Chapter 9
Force and Laws of motion

1State First law of motion.
An object remains in a state of rest or of uniform motion in a straight line unless acted upon by an external unbalanced force.

2.What is Inertia ?
The natural tendency of an object to resist a change in their state of rest or of uniform motion is called inertia.
The mass of an object is a measure of its inertia.
Its S.I. unit is kg.
A body with greater mass has greater inertia.
3.Which of the following has more inertia: (a) a rubber ball and a stone of the same size? (b) a bicycle and a train? (c) a five-rupee coin and a one-rupee coin?

Solution

Since inertia is dependent on the mass of the object, the object with the greater mass will hold greater inertia. The following objects hold greater inertia because of their mass.

*Stone

*Train

*Five-Rupee coin

4.Explain why some of the leaves may get detached from a tree if we vigorously shake its branch.

Solution

When the branch of the tree is shaken, the branch moves in a to-and-fro motion. However, the inertia of the leaves in attached to the branch resists the motion of the branch. Therefore, the leaves that are weakly attached to the branch fall off due to inertia whereas the leaves that are firmly attached to the branch remain attached.

5.Why do you fall in the forward direction when a moving bus brakes to a stop and fall backwards when it accelerates from rest?

Solution

Initially, when the bus accelerates in a forward direction from a state of rest, the passengers experience a force exerted on them in the backward direction due to their inertia opposing the forward motion.

Once the bus starts moving, the passengers are in a state of motion in the forward direction. When the brakes are applied, the bus moves towards a position of rest. Now, a force in the forward direction is applied on the passengers because their inertia resists the change in the motion of the bus. This causes the passengers to fall forwards when the brakes are applied.