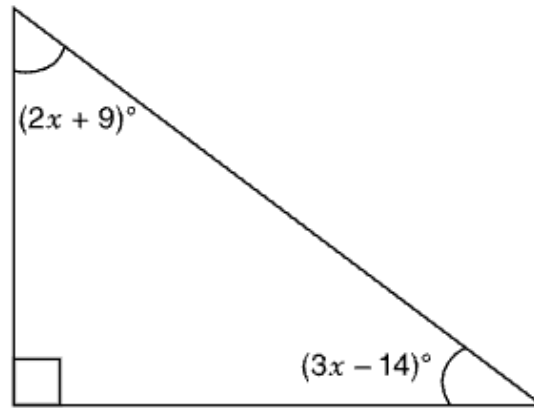
- A. 6.25 mi
- B. 8.75 mi
- C. 10 mi
- D. 15.625 mi

Math Item 12



$P$  is the center of the circle above, and  $R$ ,  $S$ , and  $T$  are points on the circle. What is the value of  $x$ ?

- A. 12
- B. 15
- C. 17
- D. 19



In the right triangle shown above, what is the measure of the smallest angle?

- A.  $43^\circ$
- B.  $44^\circ$
- C.  $46^\circ$
- D.  $47^\circ$

Math Item 14

James must read 84 pages of a book for a class assignment. If he reads  $\frac{1}{4}$  of the pages in the morning and  $\frac{1}{3}$  of the **remaining** pages in the afternoon, how many pages will he still need to read?

- A. 35
- B. 42
- C. 45
- D. 56

$$\frac{1}{11} + \frac{1}{22} + \frac{1}{33}$$

What is the value of the expression shown above?

A.  $\frac{1}{22}$

B.  $\frac{1}{11}$

C.  $\frac{1}{6}$

D.  $\frac{3}{22}$

The table shows the proportional relationship between  $x$  cups of oatmeal and  $y$  ounces of raisins in a bread recipe.

BREAD RECIPE

Cups of Oatmeal ( $x$ )	Ounces of Raisins ( $y$ )
2	1.0
3	1.5
6	3.0

What is the constant of proportionality of the number of ounces of raisins to the number of cups of oatmeal?

Enter your answer in the space.

Math Item 17

At Midville High School, 64 students are members of either the orchestra or the choir, or both. Of these students, 38 are members of the orchestra, and 46 are members of the choir. What fraction of the total is the number of students who are members of **both** the orchestra and the choir?

- A.  $\frac{16}{21}$
- B.  $\frac{10}{19}$
- C.  $\frac{10}{23}$
- D.  $\frac{5}{16}$

Math Item 18

Which of the following decimals is equivalent to  $1\frac{2}{3} + 2\frac{4}{9}$ ?

A.  $3.\bar{1}$

B.  $3.\bar{6}$

C.  $4.\bar{1}$

D.  $4.\bar{9}$

Math Item 19

A store manager purchases a piece of furniture for \$456.00. To determine the selling price, the manager increases the purchase cost by 125%. A customer buys the furniture and pays an additional 8% sales tax. How much does the customer pay for the furniture?

- A. \$615.60
- B. \$627.48
- C. \$1,108.08
- D. \$1,846.80

Math Item 20

What is the value of  $\frac{-9(-4)^2+36(-4)+304}{-4}$ ?

- A.  $-76$
- B.  $-4$
- C.  $4$
- D.  $148$

Math Item 21

Maxie borrowed \$7.75 from her mother, \$11.00 from her father, and \$4.50 from her brother to purchase a video game. Her grandmother gave her \$25.00 as a gift. How much money will Maxie have left or still owe if she uses the money her grandmother gave her to pay back the money she borrowed?

- A. Maxie will still owe \$2.25.
- B. Maxie will still owe \$1.75.
- C. Maxie will have \$1.75 left.
- D. Maxie will have \$2.25 left.

Seth grows strawberries in his garden.

- He picked  $2\frac{1}{2}$  cups of strawberries on Monday.
- He picked 4 cups of strawberries on Tuesday.
- He ate  $\frac{3}{4}$  cup of strawberries for breakfast each day on Wednesday, Thursday, and Friday.

How many cups of strawberries did Seth have left?

- A.  $3\frac{1}{2}$
- B.  $4\frac{1}{4}$
- C. 6
- D. 9

Math Item 23

Which situation involves quantities that combine to equal zero?

- A. receiving \$5 as a gift and then giving \$5 to a friend
- B. buying a book for \$10 and then buying lunch for \$10
- C. getting on an elevator at the ground floor, rising 3 floors, and then rising 3 more floors
- D. starting in a cave 20 feet below the ground, climbing up 20 feet, and then climbing up 20 feet more

Math Item 24

An athlete runs  $\frac{1}{8}$  kilometer in  $\frac{3}{4}$  minute. At this rate, how many kilometers would the athlete run in 1 minute?

