

## 6<sup>th</sup> foundation

### Thrust

①

when body is stationary i.e. at rest

The combination of forces acting on it balance each other.

④

when no force is acting on the body  
acceleration = 0

$$\Rightarrow dv = \text{change in velocity} = 0$$

$$\Rightarrow \text{velocity} = \text{constant}$$

⑤

Due to inertia of direction, when a bus suddenly takes a turn, it changes its direction but at same time, the upper part of the passengers of the bus can not move in the same direction instantly. Therefore the passengers are thrown in a direction opposite to the direction of turning of bus.

⑥

when train starts suddenly moving forward, the passengers standing in the compartment tends to fall backward is an example of inertia of rest. The reason behind this is the lower part of the passenger's



body is in close contact with the train.  
As the train starts moving, his lower part obtains the motion at once, but the upper part due to the inertia of rest cannot obtain the motion simultaneously i.e. it tends to remain at the same place.

⑧

If a body is released from rising helicopter, the body due to its inertia of motion, it follows same direction as that of helicopter instantly. After reaching to maximum height the body velocity is zero and starts falling down.

⑨

When tree is vigorously shaken, the tree is in motion, while the fruits are at rest, due to their inertia of rest.

∴ The force acts on the leaves in changing direction and results in the fruits detaching from the trees.

⑩

Shaking in the process of changing speed of motion. As wet dog shakes its body the water droplets already set into motion with certain speed in particular direction will fly outward due to their inertia of motion as well as inertia of direction i.e. water droplets cannot change their speed & direction of motion of their own.



(13)

Due to inertia of rest when an external force is applied to pull the cloth, it moves, but the dishes remain motionless because no force is applied to the dishes. As a result, the clothes can be dragged out without causing the dishes to fall off.

(15)

mud guards are used over the rotating wheel of vehicles, due to inertia of direction, the mud sticks to the wheel flies off tangentially. This spoils the vehicle and also persons just behind it. To avoid this mud guards are used.

$$\frac{L_{\text{Task}}}{CvQ'x}$$

(9)

Inertia of motion is defined as the persistence offered by the body to continue to be in the uniform motion unless an external force acts on it.

Therefore to gain momentum an athlete runs for a while before taking a long jump this helps in jumping higher and longer due to the inertia of motion gained.



③

when the horse suddenly stops, the rider falls in the forward direction due to inertia of motion.

The lower portion of the rider comes to rest along with the horse while the upper portion of the rider still continues to move forward.

④

The inertia of rest keeps the dust in position and the dust gets removed as the carpet moves away. Due to inertia of rest, a body tends to be in rest or will oppose any motion. That is why the inertia of rest keeps the dust in position and the dust gets removed as the carpet moves away.

⑥

Initially the paper and the pile of books are in a state of rest.

When the paper is pulled suddenly with a sharp jerk, the books resting on it continue in their state of rest on account of inertia of rest and hence are left behind as a pile.



## Jee main level

①

When a body is in motion, by virtue of inertia of motion. When it comes down from brain, the body tries to continue with velocity of brain -- but the legs when touch the ground, they are at rest. So the leg stops and body moves with velocity and direction of brain. Hence a person falls.

②

If a particle travels in a circular motion, then the direction of the velocity of the particle is tangential.

Suppose the grinding stone is rotating, it will have a circular motion, so the spark travels tangentially.

Thus, when a knife is sharpened with the help of a rotating grinding stone, then the spark always travels tangentially to it.

③

This is due to the fact that when the vehicle is in motion, the tires rotate. Because of rotation the mud in the tires subjected to centrifugal force which makes it to move in a outward circle but as soon as the mud loses its contact from the tires comes out tangentially.



(4)

when a car starts suddenly, the person falls backwards because of inertia of rest of passenger. This is due to the fact that because of their inertia the passengers tend to remain in their state of rest when the car starts suddenly.

### Advanced

(6)

The force of the ground on the horse.

As the horse goes forward, the force pulls the cart. so, the movement of horse is due to the force exerted by the ground. this force is frictional force.

(7)

The boat and fan are systems. so the forces they exert on each other are internal forces. Both internal forces act on the boat. so, the net force on the boat is zero.

The net force on the boat is zero. so, by the first law of motion, it will continue to remain in a state of rest.