Paths Under Gravity

Use motion as evidence of gravity in space.

6.3 "Construct an evidence-based explanation of the role of gravity on the movement of natural and manmade objects within galaxies and the solar system."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline three observations of motion that provide evidence of gravity, and circle the source of gravity linked to each observation.

Why Space Objects Turn

1. On a clear night, stars can look fixed in place. Yet the Sun and billions of other stars move through the Milky Way galaxy. Astronomers track star positions and speeds over time. Their measurements show that many stars, including our Sun, travel around the galaxy's center. The stars do not fly straight out into space. Gravity from matter spread throughout the galaxy pulls them inward as they move forward. Their curved paths are evidence that gravity shapes motion on a galactic scale.

2. A comet gives another clue about gravity. It travels around the Sun on a long, stretched orbit. When the comet approaches the Sun, its path bends, and it speeds up. As it moves farther away, it slows down. Astronomers can record its position on different nights and compare the distances it travels in equal amounts of time. These changes are evidence that the Sun's gravity affects the comet's motion. The pull is stronger when the comet is closer, but its forward motion keeps it from falling straight into the Sun.

3. People also put objects into orbit. A rocket gives a satellite enough sideways speed high above Earth. After launch, the satellite keeps moving forward while Earth's gravity pulls it toward the planet. From the ground, observers can track the satellite as it repeatedly circles Earth instead of moving off in a straight line. Its curved path is evidence that gravity still acts on it, even far above the ground. Without that inward pull, the satellite would leave its orbit. A satellite needs no running engine to remain in orbit.

2 ANSWER WITH EVIDENCE

Use the passage

1. How do the paths of stars in the Milky Way provide evidence that gravity affects their motion?

2. What change in a comet's motion provides evidence that the Sun's pull is stronger when the comet is closer?

3. A satellite's engine is not running. What evidence shows that gravity still acts on the satellite?

4. How are the Sun's path through the galaxy and a satellite's path around Earth alike? What pulls each one inward?

3 YOUR TURN

Your own words

A new robotic probe passes close to Jupiter with its engine off. In four sentences, predict how its path changes and explain why, using evidence from both the comet and the satellite in the passage.

ANSWER KEY

Paths Under Gravity

GRADE 6 · 6.3

PART 1 · READ AND MARK

Underline three observations of motion that provide evidence of gravity, and circle the source of gravity linked to each observation. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	How do the paths of stars in the Milky Way provide evidence that gravity affects their motion?	**Many stars travel around the galaxy's center instead of moving straight out. Gravity from matter throughout the galaxy pulls them inward, curving their paths.**
2	What change in a comet's motion provides evidence that the Sun's pull is stronger when the comet is closer?	**The comet speeds up as it approaches the Sun and slows down as it moves farther away.**
3	A satellite's engine is not running. What evidence shows that gravity still acts on the satellite?	**Observers track the satellite repeatedly circling Earth instead of moving away in a straight line. Earth's gravity pulls it inward.**
4	How are the Sun's path through the galaxy and a satellite's path around Earth alike? What pulls each one inward?	**Both follow curved paths as they move forward. Matter throughout the galaxy pulls the Sun inward, while Earth pulls the satellite inward.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

As the probe passes Jupiter, its path bends toward the planet instead of staying straight. The comet's path bends as it approaches the Sun, showing that gravity can change direction. The satellite circles Earth without a running engine because Earth's gravity pulls it inward. In the same way, Jupiter's gravity can turn the probe while its engine is off.

For the marking job, accept the stars' travel around the galaxy's center, the comet's curved path or speed change, and the satellite's repeated orbit as observations. In Part 3, accept a path that curves toward Jupiter, supported by evidence about both passage objects.