What Are Wind Tunnels?

by David Hitt

Wind tunnels are large tubes with air moving inside. The tunnels are used to copy the actions of an object in flight. Researchers use wind tunnels to learn more about how an aircraft will fly. NASA uses wind tunnels to test scale models of aircraft and spacecraft. Some wind tunnels are big enough to hold full-size versions of vehicles. The wind tunnel moves air around an object, making it seem like the object is really flying.

How do Wind Tunnels Work?

Most of the time, powerful fans move air through the tube. The object to be tested is fastened in the tunnel so that it will not move. The object can be a small model of a vehicle. It can be just a piece of a vehicle. It can be a full-size aircraft or spacecraft. It can even be a common object like a tennis ball. The air moving around the still object shows what would happen if the object were moving through the air. How the air moves can be studied in different ways. Smoke or dye can be placed in the air and can be seen as it moves. Threads can be attached to the object to show how the air is moving. Special instruments are often used to measure the force of the air on the object.

How Does NASA Use Wind Tunnels for Aircraft?

NASA has more wind tunnels than any other group. The agency uses the wind tunnels in a lot of ways. One of the main ways NASA uses wind tunnels is to learn more about airplanes and how things move through the air. One of NASA’s jobs is to improve air transportation. Wind tunnels help NASA test ideas for ways to make aircraft better and safer. Engineers can test new materials or shapes for airplane parts. Then, before flying a new airplane, NASA will test it in a wind tunnel to make sure it will fly as it should.

NASA also works with others that need to use wind tunnels. That way, companies that are building new airplanes can test how the planes will fly. By letting these companies use the wind tunnels, NASA helps to make air travel safer.
How Can Wind Tunnels Help Spacecraft?

NASA also uses wind tunnels to test spacecraft and rockets. These vehicles are made to operate in space. Space has no atmosphere. Spacecraft and rockets have to travel through the atmosphere to get to space. Vehicles that take humans into space also must come back through the atmosphere to Earth.

Wind tunnels have been important in making the Ares rockets and Orion spacecraft. Ares and Orion are vehicles that will take astronauts into space. NASA engineers tested ideas for the design of Ares in wind tunnels. They needed to see how well Ares would fly. Engineers tested Orion models. They needed to know what would happen to different designs when the spacecraft came back through the atmosphere.

Long after the first design work is finished, NASA can still use wind tunnels. Wind tunnel tests have helped NASA change the space shuttle to make it safer. Wind tunnels will keep helping make all spacecraft and rockets better.

Wind tunnels can even help engineers design spacecraft to work on other worlds. Mars has a thin atmosphere. It is important to know what the Martian atmosphere will do to vehicles that are landing there. Spacecraft designs and parachutes are tested in wind tunnels set up to be like the Martian atmosphere.

NASA has many different types of wind tunnels. They are located at NASA centers all around the country. The wind tunnels come in a lot of sizes. Some are only a few inches square, and some are large enough to test a full-size airplane. Some wind tunnels test aircraft at very slow speeds. But some wind tunnels are made to test at hypersonic speeds. That is more than 4,000 miles per hour!
Which of the following best summarizes the main idea of the passage?

A  “Researchers use wind tunnels to learn more about how an aircraft will fly.”
   (paragraph 1)
B  “Special instruments are often used to measure the force of the air on the object.”
   (paragraph 2)
C  “NASA engineers tested ideas for the design of Ares in wind tunnels.” (paragraph 6)
D  “Long after the first design work is finished, NASA can still use wind tunnels.”
   (paragraph 7)

Key: A

MEASURES CCLS: RI.5.2:
Determine two or more main ideas of a text and explain how they are supported by key details; summarize the text.

HOW THIS QUESTION MEASURES RI.5.2:
This question measures RI.5.2 because it asks the student to analyze specific details from the text to determine which of them best summarizes the main idea of the article. To answer correctly, students must combine their comprehension of the entire text with an analysis of each detail.

WHY CHOICE “A” IS CORRECT:
Students who choose “A” are able to identify that the quote includes the main elements of the article—the researchers, wind tunnels, and aircraft—and correctly states the relationship among the three. Each of these elements is supported by specific details and examples throughout the passage.

WHY THE OTHER CHOICES ARE INCORRECT:
Choice B: Students may have chosen “B” because this sentence does provide important information about how wind tunnels operate, which is essential to understanding their use for a variety of purposes. This, however, is a supporting detail that contributes to an understanding of the article’s focus rather than a general statement of the focus.

Choice C: Students may have chosen “C” because this sentence could be seen as support for a main idea of a section. It supports the idea that NASA tests spacecraft by using wind tunnels, so rather than summarizing the main idea of the article, it expands upon information about a specific group that uses wind tunnels.

Choice D: Students may have chosen “D” because it is a main idea of a paragraph, elaborating on how NASA uses wind tunnels. The sentence develops the variety of wind tunnel uses rather than stating the general main idea. It is too specific to qualify as a summary of the main idea of the passage.

HOW TO HELP STUDENTS MASTER RI.5.2:
To arrive at the correct answer, a student must analyze the entire article and determine how each part contributes to the whole. Choices “B,” “C,” and “D” all contribute to that understanding, but none of them alone describe the main idea. Each part of the passage expands upon how different researchers use wind tunnels to test a variety of types of aircraft. To help students succeed with questions like this, instruction can focus on summarizing texts, attending to the way authors build central ideas with supporting ideas. This skill enables a student to use informational text as a tool for understanding new concepts.
Which key detail helps the reader understand the importance of using wind tunnels?

A. Wind tunnels can move air more than 4,000 miles per hour.
B. Wind tunnels are design tools that help make safer aircraft vehicles.
C. Wind tunnels can create different atmospheres.
D. Wind tunnels are large tubes that show how air moves.

Key: B

MEASURES CCLS: RI.5.2:
Determine two or more main ideas of a text and explain how they are supported by key details; summarize the text.

HOW THIS QUESTION MEASURES RI.5.2:
This question measures RI.5.2 because it asks students to analyze specific details from the text to determine which of them best supports one of the main ideas of the text. Students must select the detail that highlights the importance of the wind tunnels.

