

Name _____

Why Do Objects of Different Masses Fall at the Same Rate in a Vacuum?

Open-Ended Response Answer Key

1. No, I would not expect the results to be the same on the Moon. While the principle that objects fall at the same rate in a vacuum still holds, the weaker gravity on the Moon would result in a slower rate of falling for both heavy and light objects compared to Earth. This is because the acceleration due to gravity on the Moon is about one-sixth that of Earth's.
2. Both objects will have the same acceleration due to gravity (9.8 m/s^2) and will increase their velocities as they fall. However, the heavier object will experience a stronger gravitational force, resulting in a greater resistance due to its higher mass. This means the heavier object will have a slightly lower acceleration and reach a higher terminal velocity compared to the lighter object.
3. Understanding this concept is crucial for scientists because it allows them to predict and interpret the behavior of objects in various gravitational environments accurately. It ensures that experiments and measurements are not influenced by the mass of the objects being studied and helps scientists make meaningful comparisons between different experiments.
4. Yes, one practical application is in astronaut training. Simulating microgravity on Earth requires creating conditions where objects fall at the same rate in a vacuum chamber, allowing astronauts to practice tasks in a controlled environment before going to space. This concept is also relevant in physics experiments involving free-fall and in designing spacecraft re-entry systems.

