Name _____

Orbiting the Sun: The Dance of Planets in Our Solar System

Open-Ended Response Answer Key

1. If the Sun's gravitational pull suddenly vanished, the planets would no longer be held in their orbits. They would continue to move in straight lines at a constant speed due to their inertia. The result would be a straight path away from the point where they were in their orbits at that moment.
2. Inertia is the tendency of objects to continue moving in a straight line at a constant speed unless acted upon by a force. In the context of planets, inertia keeps them moving forward in their orbits. Everyday examples of inertia include a car continuing to move when the brakes are applied, a ball rolling until friction slows it down, or a book staying at rest until someone pushes it.
3. Kepler's Laws of Planetary Motion are significant because they provided a mathematical framework to describe how planets move in their orbits. These laws have contributed to our understanding of planetary orbits by explaining that planets follow elliptical paths around the Sun, move faster when closer to the Sun, and have a specific mathematical relationship between their orbital periods and distances from the Sun. Kepler's laws have been fundamental in advancing our knowledge of celestial mechanics and continue to be used in astronomy today.
4. Principles of planetary motion and gravity would apply to spacecraft traveling between stars, just as they do within our solar system. Spacecraft would need to consider the gravitational influence of stars and other celestial bodies in the target solar system. Challenges would include calculating trajectories that avoid collisions with planets and maintaining stable orbits around the destination star. Navigating such journeys would require precise calculations, advanced technology, and extensive planning to ensure the safety and success of interstellar travel.