WHY CHOICE “B” IS CORRECT:
Students who choose “B” are able to identify the detail that supports one of the main ideas of the text: the importance of using wind tunnels. The article describes how using wind tunnels is an important part of building and testing aircraft in order to make them safer when used commercially by airlines or by NASA in spaceflight. The safety provided by first testing aircraft wind tunnels is the important detail for students to identify.

WHY THE OTHER CHOICES ARE INCORRECT:
Choice A: Students may have chosen “A” because the statement describes an impressive feature of wind tunnels. The statement, however, does not explicitly connect this information to the importance of their use. It is a secondary detail with respect to the content of the passage as a whole.
Choice C: Students may have chosen “C” because the statement describes an important feature of wind tunnels. The statement, however, does not explicitly connect this information to the importance of their use. It is a secondary detail with respect to the content of the passage as a whole.
Choice D: Students may have chosen “D” because the statement defines wind tunnels. The statement, however, does not explicitly connect this definition to the importance of their use. The definition of a wind tunnel is necessary to the article, but it does not explain its contribution to safety.

HOW TO HELP STUDENTS MASTER RI.5.2:
To arrive at the correct answer, students must differentiate between supporting information and information that helps describe the overall importance of wind tunnels. Choices “A,” “C,” and “D” all focus on what wind tunnels are and how they operate. The student must analyze the statements in order to determine that only “B” refers to what is achieved with wind tunnels rather than simply describing them. “D” shows what they are, “C” tells what they can do, and “A” demonstrates their power. By mentioning increased safety, only “B” addresses the importance of the use of wind tunnels. To help students succeed with questions like this, instruction can focus on attending to the way authors build central ideas with supporting details. Instruction can also focus the way ideas and details relate, which aids general comprehension as well as the ability to understand the importance and use of various types of information within a text.
The statement that “NASA also works with others that need to use wind tunnels” most strongly suggests that

A  many different groups are developing space shuttles
B  NASA hopes to buy vehicles made by other agencies
C  NASA has the largest wind tunnels in existence
D  many companies do not have their own wind tunnels

Key: D

MEASURES CCLS: RI.5.1:
Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text.

HOW THIS QUESTION MEASURES RI.5.1:
This question measures RI.5.1 because it asks students to identify an inference that is supported by a quote from the text. To answer correctly students must understand the quote in the context of the text and determine which inference it most strongly supports. The correct answer is worded so that it does not refer to anything explicitly stated in the paragraph. Students must recognize the valid inference that is implicit in the text.

WHY CHOICE “D” IS CORRECT:
Students who choose “D” are able to identify that it makes a valid inference that is supported by the quotation itself as well as the surrounding text. If NASA allows others to use their wind tunnels, it is safe to assume that those others do not have wind tunnels of their own.

WHY THE OTHER CHOICES ARE INCORRECT:
Choice A:  Although other groups could possibly develop space shuttles, the passage talks at length about the idea that wind tunnels are used for a variety of purposes and not just space shuttles. It also states that some of the “companies” to which NASA lends its wind tunnels are “building airplanes.” This information makes it more likely that these other groups are doing other things rather than building space shuttles.

Choice B:  This choice suggests that NASA will benefit for loaning out its wind tunnels. The passage, however, only refers to what NASA provides and mentions the “others” in general terms. The reader is not told what the other companies make or if their products could be of benefit to NASA. The benefit is “safer” air travel.

Choice C:  The large size of NASA’s wind tunnels can certainly be inferred, but to conclude that they are “the largest in existence” requires making a broad generalization from limited information. It is possible that NASA’s wind tunnels are the largest in the world, but the information in the passage does not necessarily support that conclusion. This also assumes that only companies needing the largest wind tunnels need to use NASA’s facilities, a point that the text does not support.

HOW TO HELP STUDENTS MASTER RI.5.1:
This question measures a student’s ability to recognize an inference that is based on the information in a passage. While choice “C” may be tempting to conclude, the statement is much too broad to be inferred from the passage. Choices “A” and “B” rely on information in the passage but then extend that information beyond the support that is provided. Choice “D” is the only specific inference that can be supported by limiting evidence to the statements provided about NASA and the companies with whom they work. If they had their own wind tunnels, they would not need to use those at NASA. To help students succeed with questions like this,
instruction could focus on students’ comprehension of grade-level complex texts and gaining the ability to make inferential claims based on specific details in texts.
The most important feature of a wind tunnel used to test vehicles that can land on Mars is the ability to test how

A  gravity affects vehicles  
B  a thin atmosphere affects vehicles  
C  high-speed winds affect vehicles  
D  freezing temperatures affect vehicles

Key: B

MEASURES CCLS: RI.5.3:

Explain the relationships or interactions between two or more individuals, events, ideas, or concepts in a historical, scientific, or technical text based on specific information in the text.

HOW THIS QUESTION MEASURES RI.5.3:

This question measures RI.5.3 because it asks students to relate distinct pieces of information in the text: characteristics of Mars and features of wind tunnels. Recognizing the correct choice requires students to track the way the text develops and relates discrete ideas to make larger points.

WHY CHOICE “B” IS CORRECT:

Students who choose “B” are able to connect various ideas in the text. The text states that “Mars has a thin atmosphere” and “It is important to know what the Martian atmosphere will do to vehicles that are landing there.” Since Mars has a thin atmosphere, that is what the wind tunnel would have to replicate.

WHY THE OTHER CHOICES ARE INCORRECT:

Choice A: Students may have chosen “A” because although the absence of gravity is often a major element of a discussion about space travel, there is no basis for assuming that this is something that is only related to Mars. In addition, gravitational pull is not mentioned as something that is tested in wind tunnels. Consequently, there is no textual support that wind tunnels would be used for testing the effects of gravity on vehicles.

Choice C: Students may have chosen “C” because high speeds are mentioned at the end of the passage with respect to “testing at hypersonic speeds.” The text, however, makes no connection between this information and Mars.

Choice D: Students may have chosen “D” because it mentions the cold temperatures of Mars. Although the temperature on Mars could affect vehicles, the passage does not discuss the temperature in the wind tunnels or any type of testing regarding temperature.

