TOPPERZ@WORK EDUCATION CENTRE

CBSE XI QUESTIONS

1. A fizzy drink bottle is falling freely. Will the bubbles of the gas rise in the water of the bottle?

Bubbles will not rise in water because water in the freely falling bottle is in a state of no weight , hence no upthrust acts on the bubbles.

2. A bird is sitting on the floor of a wire cage and the cage is in the hand of a boy. The bird starts flying in the cage. Will the boy experience any change in the weight of the cage?

When the bird starts to fly inside the cage, the weight of the bird is not experienced by the boy as the air inside is in free contact with atmospheric air and hence the cage will appear lighter.

3. How does banking reduce wear and tear of tyres?

When a curved road is unbanked, the force of friction between the tyres and the road provides the necessary centripetal force. Friction has to be increased which will cause wear and tear. But when a curved road is banked, a component of normal reaction of the ground provides the necessary centripetal force which reduces the wear and tear of tyres.

4. A stone tied at the end of a string is whirled in a circle. If the string breaks, the stone flies away tangentially. Why?

When a stone is moving around a circular path, its velocity acts tangent to the circle. When the string breaks, the centripetal force is not acting anymore. Due to inertia, the stone continues to move along the tangent to circular path and flies off tangentially to the circular path.

5. Find the distance of a point from the Earth's centre where the resultant gravitational field due to the earth and the moon is zero. The mass of the earth is 6x10^24 kg and that of the moon is 7.4x10^22 kg. The distance between the moon and the sun is 4x10^5km.

F=GMeM/r^2

Also $F=GMmM/(4x10^5-r)^2$ where Me= mass of earth, Mm= mass of moon and M=mass of an arbitrary object at the point.

Equating the two equations, we get, $r= 3.6x10^5$ km.

6. What is the time period of a simple pendulum in a satellite orbiting around the earth?

Time period= $2\pi\sqrt{l/g}= 2\pi\sqrt{l/a}$ where a= effective gravitational force.

A satellite experiences acceleration due to gravity and centripetal acceleration also.

So, $a= \sqrt{g^2+(v^2/R)^2}$ where v= velocity of satellite, R= radius of orbit and l= length of pendulum.

Therefore, $T= 2\pi\sqrt{l/ g^2+(v^4/R^2)}$.