

CHAPTER

7

Section 7-1 Quiz

Planetary Motion and Gravitation

1. Write Kepler's laws next to their respective numbers below.

1st _____

2nd _____

3rd _____

2. Mercury is 57.9×10^6 km from the Sun. Venus is 108.2×10^6 km from the Sun. If Venus has a period of 224.7 Earth days, how many Earth days does it take Mercury to make one trip around the Sun?

88 days

3. The Sun has a mass of 1.99×10^{30} kg. The planet Neptune has a mass of 1.03×10^{26} kg and is 4.50×10^{12} m from the Sun. Calculate the gravitational force between the Sun and Neptune.

6.75×10^{20} N

4. Describe the process and equipment Cavendish used to establish an experimental value for the universal gravitational constant.

CHAPTER

7

Section 7-2 Quiz

Using the Law of Universal Gravitation

1. Explain the conditions necessary for an object to attain and then stay in orbit around Earth.

2. What are the orbital speed (in m/s) and period (in seconds) of a satellite orbiting 350 km above the surface of Earth? Earth has a mass of 5.98×10^{24} kg and a radius of 6.38×10^6 m.

7698.5 m/s

5492.7 s

3. A satellite orbits Earth 270 km above Earth's surface. Calculate the acceleration due to gravity at this altitude.

9.02 m/s²

4. Briefly explain how Einstein's general theory of relativity accounts for gravity, both its causes and effects. In your answer, include an explanation of how the general theory of relativity differs from Newton's law of universal gravitation.

5) What is the acceleration due to gravity near the surface of the moon if an object that has a mass of 22.0 kg has a weight of 36.0 N near the moon's surface?

$$1.6 \text{ m/s}^2$$

6) What is the weight of a 72.0 kg object near the surface of the Moon?

$$117.8 \text{ N}$$

7) What is the acceleration due to gravity on the surface of the sun?

$$274 \text{ m/s}^2$$

8) The Earth orbits the Sun at a distance of 1.46×10^{10} m from center to center. What is the strength of the Sun's gravitational field at this distance?

$$0.62 \frac{\text{N}}{\text{Kg}}$$