HOW TO HELP STUDENTS MASTER RI.5.3:

This question measures students’ ability to take two pieces of textual information and recognize how the text establishes a relationship between them. Choices “A,” “C,” and “D” connect textual information in ways that are not supported by the passage. Choice “B” correctly expresses the relationship between the unique atmosphere on Mars and the necessity to determine its effect on vehicles with a wind tunnel. To help students succeed with questions like this, instruction could focus on tracking the development of related ideas across a text. Using texts that develop and relate ideas across multiple paragraphs, students can be asked to analyze various textual details and explain how the text develops a relationship between them.
Which sentence from the passage best explains why NASA uses wind tunnels to test spacecraft models?

A  “These vehicles are made to operate in space.” (paragraph 5)
B  “Spacecraft and rockets have to travel through the atmosphere to get to space.” (paragraph 5)
C  “They needed to know what would happen to different designs when the spacecraft came back through the atmosphere.” (paragraph 6)
D  “Some are only a few inches square, and some are large enough to test a full-size airplane.” (paragraph 9)

Key: C
MEASURES CCLS: RI.5.8:

Explain how an author uses reasons and evidence to support particular points in a text, identifying which reasons and evidence support which point(s).

HOW THIS QUESTION MEASURES RI.5.8:

This question measures RI.5.8 because it asks the student to determine which textual information supports a central point in the text. All of the choices are found in the text, and all contribute to an understanding, but only one choice provides clear full support for the cited point.

WHY CHOICE “C” IS CORRECT:

Students who choose “C” are able to identify that it provides full support for the reason why NASA tests spacecraft in wind tunnels. This quote connects the atmosphere to the testing of spacecraft, which fully answers the question. NASA needs to determine how the spacecraft will perform in the conditions that exist in a reentry through the atmosphere. The wind tunnels can provide those conditions, but not those of space.

WHY THE OTHER CHOICES ARE INCORRECT:

Choice A: Students may have chosen “A” because it introduces the operation of spacecraft, which is relevant to the topic. However, the fact that the vehicles operate in space does not fully explain why they are tested in wind tunnels.

Choice B: Students may have chosen “B” because it gives background information that provides a basis for understanding why wind tunnels are used to test spacecraft. This sentence, however, does not explicitly mention the spacecraft’s reentering of the atmosphere or connect it to testing the performance of various designs.

Choice D: Students may have chosen “D” because it describes wind tunnels in a way that explains that their appearance can be adapted for different purposes. Although it is true that this reveals how the design makes it possible to test a large spacecraft, it doesn’t explain why it is used for that purpose.

HOW TO HELP STUDENTS MASTER RI.5.8:

To arrive at the correct answer, a student must determine the needs of the scientists, the path and conditions that affect spacecraft, and connect those to an understanding of the capabilities of wind tunnels. Choices “A,” “B,” and “D” are all relevant but only “C” fully expresses the connection of that information to the point cited in the question. By telling only where spacecraft operate, “A” omits the conditions that affect spacecraft, the needs of scientists, and any connection to the understanding of what wind tunnels can do. “B” better
connects to the conditions, but still omits a connection to scientists and wind tunnels. "D" makes the best connection to the design and capabilities of the wind tunnels, but makes no connection to the needs of scientists in relation to the path and conditions that affect spacecraft. Only "C" refers to the needs of scientists ("they needed to know what would happen"), the conditions affecting spacecraft ("came back through the atmosphere"), and the explanation of the capabilities of wind tunnels. To help students succeed with questions like this, instruction could focus on attending to the way authors use various statements to support and build specific claims across a text.
Which sentence from the passage best explains how a wind tunnel works?

A  “NASA uses wind tunnels to test scale models of aircraft and spacecraft.” (paragraph 1)
B  “The object to be tested is fastened in the tunnel so that it will not move.” (paragraph 2)
C  “The air moving around the still object shows what would happen if the object were moving through the air.” (paragraph 2)
D  “Smoke or dye can be placed in the air and can be seen as it moves.” (paragraph 2)

**Key:** C

**MEASURES CCLS: RI.5.1:**
Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text.

**HOW THIS QUESTION MEASURES RI.5.1:**
This question measures RI.5.1 because it requires students to use quoted information from the passage to demonstrate understanding of its details. A student must place each of the quotations in context in order to determine the answer to the question.

**WHY CHOICE “C” IS CORRECT:**
Students who choose “C” show an understanding that the description offers the most complete explanation of the way in which a wind tunnel provides information about the object being tested. The focus is on the action of the wind tunnel (the air moving around) and the information that it provides (what would happen if the object were moving through the air).

**WHY THE OTHER CHOICES ARE INCORRECT:**

**Choice A:** Students may have chosen “A” because it focuses on the use of wind tunnels, but there is no explanation of how they achieve their purpose. The option relates to the topic of the question, but this response substitutes purpose for process.

**Choice B:** Students may have chosen “B” because it explains a portion of the process; however, instead of explaining how the wind tunnel works, it focuses on the placement of the object being tested. This sentence provides no indication of the operation of the wind tunnel after the tested object is fastened in place.

**Choice D:** Students may have chosen “D” because the smoke or dye reflects the air’s movement, but that does not explain how the wind tunnel provides information. The only thing that can be inferred from this sentence in terms of operation is that the wind tunnel results in the movement of air, and that smoke or dye enables that movement to be seen.

**HOW TO HELP STUDENTS MASTER RI.5.1:**
This question measures students’ understanding of a major concept in the article. Choices “A”, “B,” and “D” contain elements of the explanation of a wind tunnel, but each is missing an essential component. Choices “A” and “B” focus on the objects being tested; choice “A” mentions what they are and “B” describes how they are placed. Choice “D” is loosely related to an explanation of what the wind tunnel does because the smoke provides the means of observation. How researchers are able to observe the movement, however, is not the same as an explanation of what is taking place in the observation. Choice “C” describes how a wind tunnel works by showing how what can be seen affects what can be learned. To help students succeed with questions like this, instruction could focus developing comprehension of the central ideas in a text through examination of specific textual details.
The Discontented Rock

an Iroquois tale by Frances Jenkins Olcott

1 FROM the beginning of the Earth, Gustahote, the great Rock, had overhung the valley. He watched and guarded the land, but he was not content, and longed to be something mightier and stronger than he was.

