

■ Gravity: The Invisible Force

4th Grade Close Reading & Thinking Challenge

Name: _____

Date: _____

Read Closely!

Jump as high as you can and you will realize something is pulling you back toward the ground. You cannot see it, touch it, or hear it, but it is always there. An invisible force called **gravity**. It's one of the most important forces in our universe. Gravity keeps our feet on the ground, makes rain fall from the sky, and even holds the Moon as it travels around Earth. Get ready to explore the amazing force that keeps everything from floating away.

In the 1600s, an English scientist named **Isaac Newton** began studying the mysterious force that pulled objects downward. One story says that Newton saw an apple fall from a tree. He wondered why the apple fell straight down instead of floating away. His questions led him to an amazing idea: Earth pulls objects toward itself for some reason. Newton discovered that gravity is not just something that makes apples fall but it is a force that reaches every corner of the universe.

Everything that has mass has gravity. The more mass something has, the more gravity it has. Gravity does more than keep your feet on the ground; it also determines how much an object **weighs**. Imagine you weigh **100 pounds on Earth**. On the Moon you would weigh only about **16 pounds**! Talk about instant weight loss! This happens because the Moon has much weaker gravity than Earth. You are the same person and you still have the same amount of matter, or **mass**, but your weight would change because the Moon's gravity pulls on you less strongly.

Gravity doesn't stop here. It has a huge influence on planets, moons, and spacecraft and has an important role in space flight. When a spacecraft launches, it has to escape the Earth's strong pull. This is called **escape velocity**. A rocket has to be going at least 25,000 miles per hour to escape the Earth's gravitational pull. Even after reaching space, gravity still affects the spacecraft and astronauts. When astronauts appear to float, they are experiencing **microgravity**. *Micro* means very small.

Have you ever balanced a pencil on your finger and moved it back and forth until you found the perfect spot where it would stay balanced? That spot is connected to an object's **center of gravity**, the point where its weight is balanced. Now imagine trying the same trick with a hammer. Because a hammer has a heavy metal head on one end and a lighter handle on the other, its center of gravity is closer to the heavy end. You would have to find a different spot to balance it! Gravity is always pulling on every part of an object, and the center of gravity helps us understand where those pulls balance out.

■■ Gravity Detective Challenge

Use the article to prove your thinking. When a question asks for evidence, go back to the text and find the clue!

1. Key Details — Gravity Everywhere

Name three things gravity does. Write each one in your own words.

1. _____
2. _____
3. _____

2. Find the Evidence

What evidence from the article shows that gravity is invisible but still real?

3. Vocabulary Detective

The article says that gravity is a force. What does *force* most likely mean in this passage?

- A. A push or pull that can affect an object
- B. A loud sound
- C. A kind of machine
- D. A place in space

4. Newton's Big Question

What question did Isaac Newton wonder about when he saw the apple fall? Why was this question important?

5. Gravity & Weight — Think Like a Scientist

A person weighs 100 pounds on Earth but about 16 pounds on the Moon. Why does the person weigh less on the Moon?

6. Mass or Weight?

The person is still made of the same amount of matter on Earth and on the Moon. Is that describing mass or weight? Explain your answer.

7. Cause & Effect in Space

Why must a rocket travel extremely fast when it leaves Earth?

8. Vocabulary in Context

The prefix micro- means “very small.” Based on the article, what does microgravity mean?

9. Make an Inference

Why might astronauts seem to float inside a spacecraft even though gravity still affects them?

10. Center of Gravity Challenge

Why is the center of gravity of a hammer closer to its metal head than to its handle?

11. Compare & Explain

How would balancing a pencil be different from balancing a hammer? Use evidence from the article.

12. Big Idea — Explain Your Thinking

In 3–5 sentences, explain why gravity is important both on Earth and in space. Include at least two details from the article.

■ Gravity Mission: Exit Ticket

One last chance to show what you know!

Imagine you are explaining gravity to a younger student. Complete the sentences below.

Gravity is... _____

One surprising thing I learned is... _____

Gravity affects space travel because... _____

One question I still have about gravity is... _____

■ Bonus Brain Stretch

If you could visit the Moon, what is **one activity** you think would feel different because of the Moon's weaker gravity? Use what you learned in the article to explain your prediction.
