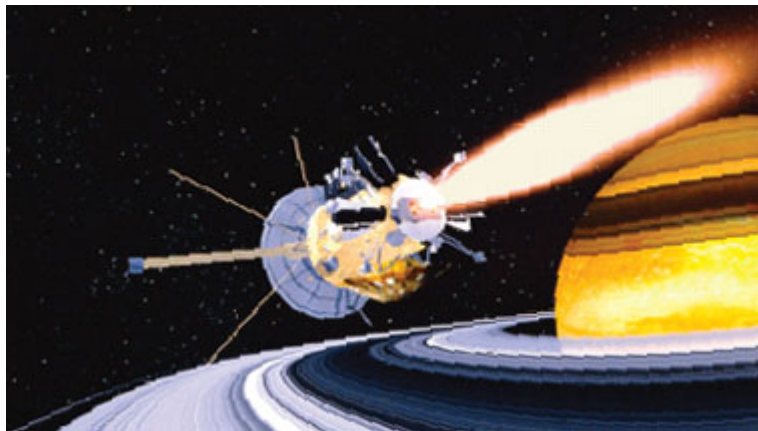


Loopy Loops

Spacecraft uncovers surprises about Saturn's rings.

Scientists studying Saturn have the inside scoop on the planet's hoops. NASA, the U.S. space agency, is using the spacecraft *Cassini* to learn more about Saturn's rings. *Cassini* recently discovered how the rings **orbit** the planet, and it's a bumpy ride! To orbit is to circle.



Getty Images

Cassini circles the ringed planet.

Saturn has seven major rings. The loops **consist** of chunks of ice (see below). To consist is to be made of. The rings look smooth and flat in most pictures, like a CD. However, data from *Cassini* shows that the pieces of frozen water continuously crash into one another, like bumper cars. That makes for a rough orbit.

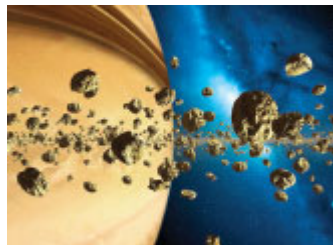


Photo Researchers, Inc.

There are huge gaps of up to thousands of miles between each of Saturn's rings. *Cassini* discovered that **moonlets** travel inside those gaps. A moonlet is a small moon. The moonlets cause Saturn's rings to ripple like waves, explains Jeff Cuzzi. He is a NASA scientist.

"The normally very flat rings get flipped up ... to the height of a mountain," Cuzzi told *WR News*. "[They flop] around like water in a huge tank."

Experts are excited about *Cassini's* loopy findings. The spacecraft has been studying Saturn since 2004. It is still orbiting the planet today. Scientists hope *Cassini* will help them figure out how old Saturn's rings are. "Saturn is really unique," Cuzzi says. "We expect to see lots more changes in the ... planet and the rings."

Rings and Things

Searching for far-out facts about Saturn? Keep reading to learn more about the ringed planet.

Great Big Space



Saturn is the second-largest planet in our solar system, after Jupiter. Its **diameter**, or distance across, is 74,975 miles. That's bigger than nine Earths!

*Photo
Researchers,
Inc.*

Saturn's Story



Galileo (ga-luh-LEE-oh) discovered Saturn's rings in 1610. Using a telescope, he noticed "bulges" around the planet. Nearly 50 years later, another expert determined those bulges were rings.

WR News

Wild Weather



NASA

Boom! Electrical storms on Saturn can spark lightning bolts 10,000 times more powerful than those on Earth. Winds can reach up to 1,100 miles per hour.

Name: _____

Date: _____

1. Who first discovered Saturn's rings?

- A astronauts on the spacecraft *Cassini*
- B NASA scientists
- C Jeff Cuzzi
- D Galileo

2. Which of the following happens last in the text?

- A The author describes the moonlets that orbit Saturn.
- B The author describes different facts about Saturn.
- C The author describes the spacecraft *Cassini*.
- D The author describes the rings of Saturn.

3. It can be inferred from the passage that

- A the ice that makes up the rings of Saturn is probably going to melt
- B NASA will send *Cassini* to Saturn again for more research
- C there is still a lot to learn about Saturn
- D scientists will stop studying Saturn very soon

4. Read the following sentence from the passage. "Experts are excited about *Cassini's* loopy findings."

The author uses the phrase "loopy findings" to show that

- A the spacecraft is silly
- B Saturn has seven major rings
- C the spacecraft has discovered interesting facts about Saturn's rings
- D Saturn's rings are smooth and flat in most places

5. The main idea of this passage is that

- A Saturn is a very loopy planet
- B scientists have recently made new discoveries about Saturn
- C Saturn is the second-largest planet in our solar system
- D Saturn has seven major rings

6. Using details from the text, describe what *Cassini* was able to show scientists about Saturn's rings.

7. Why would it be too dangerous for a human astronaut to go to Saturn to learn about the planet? Use evidence from the text to support your answer.

8. The question below is an incomplete sentence. Choose the word that best completes the sentence.

_____ Galileo discovered Saturn's rings in 1610, it took another 50 years to determine the bulges he saw were rings.

- A So
- B Before
- C Since
- D After

9. Answer the following questions based on the sentence below.

NASA sent the spacecraft *Cassini* into outer space to get more information about Saturn and its rings.