2 “If I could be the wide river that flows through the valley,” he thought, “then surely I should be mighty and strong! The river winds happy and free through its broad lands; and green grass and flowers follow its course. If I could only be that river!”

3 And instantly Gustahote the Rock became the river. Down the valley he sped, leaping with joy, and the singing brooks from the hills ran into his stream. Through rocky gorges he tossed his foaming waves toward the Sky, and they returned to him in a rainbow spray. He wound around the bases of lofty mountains, and leaped down precipices. Then through the silent forest he glided, and the trees dipped their branches in his cool waters.

4 On and on he hastened, faster and faster, growing wider as he went, until at last he plunged into the billowing ocean. It encircled him with its broad, hungry arms, and drew him down and mingled his waters with the deep, so that he was the river no longer.

5 Then suddenly Gustahote found himself again the Rock, overhanging and guarding the valley. And he rejoiced to have escaped from the hungry deep.

6 But he was not content. He still longed to be something mightier and stronger than he was.

7 “If I could have wings, and live in the Sky,” he thought, “then surely I should be mighty and strong! The Sky is open and pathless, and leads to unseen heights. It has no billowing deep to swallow the unfortunate.”

8 And even as he thought thus, Gustahote the Rock became a bird, and the air was caressing and delicious as he tried his wings. He plumed them, and fluttered them, and spreading them wide, soared into the Sky. Beneath him were the valleys and the forests and the mountains, growing smaller and smaller as he flew upward.

9 The air became cold, as he rose above the clouds and entered the Land of Mists. A whirling wind rushed past him, breaking his wings. They drooped at his sides, and he fell heavily toward the Earth. But a fiercer blast caught him, and tore his body to fragments, and whirled the pieces over and over through the endless grey Sky.
Then suddenly Gustahote found himself again the Rock, overhanging and guarding the valley. And he rejoiced that he had escaped from the pathless Sky.

But still he was not content. He longed to be something mightier and stronger than he was.

“If I could be a creature, and wander about on the Earth,” thought he, “then surely I should be mighty and strong. Fair are the valleys of the Earth, and wide its green forests, and beautiful and fruitful its meadows. It has no fierce rushing wind to rend in pieces the unfortunate.”

And even as he thought thus, Gustahote the Rock became a creature walking upon the Earth. He wandered up and down the world, so strange to him, and soon grew lonely and desired a companion.

First he sought the beasts, but they were too busy getting their food to stop and talk to a strange creature. After that he went to the birds, but they were nesting, and could not stop to talk to a strange creature. Weary, lonely, and despairing, he wandered about.

Then suddenly Gustahote found himself again the Rock overhanging and guarding the valley. And he rejoiced that he was a Rock once more. And he heard a voice whisper:—

“Be content, O Gustahote the Rock! The waters may overflow you, but they cannot drown you. The Sun may look upon you with its hottest rays, but he cannot burn you. The tempest may strike you, but it cannot rend you. Old age cannot wrinkle you. The rivers may dry up in their beds, the forests may fall into dust, but you will stand stanch and true, and always watching, and forever remain unchanged and changeless.”

So Gustahote the Rock rejoiced exceedingly; and he still overhangs and guards the valley. The river flows from him, and the Sky smiles or frowns, and the Earth heeds him not. But he is content.
What makes Gustahote lonely while he’s an Earth creature? Use two details or examples from the passage to support why Gustahote is lonely.

MEASURES CCLS: RL.5.1, RL.5.2, RL.5.3:
RL.5.1: Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text.

RL.5.2: Determine a theme of a story, drama, or poem from details in the text, including how characters in a story or drama respond to challenges or how the speaker in a poem reflects upon a topic; summarize the text.

RL.5.3: Compare and contrast two or more characters, settings, or events in a story or drama, drawing on specific details in the text (e.g., how characters interact).

HOW THIS QUESTION MEASURES RL.5.1, RL.5.2, and RL.5.3:
The question measures RL.5.1 and RL.5.2 because it asks students to comprehend and apply textual details to support a general inference. This inference requires students to understand a major challenge faced by the main character and locate evidence to support it. In addition, since any text-supported response is acceptable, a student could focus on the interaction between characters, which would measure RL.5.3.

CHARACTERISTICS OF RESPONSES RECEIVING FULL CREDIT:
This question asks students to use textual details to demonstrate an understanding of the cause of Gustahote’s loneliness. Comprehending this cause-effect relationship is central to an understanding of the story’s ending. Because any response that answers the question and is logically supported by two relevant details or examples is acceptable, there is a variety of possible full-credit inferences.

Some possible text-supported responses are:
- Other creatures were too busy to interact with Gustahote.
• Gustahote was not included in the daily lives of Earth creatures.
• The other creatures paid no attention to Gustahote.
• Gustahote looked for someone to keep him company.

There is no single "correct" response, but rather responses that are defensible based on the Short-Response (2-Point) Holistic Rubric, and responses that are not. Student responses are evaluated on the relevance, accuracy, and sufficiency of details selected from the text and the organization of details in a logical manner. Student responses should include relevant inferences and conclusions. Responses should be in complete sentences where errors, if present, do not impact readability.

SAMPLE STUDENT RESPONSES AND SCORES APPEAR ON THE FOLLOWING PAGES:
What makes Gustahote lonely while he’s an Earth creature? Use two details or examples from the passage to support why Gustahote is lonely.

Gustahote becomes lonely because nobody would pay attention to him. The beasts were too busy getting their food to stop and talk to him. The birds were too busy nesting. Therefore, they did not have time for him either. In addition, the world itself was incredibly strange to him after being a rock for so long.

Score Point 2 (out of 2 points)

This response makes a valid inference from the text to explain why Gustahote is lonely while he’s an Earth creature (nobody would pay attention to him). The response provides a sufficient number of concrete details from the text for support as required by the prompt (The beasts were too busy getting their food to stop and talk to him. The birds were too busy nesting. Therefore, they did not have time for him either). This response includes complete sentences where errors do not impact readability.
What makes Gustahote lonely while he’s an Earth creature? Use two details or examples from the passage to support why Gustahote is lonely.

