

## Short Answer

### 7.1 Kepler's Laws of Planetary Motion 27.

Explain how the masses of a satellite and its parent body must compare in order to apply Kepler's laws of planetary motion.

- The mass of the parent body must be much less than that of the satellite.
- The mass of the parent body must be much greater than that of the satellite.
- The mass of the parent body must be equal to the mass of the satellite.
- There is no specific relationship between the masses for applying Kepler's laws of planetary motion.

28.

Hyperion is a moon of the planet Saturn. Its orbit has an eccentricity of 0.123 and a semi-major axis of  $1.48 \times 10^6 \text{ km}$ . How far is the center of the orbit from the center of Saturn?

- $1.82 \times 10^5 \text{ km}$
- $3.64 \times 10^5 \text{ km}$
- $1.20 \times 10^7 \text{ km}$
- $2.41 \times 10^7 \text{ km}$

29.

The orbits of satellites are elliptical. Define an ellipse.

- An ellipse is an open curve wherein the sum of the distance from the foci to any point on the curve is constant.
- An ellipse is a closed curve wherein the sum of the distance from the foci to any point on the curve is constant.
- An ellipse is an open curve wherein the distances from the two foci to any point on the curve are equal.
- An ellipse is a closed curve wherein the distances from the two foci to any point on the curve are equal.

30.

The planet Mars has two moons, Deimos and Phobos. Deimos orbits Mars every 1.26 days with an average radius of  $2.35 \times 10^3 \text{ km}$ . Phobos has an average orbit about four times greater in radius than Deimos. How long does it take for Phobos to make an orbit of Mars?

- 2.24 days
- 5.04 days
- 9.40 days
- 10.0 days

## 7.2 Newton's Law of Universal Gravitation and Einstein's Theory of General Relativity 31.

Newton's third law of motion says that, for every action force, there is a reaction force equal in magnitude but that acts in the opposite direction. Apply this law to gravitational forces acting between the Washington Monument and Earth.

- The monument is attracted to Earth with a force equal to its weight, and Earth is attracted to the monument with a force equal to Earth's weight. The situation can be represented with two force vectors of unequal magnitude and pointing in the same direction.
- The monument is attracted to Earth with a force equal to its weight, and Earth is attracted to the monument with a force equal to Earth's weight. The situation can be represented with two force vectors of unequal magnitude but pointing in opposite directions.
- The monument is attracted to Earth with a force equal to its weight, and Earth is attracted to the monument with an equal force. The situation can be represented with two force vectors of equal magnitude and pointing in the same direction.
- The monument is attracted to Earth with a force equal to its weight, and Earth is attracted to the monument with an equal force. The situation can be represented with two force vectors of equal magnitude but pointing in opposite directions.

32.

True or false—Gravitational force is the attraction of the mass of one object to the mass of another. Light, either as a particle or a wave, has no rest mass. Despite this fact gravity bends a beam of light.

- True
- False

33.

The average radius of Earth is  $6.37 \times 10^6 \text{ m}$ . What is Earth's mass?

- $9.35 \times 10^{17} \text{ kg}$
- $5.96 \times 10^{24} \text{ kg}$
- $3.79 \times 10^{31} \text{ kg}$
- $2.42 \times 10^{38} \text{ kg}$

34.

What is the gravitational force between two  $60.0 \text{ kg}$  people sitting  $100 \text{ m}$  apart?

- $2.4 \times 10^{-11} \text{ N}$
- $2.4 \times 10^{-9} \text{ N}$
- $3.6 \times 10^{-1} \text{ N}$

d.  $3.6 \times 10^1, \text{N}$