Name _____

The Sun's Gravitational Dance: How it Shapes the Planets

Open-Ended Response Answer Key

1. The Sun's gravity plays a crucial role in maintaining the stability of our solar system. It keeps planets in their orbits, preventing them from drifting into space or colliding with each other. For example, Earth's orbit is shaped by the Sun's gravity, ensuring a consistent distance and temperature range. Similarly, the orbits of all planets and celestial bodies are influenced by the Sun's gravitational pull, creating a well-organized and predictable solar system.
2. Understanding the Sun's gravity is essential for space exploration. Spacecraft must account for the Sun's gravitational pull when plotting their courses through our solar system. Gravity assists from planets are used to alter spacecraft trajectories efficiently. Challenges include the need for precise calculations to achieve desired orbits and the risk of spacecraft being influenced by other celestial bodies' gravity if not properly controlled.
3. Solar tides on Earth are caused by the gravitational pull of the Sun. The Sun's gravity, although weaker than the Moon's, contributes to the rising and falling of ocean waters. Solar tides, along with lunar tides, create variations in sea levels. Their combined effects result in high and low tides. Solar tides are most evident during full moon and new moon phases when the Sun, Moon, and Earth align.
4. If the Sun's gravity were to suddenly disappear, the planets in our solar system would no longer be held in stable orbits. They would move in straight lines, tangential to their previous orbits, and travel in a straight path into space. This would disrupt the entire structure of our solar system, leading to chaos as planets and other celestial bodies drifted away from their former paths. The solar system as we know it would cease to exist.