Gustahote is lonely while he’s an Earth creature. He is lonely because he is the only one of his type. The beasts and birds follow different customs and are too busy to stop and talk with a strange creature. The beasts were too busy getting food, and the birds were too busy nesting. Nobody would be Gustahote’s companion when Gustahote wandered about, everything was so strange and unfamiliar which made him lonely. This what make Gustahote lonely while he was Earth’s creature.

Score Point 2 (out of 2 points)
This response makes valid inferences from the text to explain why Gustahote is lonely while he’s an Earth creature (he is the only one of his type and Nobody would be Gustahote’s companion). The response provides a sufficient number of concrete details from the text for support as required by the prompt (The beasts and birds follow different customs and are too busy to stop and talk with a strange creature. The beasts were too busy getting food, and the birds were too busy nesting). This response includes complete sentences where errors do not impact readability.
What makes Gustahote lonely while he’s an Earth creature? Use two details or examples from the passage to support why Gustahote is lonely.

Score Point 1 (out of 2 points)
This response makes a valid inference from the text to explain why Gustahote is lonely while he’s an Earth creature (the world is so strange to him. Then, he desiresd a companion. Next, no one would talk to him); however, the response does not provide two details from the text for support as required by the prompt. This response includes complete sentences where errors do not impact readability.
What makes Gustahote lonely while he’s an Earth creature? Use **two** details or examples from the passage to support why Gustahote is lonely.

**Score Point 1 (out of 2 points)**

This response makes a valid inference from the text to explain why Gustahote is lonely while he’s an Earth creature (*he has no one to talk to and everyone is busy*); however, the response does not provide two details from the text for support as required by the prompt.
What makes Gustahote lonely while he’s an Earth creature? Use **two** details or examples from the passage to support why Gustahote is lonely.

Gustahote is lonely because he wants to be mightier and stronger. Also, he wants to be different but learn it is not always fun being a river, bird, or a creature. Gustahote is happy to be him.

**Score Point 0 (out of 2 points)**

This response is inaccurate (*because he wants to be mightier and stronger*) and does not address any of the requirements of the prompt.
The Unfortunate Fireflies

by Clara Dillingham Pierson

SEVERAL very large families of Fireflies lived in the marsh and were much admired by their friends who were awake at night. The older Fireflies told the younger ones that they should get all the sleep they could during the daytime if they were to flutter and frisk all night. Most of them did this, but two young Fireflies, who cared more about seeing the world than they did about minding their elders, used to run away while the rest were dreaming. Each thought herself very important, and was sure that if the others missed her they wouldn’t sleep a wink all day.

One night they planned to go by daylight to the farthest corner of the marsh. They went to bed when the rest did and pretended to fall asleep. When she was sure that the older Fireflies were dreaming, one of them reached over with her right hind leg and touched the other just below the edge of her left wing-cover. “Are you ready?” she whispered.

“Yes,” answered the friend, who happened to be the smaller of the two.

When well away from their sleeping relatives, they lifted their wing-covers, spread their wings, and flew.

“Oh, wouldn’t they make a fuss if they knew!” exclaimed the Larger Firefly.

“They think we need to be told every single thing,” said the Smaller Firefly.

Just then a Flycatcher darted toward them and they had to hide. He had come so near that they could look down his throat as he flew along with his beak open. The Fireflies were so scared that their feelers shook.

“I wish that bird would mind his own business,” grumbled the Larger Firefly.

“That’s just what he was doing,” said a voice beside them, as a Garter Snake drew himself through the grass. Then their feelers shook again, for they knew that snakes do not breakfast on grass and berries.

“Did you ever see such luck?” said the Smaller Firefly. “If it isn’t birds it is snakes.”

“Perfectly dreadful!” answered the other. “I never knew the marsh to be so full of horrid people.”

Then they reached the farther corner of the marsh and crawled around to see what they could find. Their eyes bothered them so that they could not see unless they were
close to things, so it was useless to fly. They peeped into the cool dark corners under the skunk cabbage leaves, and lay down to rest on a bed of soft moss.

13 While they were resting, they noticed a plant growing near. It had a flower of green and dark red which was unlike any other blossom they had ever seen. Each leaf was stiff and hollow and grew right out of the ground instead of coming from a stalk.

14 “I’m going to crawl into one of them,” said the Larger Firefly. She balanced herself on the top of a fresh green leaf.

15 “I’m going into this one,” said the other Firefly, as she alighted on the edge of a brown-tipped leaf. “It looks nice and dark inside.” Each dropped quickly into her own leaf.

16 Then there was a queer sputtering, choking voice in the fresh green leaf and exactly the same in the brown-tipped one. After that a weak little voice in the green leaf said, “I fell into water.”

17 Another weak voice from the brown-tipped one replied, “So did I.”

18 On the inside of each leaf were many stiff hairs, all pointing downward. Now that they wanted to get out, these same hairs stuck into their eyes and pushed against their legs and made them exceedingly uncomfortable.

19 After a while they gave up trying to get out until they should be rested. It was after sunset when they tried the last time, and the light that shone from their bellies brightened the little green rooms where they were. They went at it carefully. Slowly, one foot at a time, they managed to climb out of the doorway at the top. As they came out, they heard the squeaky voice of a young Mouse say, “Oh, where did those bright things come from?”

20 They also heard his mother answer, “Those are only a couple of foolish Fireflies who have been in the leaves of the pitcher-plant all day.”

21 They flew toward home. “I’m dreadfully tired,” said one, “but I suppose we shall have to dance in the air with the rest or they will make a fuss.”

22 “Yes,” said the other. “It spoils everything if we are not there.”

23 As they came near the middle of the marsh they were surprised to see the mild summer air twinkling with hundreds of tiny lights as their friends and relatives flew to and fro in the dusk. “Well,” said the Larger Firefly, “I think they might have waited for us!”

24 “Humph!” said the Smaller Firefly. “If they can’t be more polite than that, I won’t play.”

25 So two very tired and cross young Fireflies sat on a last year’s cat-tail and sulked. “We were not even missed!” they cried.

