Chapter 10

ANSWERS

Multiple Choice Questions

1.	(a)	**2.**	(c)	**3.**	(a)	**4.**	(c)
5.	(d)	**6.**	(d)	**7.**	(c)	**8.**	(d)
9.	(b)	**10.**	(a)	**11.**	(d)	**12.**	(a)
13.	(a)	**14.**	(b)	**15.**	(d)		

Short Answer Questions

16. Gravitational force. This force depends on the product of the masses of the planet and sun and the distance between them.

17. Both stones will take the same time to reach the ground because the two stones fall from the same height.

18. The moon will begin to move in a straight line in the direction in which it was moving at that instant because the circular motion of moon is due to centripetal force provided by the gravitational force of earth.

19. The value of 'g' at the equator of the earth is less than that at poles. Therefore, the packet falls slowly at equator in comparison to the poles. Thus, the packet will remain in air for longer time interval, when it is dropped at the equator.

20. $g_e = g$ and $g_m = \frac{g}{6}$

Force applied to lift a mass of 15 kg at the earth, $F = m g_e = 15\ g_e$ N

Therefore, the mass lifted by the same force on the moon,

$$m = \frac{F}{g_m} = \frac{15 g}{\frac{g}{6}} = 90 \text{ kg}$$

21. $g = \frac{GM}{R^2}$ or $M = \frac{g \times R^2}{G} \Rightarrow$ Density $D = \frac{\text{mass}}{\text{volume}} = \frac{g \times R^2}{G \times V_e}$

(Where V_e is the volume of the earth)

or $$D = \frac{g \times R^2}{G \times \frac{4}{3}\pi R^3} = \frac{3g}{4\pi GR}$$

22. The gravitational force is responsible for providing the necessary centripetal force.

Long Answer Questions

23. Weight of an object is directly proportional to the mass of the earth and inversely proportional to the square of the radius of the earth. i.e.,

Weight of a body $\propto \frac{M}{R^2}$

Original weight $W_o = m\,g = m\,G\,\frac{M}{R^2}$

When hypothetically M becomes $4\,M$ and R becomes $\frac{R}{2}$

then weight becomes $W_n = m\,G\,\frac{4M}{(\frac{R}{2})^2} = (16\,m\,G)\frac{M}{R^2} = 16 \times W_o$

The weight will become 16 times.

24. $F \propto m_1 m_2$ and $F \propto \frac{1}{d^2}$

This hypothesis is not correct. The two bricks, like a single body, fall with the same speed to reach the ground at the same time in case of free-fall. This is because acceleration due to gravity is independent of the mass of the falling body.

25. $h_1 = \frac{1}{2} g t_1^2$ $\quad h_2 = \frac{1}{2} g t_2^2$, as $x = 0$

$\frac{t_1}{t_2} = \sqrt{\frac{h_1}{h_2}}$.

Ratio will not change in either case because acceleration remains the same. In case of free-fall acceleration does not depend upon mass and size.

26. a) (i) The cube will experience a greater buoyant force in the saturated salt solution because the density of the salt solution is greater than that of water.

(ii) The smaller cube will experience lesser buoyant force as its volume is lesser than the initial cube.

b) Buoyant force = weight of the liquid displaced

= density of water × volume of water displaced ×g

$= 1000 \times \frac{4}{4000} \times 10 = 10$ N