Paths Through Space

Use observations to explain orbits.

E.6.8 "Students will demonstrate an understanding of Earth's place in the universe and the interactions of the solar system (sun, planets, their moons, comets..."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline two kinds of evidence scientists use to study motion in space. Circle each place the passage explains how gravity and forward motion work together.

Following a Comet

1. On a cold night, a comet can look like a fuzzy star with a long tail. A comet is a small body made of ice, dust, and rock. As it nears the Sun, some ice turns to gas and carries dust outward, making a glowing cloud and tail. Astronomers record the comet's position against distant stars over many nights. Its changing position shows that it moves. Repeated observations reveal a curved path around the Sun, rather than a straight trip across space.

2. Why does the comet follow that path? The Sun's gravity pulls the comet inward, while the comet's forward motion keeps it from falling straight into the Sun. Together, these produce an orbit. Scientists test this explanation by calculating where the comet should appear later, then comparing the prediction with telescope observations. A spacecraft can also measure a comet's changing speed and direction as it approaches and leaves the Sun. Matching predictions and measurements give scientists evidence that gravity shapes the comet's motion.

3. The same idea helps explain other motions, but not every object circles the Sun directly. Earth orbits the Sun, while the Moon orbits Earth because Earth's gravity pulls it inward as it moves forward. The Sun's gravity also affects the Moon as the whole Earth-Moon system travels around the Sun. Many asteroids orbit the Sun, too. Unlike icy comets, asteroids are mostly rock or metal. Telescope records and spacecraft measurements together help scientists compare these paths, even when the objects are too far away to visit.

2 ANSWER WITH EVIDENCE

Use the passage

1. Why does the comet follow a curved path instead of falling straight into the Sun?

2. Compare the comet's orbit with the Moon's orbit. What pulls each object inward?

3. How can scientists use a prediction and telescope observations to test an explanation of the comet's orbit?

4. What can spacecraft measurements show about a comet's motion that records of its position on different nights do not measure directly?

3 YOUR TURN

Your own words

Imagine scientists spot an object that might orbit a distant star. In 3 or 4 sentences, explain how it could stay in orbit and plan observations on different nights to test your model. State one result that would challenge your model.

ANSWER KEY

Paths Through Space

GRADE 6 · E.6.8

PART 1 · READ AND MARK

Underline two kinds of evidence scientists use to study motion in space. Circle each place the passage explains how gravity and forward motion work together. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	Why does the comet follow a curved path instead of falling straight into the Sun?	**The Sun's gravity pulls the comet inward, while its forward motion keeps it from falling straight into the Sun. Together, these produce a curved orbit.**
2	Compare the comet's orbit with the Moon's orbit. What pulls each object inward?	**The comet orbits the Sun and is pulled inward by the Sun's gravity. The Moon orbits Earth and is pulled inward by Earth's gravity.**
3	How can scientists use a prediction and telescope observations to test an explanation of the comet's orbit?	**They predict where the comet will appear later, then compare that position with telescope observations.**
4	What can spacecraft measurements show about a comet's motion that records of its position on different nights do not measure directly?	**A spacecraft can measure the comet's changing speed and direction as it approaches and leaves the Sun.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

The star's gravity could pull the object inward while its forward motion carries it along a curved orbit. I would record its position against distant stars on several nights and predict where it should appear next. I would then compare the new position with my prediction. A position far from the predicted path would challenge my model.

Accept models that combine gravity with forward motion and propose observations at different times. A challenging result should conflict with the student's predicted path.