26 They were much wiser after that, for they had learned that two young Fireflies were not so wonderfully important after all. And that if they chose to do things which it was never meant young Fireflies should do, they would be likely to have a very disagreeable time, but that other Fireflies would go on eating and dancing and living their own lives. To be happy, they must keep the Firefly laws.
Explain why the young fireflies complain about the older fireflies. Use two details from the passage to support your answer.

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MEASURES CCLS: RL.5.1, RL.5.2, RL.5.3:

RL.5.1: Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text.

RL.5.2: Determine a theme of a story, drama, or poem from details in the text, including how characters in a story or drama respond to challenges or how the speaker in a poem reflects upon a topic; summarize the text.

RL.5.3: Compare and contrast two or more characters, settings, or events in a story or drama, drawing on specific details in the text (e.g., how characters interact).

HOW THIS QUESTION MEASURES RL.5.1, RL.5.2, and RL.5.3:

The question measures RL.5.1 and RL.5.3 because it asks students to quote accurately from the text in order to explain a relationship between two groups of characters. In addition, this relationship is a central idea of the story, so depending on how students choose to answer the question, it can also measure RL.5.2.

CHARACTERISTICS OF RESPONSES RECEIVING FULL CREDIT:

This question asks students to use textual details to demonstrate an understanding of the fireflies’ motivation, a central idea because of its central connection to the actions, consequences, and message of the story. A satisfactory response to this question demonstrates the ability to connect characters’ thoughts and feelings to relationships, actions, and themes. The young fireflies see themselves as equal to the older ones in both knowledge and ability, which leads to calamitous results. While correct responses may vary, the student must support their analysis with relevant, concrete details or examples from the text.
Some possible text-supported responses are:

- The young fireflies are interested in a more exciting life.
- The young fireflies resent being told what to do.
- The young fireflies see themselves as the center of the community, while the older ones don’t even notice they are gone.
- The young fireflies are anxious for increased independence.

There is no single “correct” response, but rather responses that are defensible based on the Short-Response (2-Point) Holistic Rubric, and responses that are not. Student responses are evaluated on the relevance, accuracy, and sufficiency of details selected from the text and the organization of details in a logical manner. Student responses should include relevant inferences and conclusions. Responses should be in complete sentences where errors, if present, do not impact readability.

SAMPLE STUDENT RESPONSES AND SCORES APPEAR ON THE FOLLOWING PAGES:
Score Point 2 (out of 2 points)
This response makes valid inferences from the text to explain why the young fireflies complain about the older fireflies (they always follow the rules and they do not miss them when they are gone). The response provides a sufficient number of concrete details from the text for support as required by the prompt (They think we need to be told every single thing, when they get back from their adventure the fireflies did not change routines or look for them. So very tired and cross young fireflies sulked on last years cat-tail "We were not even missed!"). This response includes complete sentences where errors do not impact readability.
Score Point 2 (out of 2 points)

This response makes a valid inference from the text to explain why the young fireflies complain about the older fireflies (the older fireflies always tell them what to do). The response provides a sufficient number of concrete details from the text for support as required by the prompt (they told them to sleep during the day not night and no one misses them when they are gone). This response includes complete sentences where errors do not impact readability.
The young fireflies complain about the older fireflies because they think the older fireflies are unfun so they head out in the day disobeying the older fireflies.

Score Point 1 (out of 2 points)
This response makes a valid inference from the text to explain why the young fireflies complain about the older fireflies (they think the older fireflies are unfun); however, the response provides only one concrete detail from the text for support (so they head out in the day disobeying the older fireflies).
Explain why the young fireflies complain about the older fireflies. Use two details from the passage to support your answer.

They complain because the older flies didn’t miss them.

Score Point 1 (out of 2 points)
This response makes a valid inference from the text to explain why the young fireflies complain about the older fireflies (the older flies didn’t miss them); however, the response does not provide two details from the text for support as required by the prompt.
Explain why the young fireflies complain about the older fireflies. Use two details from the passage to support your answer.

One young fireflies (complain) about the old fireflies for example young fireflies cant fly yet another example is young fireflies cant light up yet.

Score Point 0 (out of 2 points)
This response is totally inaccurate (young fireflies cant fly yet).
In the beginning of each passage, both Gustahote and the Fireflies believe something about themselves that is not true. Write a response comparing and contrasting what the characters believe at the beginning of the passages. Explain when the lessons are learned and how the characters have changed. Use details from both passages to support your answer.

In your response, be sure to
• compare and contrast what the characters believe at the beginning of passages
• explain when the lessons are learned
• describe how the characters change
• use details from both passages to support your answer
MEASURES CCLS: RL.5.1, RL.5.2, RL.5.9, AND W.5.2:

RL.5.1: Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text.

RL.5.2: Determine a theme of a story, drama, or poem from details in the text, including how characters in a story or drama respond to challenges or how the speaker in a poem reflects upon a topic; summarize the text.

RL.5.9: Compare and contrast stories in the same genre (e.g., mysteries and adventure stories) on their approaches to similar themes and topics.

W.5.2: Write informative/explanatory texts to examine a topic and convey ideas and information clearly.

HOW THIS QUESTION MEASURES RL.5.1, RL.5.2, RL.5.9 and W.5.2:

The question measures students’ mastery of RL.5.9 and W.5.2 by asking them to create a coherent essay that compares how two passages of the same genre develop similar themes through the experiences of their central characters. It also measures RL.5.1 and RL.5.2 because the response requires the student to provide relevant quotes from the text to support analysis and inferences that discuss major themes developed through the way characters change in response to challenges they face in each story.

CHARACTERISTICS OF RESPONSES RECEIVING FULL CREDIT:

A complete and accurate response to this question shows students’ ability to discuss the underlying themes of the two stories. Each story provides a clear example of characters who undergo changes as a result of experiences. A student who can trace, explain, and compare those changes demonstrates an understanding of the essential message of each story. While student responses may vary greatly, the essays are rated on insight, support, organization, and grade-appropriate use of conventions and vocabulary.

Comparisons that the texts clearly support include:

- The fireflies and Gustahote learn to be satisfied with their own lives through different experiences.
- The fireflies and Gustahote learn to be more realistic about their own capabilities.
- The fireflies and Gustahote encounter difficult and painful situations for different reasons.
- The fireflies and Gustahote learn a lesson when they are ignored by others.
- The two stories are about very different types of characters who learn the importance of appreciating what they have.