- A.  $\frac{3}{32}$
- B.  $\frac{1}{6}$
- C.  $1\frac{1}{2}$
- D. 6

Math Item 25

A bus trip takes 9 hours if the mean speed is 50 miles per hour. How many hours would this trip take if the mean speed was 45 miles per hour?

- A. 8
- B. 10
- C. 12
- D. 14



Math Item 27

A birdseed mixture is  $\frac{2}{5}$  sunflower seeds. The cost of the sunflower seeds is \$0.10 per ounce. At this rate, what is the cost of the sunflower seeds in 25 pounds of this birdseed? (Note: 1 lb = 16 oz.)

- A. \$10.00
- B. \$16.00
- C. \$40.00
- D. \$160.00

Math Item 28

A graph shows the relationship between the number of gallons of water,  $y$ , that has been added to a tank and the number of hours,  $x$ , that water has been added to the tank at a constant rate. What does the ordered pair  $(3, 24)$  represent?

- A. Three gallons of water was added in 24 hours.
- B. Three gallons of water was added per hour.
- C. Twenty-four gallons of water was added in 3 hours.
- D. Twenty-four gallons of water was added per hour.

Math Item 29

Karl has one red spinner and one blue spinner. Each spinner is divided into 4 equal sections, numbered 1 through 4. He spins each spinner once and writes down the number that each lands on. What is the probability that the two numbers, when multiplied together, will have 4 as a product?

- A.  $\frac{1}{16}$
- B.  $\frac{3}{16}$
- C.  $\frac{4}{7}$
- D.  $\frac{7}{16}$

Math Item 30

A recipe uses  $\frac{2}{3}$  cup of sugar for every  $1\frac{1}{4}$  cups of flour. A cook wants to increase the recipe. How many cups of sugar are needed for each cup of flour?

- A.  $\frac{8}{15}$
- B.  $\frac{5}{6}$
- C.  $1\frac{7}{8}$
- D.  $3\frac{2}{3}$

Math Item 31

A box contains an unknown number of green marbles. An experimenter adds 100 red marbles to the box, mixes the marbles thoroughly, and then draws out 10 marbles at random. Assume that this sample is representative of the proportion in the box. If there are 2 red marbles and 8 green marbles in this sample, approximately how many green marbles are in the box?

- A. 80
- B. 300
- C. 400
- D. 500

Math Item 32

There were 36 people at Emily's party. If each person at the party drank 2 cups of juice, how many **gallons** of juice did they drink altogether?

Note: 1 gallon = 4 quarts; 1 quart = 4 cups.

- A.  $2\frac{1}{4}$
- B.  $4\frac{1}{2}$
- C. 9
- D. 72

Math Item 33

A car costing \$24,000 is subject to a sales tax of 8%. If Bindu made a \$10,000 down payment on this car, what is the total amount she has left to pay?

- A. \$14,000
- B. \$15,620
- C. \$15,920
- D. \$25,920

Math Item 34

Last week, Emily rode the bus to school on 3 of the 5 mornings and rode the bus home on 4 of the 5 afternoons. Based on last week's events, what is the probability that Emily will ride the bus in the morning and the afternoon next Monday?

- A.  $\frac{1}{5}$
- B.  $\frac{7}{25}$
- C.  $\frac{12}{25}$
- D.  $\frac{7}{10}$

Math Item 35

XYZ Corporation hired 6 people as summer workers. Of these 6 people, 3 will be hired as permanent employees in the fall. If 2 of the 6 people are male, how many of the possible groups of 3 people hired in the fall will include **only** 1 male?

- A. 4
- B. 6
- C. 12
- D. 24

Leah has set a goal to read a total of 500 pages of a textbook. The table shows the book page numbers for the reading she did during three days.

DAILY READING LOG

Day	Pages Read
1	pages 45–90, inclusive
2	pages 100–135, inclusive
3	pages 145–190, inclusive

What percentage of her 500-page goal did Leah read on these three days? Round your answer to the nearest tenth.

Enter your answer in the space.

Math Item 37

What 3-digit number between 630 and 650 is divisible by both 5 and 8?

Enter your answer in the space.

Math Item 38

Melissa has a bag of marbles that are all the same size. The bag contains three red (R) marbles, three green (G) marbles, and two white (W) marbles. For an experiment, she will take two marbles out of the bag without looking. Which list shows the sample space for Melissa's experiment?

- A. R, G, W
- B. RG, RW, GW
- C. R, R, R, G, G, G, W, W
- D. RR, RG, RW, GG, GW, WW

The table shows the probabilities of a hockey team scoring different numbers of goals in a game.

