

Name _____

Gravity Unveiled: Can It Exist Without Mass?

Open-Ended Response Answer Key

1. In deep space far from any massive objects, the spaceship would experience a negligible gravitational force. This is because gravity depends on the presence of mass, and in the absence of nearby mass, the gravitational force would be extremely weak or virtually nonexistent. The spaceship's occupants would likely feel weightless.
2. I would explain gravity as the invisible force that makes objects with mass attract each other. I would compare it to a magnet that pulls objects together but emphasize that it works for everything with mass, not just metal objects. I would also mention that the more massive an object is, the stronger its gravity, so it can pull other things more effectively.
3. Understanding the connection between gravity and mass is crucial in fields like astronomy and space exploration. It helps astronomers predict the behavior of celestial bodies, including how planets orbit stars and how galaxies interact. In space exploration, it's essential for spacecraft navigation and ensuring astronauts' safety during missions. Without this understanding, we wouldn't be able to explore and study the universe effectively.
4. The concept that gravity depends on mass directly relates to the way we experience weight on different planets or celestial bodies. The strength of gravity on a celestial body depends on its mass. Therefore, our weight would be different on a planet with more mass than on a planet with less mass. This variation in gravitational strength is why astronauts weigh less on the Moon, which has less mass than Earth, and more on massive planets like Jupiter. Gravity's dependence on mass directly affects our weight wherever we go in the universe.

