Multiple Choice

7.1 Kepler's Laws of Planetary Motion 20.

A planet of mass m circles a sun of mass M. Which distance changes throughout the planet's orbit?

a. $\overline{f_1 f_2}$

b. $\overline{mM}$

c. $\overline{Mf_2}$

d. $\overline{Mf_1}$

21.

The focal point of the elliptical orbit of a moon is 50,000\,\text{km} from the center of the orbit. If the eccentricity of the orbit is 0.25, what is the length of the semi-major axis?

a. 12,500\,\text{km}
b. 100,000\,\text{km}
c. 200,000\,\text{km}
d. 400,000\,\text{km}

22.

An artificial satellite orbits the Earth at a distance of 1.45×10^4 km from Earth's center. The moon orbits the Earth at a distance of 3.84×10^5 km once every 27.3 days. How long does it take the satellite to orbit the Earth?

a. 0.200 days
b. 3.07 days
c. 243 days
d. 3721 days

23.

Earth is 1.496×10^8 km from the sun, and Venus is 1.08×10^8 km from the sun. One day on Venus is 243 Earth days long. What best represents the number of Venusian days in a Venusian year?

a. 0.78 days
b. 0.92 days
c. 1.08 days
d. 1.21 days

7.2 Newton's Law of Universal Gravitation and Einstein's Theory of General Relativity 24.

What did the Cavendish experiment measure?

a. The mass of Earth

b. The gravitational constant
c. Acceleration due to gravity
d. The eccentricity of Earth's orbit

25.

You have a mass of 55 kg as measured by your bathroom scale, which is calibrated for Earth's gravity. You take the scale with you from Earth to a moon of Jupiter. When you weigh yourself at your destination, you appear to weigh only 6.9 kg. What is the acceleration due to gravity on this moon?

a. 0.810 m/s^2
b. 1.23 m/s^2
c. 5.39 m/s^2
d. 37.4 m/s^2

26.

A person is in an elevator that suddenly begins to descend. The person knows, intuitively, that the feeling of suddenly becoming lighter is because the elevator is accelerating downward. What other change would produce the same feeling? How does this demonstrate Einstein's postulate on which he based the theory of general relativity?

a. It would feel the same if the force of gravity suddenly became weaker. This illustrates Einstein's postulates that gravity and acceleration are indistinguishable.
b. It would feel the same if the force of gravity suddenly became stronger. This illustrates Einstein's postulates that gravity and acceleration are indistinguishable.
c. It would feel the same if the force of gravity suddenly became weaker. This illustrates Einstein's postulates that gravity and acceleration are distinguishable.
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