HOCKEY GOAL PROBABILITIES

<b>Number of Goals</b>	<b>Probability</b>
0	0.16
1	0.21
2	0.29
3	0.21
4	0.09
5	0.04

What is the probability that the team will score three or more goals in the next game?

- A. 0.13
- B. 0.21
- C. 0.34
- D. 0.50

Math Item 40

A team is participating in a contest to collect canned goods for a food drive. The team has 53 points and must have a total of at least 100 points to win a prize. The team earns 5 points for each can of food a member collects. Which inequality can be used to find  $x$ , the number of cans of food the team needs to collect to win a prize?

- A.  $5 + 53x \leq 100$
- B.  $5 + 53x \geq 100$
- C.  $53 + 5x \leq 100$
- D.  $53 + 5x \geq 100$

Math Item 41

The distance an eagle flies is proportional to the time the eagle spends flying. An eagle flies 90 miles in 3 hours. What is the constant of proportionality for this relationship?

- A. 3
- B. 30
- C. 60
- D. 90

Math Item 42

A student reads  $\frac{1}{12}$  of a book in  $\frac{1}{3}$  hour. What fraction of the book can the student read in 1 hour?

A.  $\frac{1}{36}$

B.  $\frac{1}{4}$

C.  $\frac{5}{12}$

D.  $\frac{12}{3}$

Math Item 43

Two student clubs are selling snacks as part of a fundraiser. The Art Club sells a 24-pack of granola bars for \$12.00. The Science Club sells a 10-pack of granola bars for \$6.50. To the nearest cent, what is the difference in cost per bar between the two clubs?

Select the correct answer from each drop-down to complete the sentences.

The cost for the Art Club's bar is  per bar.

The cost for the Science Club's bar is  per bar.

The difference between the cost of the bars is .

RESPONSE_A1	RESPONSE_A2	RESPONSE_A3
\$0.40	\$0.55	\$0.05
\$0.50	\$0.65	\$0.10
\$0.60	\$0.75	\$0.15
\$0.75	\$0.85	\$0.25

Math Item 44

A bakery charges \$1.25 for each cupcake and \$2.50 for a serving tray. The equation describes  $p$ , the price of  $c$  cupcakes and a serving tray, **not** including tax.

$$p = 2.50 + 1.25c$$

If Samantha bought some cupcakes and a serving tray for a total of \$22.50, **not** including tax, how many cupcakes did she buy?

- A. 4
- B. 9
- C. 16
- D. 18

Math Item 45

Marcus and Isla are saving money to buy concert tickets.

- They decide to save the same amount each week.
- They already have \$8 saved.
- After 3 weeks, the two have \$26 saved in total.

How much money, in dollars, is being saved by Marcus and Isla each week?

Enter your answer in the space.

Math Item 46

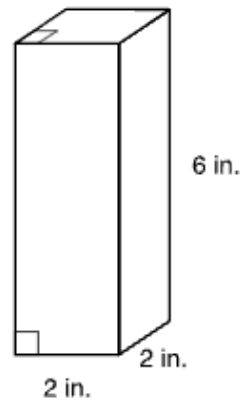
A company charges \$3.00 to ship a 4-pound package. The cost includes a base fee of \$1.50 plus \$0.50 for each pound over the first pound. The table below illustrates how the cost depends on the total weight of the package. Complete the table by matching each total weight to its correct total shipping cost.

Move the correct answer to each box. Not all answers will be used.

- 2
- 2.5
- 3
- 3.5
- 4
- 6
- 7
- 9

SHIPPING COSTS

Total Weight (pounds)	Total Cost to Ship (dollars)
2	<input type="text"/>
<input type="text"/>	2.50
6	<input type="text"/>
<input type="text"/>	5.50



What shape will result from a horizontal slice of the figure above?

- A. a square that has 2-inch sides
- B. a triangle that has 2-inch sides
- C. a rectangle that has a 2-inch side and a 6-inch side
- D. a triangle that has one 2-inch side and two 6-inch sides

Math Item 48

The perimeter of square  $W$  is twice the perimeter of equilateral triangle  $X$ . What is the ratio of the length of one side of square  $W$  to the length of one side of equilateral triangle  $X$ ?

- A. 3:8
- B. 2:3
- C. 3:2
- D. 2:1

Math Item 49

Anise has a piece of cloth measuring 45 inches by 75 inches. She wants to cut it into squares of equal size, without any cloth left over. What is the **greatest** possible side length, in inches, of one of those squares?

- A. 3
- B. 5
- C. 15
- D. 45

This table shows the number of birds that came to a bird feeder on Monday and Tuesday.

BIRDS AT BIRD FEEDER

<b>Day</b>	<b>Number of Birds</b>
Monday	30
Tuesday	24

What was the percent decrease in the number of birds from Monday to Tuesday?

- A. 6%
- B. 20%
- C. 24%
- D. 25%