

Name _____

The Dance of Planets: How Gravity Shapes Their Orbits Around the Sun

Open-Ended Response Answer Key

1. A planet with twice the mass of Earth would have a stronger gravitational pull on the Sun, causing the Sun to move slightly in response. Additionally, the planet's greater mass would result in a smaller semi-major axis, leading to a more compact and slightly faster orbit around the Sun.
2. If a planet were to lose all its inertia while in orbit, it would stop moving forward and fall directly into the Sun due to the Sun's gravitational attraction. Without inertia to counteract gravity, the planet would follow a path of freefall toward the Sun.
3. Kepler's laws of planetary motion revolutionized our understanding of planetary orbits. They provided a mathematical framework to describe and predict the motion of planets around the Sun. These laws allowed astronomers to make accurate calculations of planetary positions and orbits, paving the way for the development of modern astronomy and our comprehension of the solar system's dynamics.
4. If the gravitational force between a planet and the Sun were weakened, the planet's orbit would expand, causing it to move farther from the Sun. The planet would follow a longer and more elongated elliptical path, with slower speeds at perihelion (closest approach) and faster speeds at aphelion (farthest point). The weakening of the gravitational force would alter the planet's orbital dynamics, but it would still maintain an elliptical orbit.

