

Orbit Motion Models

Use arrows to trace how gravity and inertia shape an orbit.

S6E1.d "Develop and use a model to explain the interaction of gravity and inertia that governs the motion of objects in the solar system."

NAME _____

DATE _____

1 READ AND MARK _____ Read it twice

YOUR JOB Underline each complete sentence that explains a gravitational force or its effect. Circle each complete sentence that explains inertia or forward motion caused by inertia, so you can compare the two parts of the model.

Why Planets Curve

- ① Scientists use models to show why planets travel in curved paths instead of moving straight ahead. In a simple motion model, a planet is shown with a forward arrow and an inward arrow pointing toward the Sun. The forward arrow represents inertia, an object's tendency to keep its current motion unless a force changes it. In space, a moving planet would continue forward in a straight line if no force acted on it. The inward arrow represents gravity, the force pulling the planet toward the Sun.
- ② Because gravity pulls inward, it continually changes a planet's direction of motion. A planet's inertia means it continues moving forward, so it does not fall straight into the Sun. Together, the forward motion and inward pull make a curved path called an orbit. A model can show this by placing equal-length forward arrows at several positions around the Sun. Each forward arrow points along the planet's path, while each gravity arrow points toward the Sun. The arrows change direction around the orbit, showing that gravity redirects the planet again and again.
- ③ This model also explains what happens when conditions change. If the Sun's gravity suddenly disappeared, the inward pull would stop. The planet's inertia would not push it outward, because inertia is not a force. Instead, the planet would continue in a straight line in the direction it was moving at that moment. A faster-moving object needs a stronger inward gravitational pull to follow the same curved path. Models help scientists compare these motion patterns in different systems.

2 ANSWER WITH EVIDENCE Use the passage

1 In the motion model, what does the forward arrow represent, and what does the inward arrow represent?

2 Use gravity and inertia to explain why a planet travels in a curved orbit instead of falling straight into the Sun.

3 According to the model, what path would a planet follow if the Sun's gravity suddenly disappeared? Explain why.

4 What does a faster-moving object need to follow the same curved path, according to the passage?

3 YOUR TURN Your own words

Create a two-panel arrow model for a moon moving past a planet. In Panel 1, show a forward motion arrow labeled "inertia, tendency to continue moving" and an inward arrow labeled "gravity force"; in Panel 2, show the moon's path after gravity is removed. Write one sentence explaining the path in Panel 2.

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PART 1 • READ AND MARK

Underline each complete sentence that explains a gravitational force or its effect. Circle each complete sentence that explains inertia or forward motion caused by inertia, so you can compare the two parts of the model. Accept any marking that follows this job and points at the right text.

PART 2 • ANSWERS

#	QUESTION	ANSWER
1	In the motion model, what does the forward arrow represent, and what does the inward arrow represent?	The forward arrow represents inertia, or the tendency to continue current motion. The inward arrow represents gravity pulling the planet toward the Sun.
2	Use gravity and inertia to explain why a planet travels in a curved orbit instead of falling straight into the Sun.	Inertia means the planet continues moving forward. Gravity pulls inward and continually changes its direction, making a curved orbit.
3	According to the model, what path would a planet follow if the Sun's gravity suddenly disappeared? Explain why.	It would travel in a straight line in the direction it was moving because the inward gravitational pull would stop and inertia would maintain its motion.
4	What does a faster-moving object need to follow the same curved path, according to the passage?	It needs a stronger inward gravitational pull.

PART 3 • YOUR TURN (SAMPLE ANSWER)

Panel 1: A moon moves past a planet with a forward arrow labeled "inertia, tendency to continue moving" and an inward arrow toward the planet labeled "gravity force." Panel 2: The moon follows a straight path after the gravity force is removed. Explanation: Without gravity, the moon continues straight in its current direction because inertia is its tendency to keep moving, not an outward push.

Accept models with a forward motion arrow and an inward gravity-force arrow aimed at the planet in Panel 1. In Panel 2, accept a straight path that continues in the moon's current direction and an explanation that does not describe inertia as a force.