Other statements of comparison that include relevant text-based support may be used as a basis for analysis. There is no single “correct” response, but rather responses that sufficiently and clearly develop the topic based on the four overarching criteria in the Extended-Response (4-Point) Holistic Rubric, and responses that do not. Student responses are evaluated on the relevance, accuracy, and sufficiency of details selected from the text and the organization of details in a logical manner. Student responses should include an introductory and concluding comment and relevant inferences and conclusions. Responses should be in complete sentences where errors, if present, do not impact readability.

SAMPLE STUDENT RESPONSES AND SCORES APPEAR ON THE FOLLOWING PAGES:
In the beginning of each passage, both Gustahote and the Fireflies believe something about themselves that is not true. Write a response comparing and contrasting what the characters believe at the beginning of the passages. Explain when the lessons are learned and how the characters have changed. Use details from both passages to support your answer.

In your response, be sure to
• compare and contrast what the characters believe at the beginning of passages
• explain when the lessons are learned
• describe how the characters change
• use details from both passages to support your answer

In the beginning, they were foolish, but they then learned a lesson. In the beginning of the story, the rock thinks he can do better than being a rock, so he tries different things (river, bird, earth creature). The Fireflies believe that they shouldn’t listen to their elders and sleep during the day, but to go explore the far corners of their marsh. The Fireflies learned their lesson by when they came back from exploring, no one waited for them to play and fly with them. The rock learned his
Score Point 4 (out of 4 points)

This response clearly introduces a topic in a manner that follows logically from the task and purpose (In the beginning, they were foolish, but they then learned a lesson). The response demonstrates insightful comprehension and analysis of the texts (the rock thinks he can do better than being a rock, so he tries different things and The Fireflies believe that they shouldn’t listen to their elders and sleep during the day, but to go explore the far corners of their marsh). The topic is developed with relevant, well-chosen facts from the texts (river, bird, earth creature and when they came back from exploring, no one waited for them to play and fly with them). Varied, relevant evidence is sustained throughout (when he tried being different things, and was not satisfied and he heard a voice that said, “Be content, O Gustahote the Rock!”). The response exhibits clear, purposeful organization, and skillfully links ideas using grade-appropriate words and phrases (In the beginning, After, when). The language is stylistically sophisticated with domain-specific vocabulary (They changed because they learned from what they did. The Fireflies learned to listen to their elders, and the Rock learned to be content being a Rock). The response provides a concluding statement that follows from the topic and information presented (The three characters all learned a lesson). The response demonstrates grade-appropriate command of conventions, with few errors.
In the beginning of each passage, both Gustahote and the Fireflies believe something about themselves that is not true. Write a response comparing and contrasting what the characters believe at the beginning of the passages. Explain when the lessons are learned and how the characters have changed. Use details from both passages to support your answer.

In your response, be sure to:

- compare and contrast what the characters believe at the beginning of passages
- explain when the lessons are learned
- describe how the characters change
- use details from both passages to support your answer
Score Point 4 (out of 4 points)

This response clearly introduces a topic in a manner that follows logically from the task and purpose (both... believe something about themselves that is not true). The response demonstrates insightful comprehension and analysis of the texts (When they arrive they realize that they aren't important after all. Gustahote realized that he should love who he is he has to realize only he can be him). The topic is developed with relevant, well-chosen facts from the texts (if they run away the others would miss them and they would not sleep and if he doesn't work out with being a river, bird, or earth creature then he has to just be what he is, a rock). The response exhibits clear, purposeful organization, and skillfully links ideas using grade-appropriate words and phrases (In the beginning, In conclusion). The language used is stylistically sophisticated with domain-specific vocabulary (always listen to their elders because the elders have experience and know what is right). The response provides a concluding statement that follows from the topic and information presented (you should always listen to the person in charge in life). The response demonstrates grade-appropriate command of conventions, with occasional errors that do not hinder comprehension.
In the beginning of each passage, both Gustahote and the Fireflies believe something about themselves that is not true. Write a response comparing and contrasting what the characters believe at the beginning of the passages. Explain when the lessons are learned and how the characters have changed. Use details from both passages to support your answer.

In your response, be sure to

• compare and contrast what the characters believe at the beginning of passages
• explain when the lessons are learned
• describe how the characters change
• use details from both passages to support your answer
The two young fireflies learned their lessons at the end of the story. They learned that two young fireflies are not so important and to be happy, they must keep the firefly laws. So those are the lessons that those to animals learned and if they want to be happy they must follow the laws.

Score Point 3 (out of 4 points)
This response clearly introduces a topic in a manner that follows from the task and purpose (Gustahote believed that he wasn’t strong and that he wanted to be something stronger and mightier. The two young fireflies believed that seeing the world is much more important than respecting their elders). The response demonstrates grade-appropriate comprehension and analysis of the texts (Gustahote learned his lesson at the end and when a voice whispered to be content). The use of relevant evidence is sustained throughout (The two young fireflies learned their lessons at the end and They learned that two yound fireflys are not so important and to be happy, they must keep the firefly laws). The response exhibits clear organization, and links ideas using grade-appropriate words and phrases (In the beginning, So, if). The language is grade-appropriate with domain-specific vocabulary (Gustahote listened and now he still guards the valley). The response provides a concluding statement that follows from the topic and information presented (So those are the lessons that those to animals learned and if they want to be happy they must follow the laws). The response demonstrates grade-appropriate command of conventions, with occasional errors (yound and fireflys) that do not hinder comprehension.
In the beginning of each passage, both Gustahote and the Fireflies believe something about themselves that is not true. Write a response comparing and contrasting what the characters believe at the beginning of the passages. Explain when the lessons are learned and how the characters have changed. Use details from both passages to support your answer.