What? NASA

(did) What? _____

Why? _____

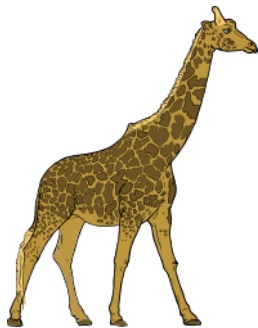
10. Read the vocabulary word and definition below, and complete questions 10a, 10b, and 11.

Vocabulary Word: unique (u · nique): very special or one of a kind.

10a. Read the sentences below and underline the word **unique**.

1. The singer's voice is unique in that she can sing both extremely high and extremely low.
2. I wore such a unique Halloween costume that no one could figure out who I was.
3. The paintings that I made in art class are unique.
4. The camel is unique for having such long eyelashes to protect its eyes from the sand.
5. Each person's signature is very difficult to copy because it is unique.

10b. Which of the following images shows a unique species of animal?



11. Is a yellow #2 pencil unique? Why or why not?

Teacher Guide & Answers

Passage Reading Level: Lexile 740

Passage Text Structure: Descriptive – the writer explains, defines, or illustrates a concept or topic

Passage Summary: This passage describes recent discoveries about Saturn. The spacecraft *Cassini* was sent by NASA to orbit Saturn and gather data, and there were several new findings about Saturn's rings.

1. Who first discovered Saturn's rings?

- A astronauts on the spacecraft *Cassini*
- B NASA scientists
- C Jeff Cuzzi
- D **Galileo**

2. Which of the following happens last in the text?

- A The author describes the moonlets that orbit Saturn.
- B **The author describes different facts about Saturn.**
- C The author describes the spacecraft *Cassini*.
- D The author describes the rings of Saturn.

3. It can be inferred from the passage that

- A the ice that makes up the rings of Saturn is probably going to melt
- B NASA will send *Cassini* to Saturn again for more research
- C **there is still a lot to learn about Saturn**
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4. Read the following sentence from the passage. "Experts are excited about *Cassini's* loopy findings." The author uses the phrase "loopy findings" to show that

- A the spacecraft is silly
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5. The main idea of this passage is that

- A Saturn is a very loopy planet
- B **scientists have recently made new discoveries about Saturn**
- C Saturn is the second-largest planet in our solar system
- D Saturn has seven major rings

6. Using details from the text, describe what *Cassini* was able to show scientists about Saturn's rings.

Suggested answer: *Cassini* showed scientists that the chunks of ice that make up the seven rings of Saturn are crashing into each other all the time. *Cassini* also found that there are small moons travelling around Saturn between Saturn's rings. [see paragraph #2]

7. Why would it be too dangerous for a human astronaut to go to Saturn to learn about the planet? Use evidence from the text to support your answer.

Suggested answer: The passage states that there are storms on Saturn with lightning 10,000 times stronger than on Earth and winds of up to 1,100 miles per hour. It would be difficult for a human to survive such storms. [see paragraph #9]

8. The question below is an incomplete sentence. Choose the word that best completes the sentence.

_____ Galileo discovered Saturn's rings in 1610, it took another 50 years to determine the bulges he saw were rings.

- A** So
- B** Before
- C** Since
- D** After

9. Answer the following questions based on the sentence below.

NASA sent the spacecraft *Cassini* into outer space to get more information about Saturn and its rings.

What? NASA

(did) What? **sent the spacecraft *Cassini* into outer space**

Why? **to get more information about Saturn and its rings**

10. ReadWorks recommends that you teach this vocabulary word to the whole class out loud using the four steps listed below.

Vocabulary Word: unique

Step 1: Introduce the word

- a. Teacher writes the word on the board and divides it into syllables: (u · nique)
- b. Teacher says: "This word is unique. What is the word?" [All students reply together out loud: "unique."]

Step 2: Provide a child-friendly definition

- a. Teacher says: "Unique means very special or one of a kind."
- b. Teacher says: "The text states that Saturn is unique. This means that it is a special planet unlike any other. Unique means very special or one of a kind."
- c. Teacher says: "What is the word?" [All students reply together out loud: "unique."]

Step 3: Practice the word

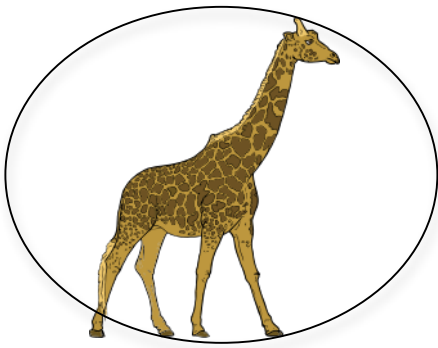
Teacher provides examples and additional opportunities to repeat the word. Read the first sentence out loud to your students. Begin reading it again and when you come to the vocabulary word, prompt students to say the vocabulary word out loud. Then, finish reading the sentence out loud to your students.

- 10a.**
1. The singer's voice is unique in that she can sing both extremely high and extremely low.
 2. I wore such a unique Halloween costume that no one could figure out who I was.
 3. The paintings that I made in art class are unique.
 4. The camel is unique for having such long eyelashes to protect its eyes from the sand.
 5. Each person's signature is very difficult to copy because it is unique.

Step 4: Check for student understanding

This step can be completed as a whole class activity or as an independent practice.

- 10b.** Which of the following images shows a unique species of animal?



- 11.** Is a yellow #2 pencil unique? Why or why not?

Suggested answer: No, because it is very common, and there is nothing special about it.

Suggested Additional Vocabulary: orbit, consist, gaps