In your response, be sure to

• compare and contrast what the characters believe at the beginning of passages
• explain when the lessons are learned
• describe how the characters change
• use details from both passages to support your answer
Score Point 3 (out of 4 points)

This response clearly introduces a topic in a manner that follows from the task and purpose (Gustahote beleved he wasn’t strong and the fireflies belived disrespecting thiere elders). The response demonstrates grade-appropriate comprehension and analysis of the texts (Their fellings are the same because they both fell the need to do it and they are different because the Rock felt bad and the fireflies felt good). The topic is developed with relevant facts and information from the texts (the Rock learned that he is content just the way he is and the Fireflies learned to respect and listen to their elders). The response exhibits clear organization, and links ideas using grade-appropriate words and phrases (In the beginning, At the end). The language is grade-appropriate with domain-specific vocabulary (weak in the beginning and he felt strong at the end). The response provides a concluding statement that follows from the topic and information presented (That’s how the Rock and the fireflies changed from the beggining and the end). The response demonstrates grade-appropriate command of conventions, with occasional errors (beleved, thiere, fellings) that do not hinder comprehension.
In the beginning of each passage, both Gustahote and the Fireflies believe something about themselves that is not true. Write a response comparing and contrasting what the characters believe at the beginning of the passages. Explain when the lessons are learned and how the characters have changed. Use details from both passages to support your answer.

In your response, be sure to
• compare and contrast what the characters believe at the beginning of passages
• explain when the lessons are learned
• describe how the characters change
• use details from both passages to support your answer

Gustahote believed that he wasn’t mighty or strong. First he wanted to be like the river that flows in the valley. Then he wanted to soar high in the sky like the birds. Next, he wanted to be a creature that roamed around on earth. Finally, he realized that he is mighty and strong.

The fireflies believed that it was better to go out in the day instead of night. One day, they went out on an adventure when a flycatcher came after them so they had to hide. Then, they saw a snake and they had to hide again. They finally learned their lesson that it was safer to go out at night with their
Score Point 2 (out of 4 points)

This response introduces a topic in a manner that follows generally from the task and purpose (Gustahote believed that he wasn’t mighty or strong and The fireflies believed that it was better to go out in the day instead). The response demonstrates a literal comprehension of the texts (First he wanted to be like the river, to be a creature, One day they went out on an adventure). The topic is partially developed with the use of some textual evidence (he realized that he is might and strong and When a flycatcher came after them so they had to hide. Then they saw a snake). The response exhibits clear organization, and links ideas using grade-appropriate words and phrases (Then, Next, Finally). The response provides a concluding statement follows generally from the topic and information presented (They finally learned their lesson that it was safer to go out at night with their relatives). The response demonstrates grade-appropriate command of conventions, with occasional errors that do not hinder comprehension.
In the beginning of each passage, both Gustahote and the Fireflies believe something about themselves that is not true. Write a response comparing and contrasting what the characters believe at the beginning of the passages. Explain when the lessons are learned and how the characters have changed. Use details from both passages to support your answer.

In your response, be sure to
• compare and contrast what the characters believe at the beginning of passages
• explain when the lessons are learned
• describe how the characters change
• use details from both passages to support your answer

Score Point 2 (out of 4 points)

This response introduces a topic in a manner that follows generally from the task (Gustahote wants to be mighty and strong, and the firefly thinks that if they get lost everybody would search for them). The response demonstrates a literal comprehension of the texts (learned his lesson and the fireflies realized). The response demonstrates a literal understanding of the texts and partially develops with some textual evidence (he realized how important he was and not to disobey there elders). The response exhibits some attempt at organization and inconsistently links ideas using words and phrases (Both charrecters). The response provides a concluding statement follows generally from the topic and information presented (changed because they became a lot wiser). The response demonstrates emerging command of conventions, with some errors (they, there, charrecters, alot) that may hinder comprehension.
In the beginning of each passage, both Gustahote and the Fireflies believe something about themselves that is not true. Write a response comparing and contrasting what the characters believe at the beginning of the passages. Explain when the lessons are learned and how the characters have changed. Use details from both passages to support your answer.

In your response, be sure to:
• compare and contrast what the characters believe at the beginning of passages
• explain when the lessons are learned
• describe how the characters change
• use details from both passages to support your answer

Score Point 1 (out of 4 points)

This response introduces a topic in a manner that follows generally from the task (In the beginning they both thought they could go through more than they actually could). The response demonstrates little understanding of the texts (The fireflies think that they could go out and explore the world). Ideas are developed using minimal evidence (They end up learning the hard way when they almost get caught by the bird and then get stuck in the leave). Gustahote wants to be mightier and stronger so he becomes things and creatures in the wild. No concluding statement is provided. The response demonstrates emerging command of conventions, with some errors (begginning, could, leave) that may hinder comprehension.
In the beginning of each passage, both Gustahote and the Fireflies believe something about themselves that is not true. Write a response comparing and contrasting what the characters believe at the beginning of the passages. Explain when the lessons are learned and how the characters have changed. Use details from both passages to support your answer.

In your response, be sure to
• compare and contrast what the characters believe at the beginning of passages
• explain when the lessons are learned
• describe how the characters change
• use details from both passages to support your answer

Score Point 1 (out of 4 points)

This response introduces a topic in a manner that follows generally from the task (Gustahote believes that he can be a river). The response demonstrates little understanding of the texts (They changed following what they supposed do). Ideas are developed using minimal evidence (If I could be the wide river that flows through the valley, "he said. If I could be that only river!"). This response exhibits little attempt at organization, and lacks the use of linking words to connect ideas. This response provides a concluding statement that is unrelated to the topic and information presented (That is my essay). This response demonstrates emerging command of conventions, with some errors (belive and they supposed do) that may hinder comprehension.
In the beginning of each passage, both Gustahote and the Fireflies believe something about themselves that is not true. Write a response comparing and contrasting what the characters believe at the beginning of the passages. Explain when the lessons are learned and how the characters have changed. Use details from both passages to support your answer.

In your response, be sure to
• compare and contrast what the characters believe at the beginning of passages
• explain when the lessons are learned
• describe how the characters change
• use details from both passages to support your answer

Score Point 0 (out of 4 points)

This response demonstrates a lack of comprehension of the task. (They are the same by talking about a life lesson). The response provides no evidence. The response exhibits no evidence of organization or use of linking words. This response uses imprecise language (The charters change by the way they reacted) and does not provide a concluding statement. This response demonstrates a lack of command of conventions, with frequent errors (gonna, two story, lesson The, charters) that hinder comprehension.