FBISE 9th Class Physics New Book Notes Chapter 3

SHORT RESPONSE QUESTIONS

Q1. When a motor cyclist hit a stationary car, he may fly off the motor cycle and driver in the car may get neck injury. Explain

Ans: When a motor cyclist hits a stationary car then he cannot stop himself due to inertia and continue his state of motion so he may fly off the motor cycle. While the driver in the car is at rest. When the motor cyclist hits the car then the upper part of the driver wants to stay at rest due to inertia, but his lower par moves with the car with a force produced of collision. So the driver in the car may get neck injury.

Q2. In autumn, when you shake a branch, the leaves are detached. Why?

Ans:

In autumn, when we shake a branch, the leaves get detached. Because when a tree is forcefully shaken, the branches of the tree come in motion but the leaves tend to continue in their state of rest due to inertia. As a result of this, leaves get separated from the branches of the tree and hence fall down

Q3. Why it is not safe to apply brakes only on the front wheel of a bicycle?

Ans: It is not safe to apply brakes only on the front wheel of a bicycle because due to inertia the rider will fall forward and may get injured. When a cyclist applies only the front wheel brakes, the front wheel suddenly comes to rest while the back wheel tends to continue its motion along with the rider's body. Due to this the rider will feel a forward push and will fall to his front. That's why it is not safe to apply brakes only to the front wheel of a bicycle. It is therefore, advised to wear a helmet while riding a bicycle and to apply brakes slowly if possible.

Q4. Deduce Newton's first law of motion from Newton's second law of motion.

Ans: According to Newton's 2^{nd} law

$$\Rightarrow\ F = ma \qquad\qquad F = m\left(\frac{v_f - v_i}{t}\right)$$

$$\Rightarrow\ \text{If } F = 0, a = 0 \quad \Rightarrow \quad \text{Since } m \neq 0,$$

$$\Rightarrow\ \text{But } a = \frac{v_f - v_i}{t} \quad \text{or} \quad v_f - v_i = 0 \ \Rightarrow\ v_t = v_1$$

For whatever time ' **t** ' is taken.

This means that the object will continue moving with uniform velocity, $\mathbf{v}_i$ throughout the time, **t**. If $\mathbf{v}_f$ is zero then $\mathbf{v}_i$ will also be zero. That is, the object wil remain at rest.

Q5. Action and reaction are equal but opposite in direction. These forces always act in pair. Do they balance each other? Can bodies move under action - reaction pair?

Ans: Balanced forces are equal and opposite forces that act on the same object. That's why they cancel out. Action and reaction forces are equal and opposite forces that act on different objects, so they don't cancel out. No, a body cannot move under action-reaction pair. For example, book lying on the table has weight downward but the table has normal reaction force in upward direction.

Q6. A man slips on the oily floor; he wants to move out of this area. He Is alone, He throws his bag to move out of this slippery area. Why is it so?

Ans: As a slippery man throws his bag in any direction, he will feel an oppositely directed force which may help him to come out of the slippery floor.

When a man slips on the oily floor then he has minimum friction between floor and his feet. He throws his bag to move out of this slippery area. When he throws a bag in one direction then this is an action, according to third law of motion as a reaction he will move in opposite direction due to less friction. This act helps him to move out from the oily floor.

Q7. How would you use Newton's 3rd law of motion and law of conservation of momentum to explain motion of rocket?

Ans: Motion of a rocket can be explained by using Newton's 3rd law of motion and law of conservation of momentum.

Newton's third law of motion states that to every action there is an equal and opposite reaction. Similarly, when a rocket moves, it exerts the action force on the gases to expel them backwards which in tum exert an equal and opposite reaction force to move the rocket forward. ·.

Q8. Why are cricket batter gloves padded with foam?

Ans: The batsman gloves are padded with foam in order to increase the impact time and thus decrease the influence of change in momentum on batman's hands.

The rate of change of momentum is given by

$$\mathrm{F} = \frac{\Delta \mathrm{p}}{\Delta \mathrm{t}} \Rightarrow F \propto \frac{1}{\Delta t}$$

For same change in momentum ($\Delta \mathbf{p}$), if impact time ($\Delta \mathbf{t}$) is greater force well be smaller. The foam of the gloves just increases time of impact ($\Delta \mathrm{t}$) between handle of bat and batsman's hand which reduces acceleration and hence the force is reduced ($F \propto$ a).

Q9. Where will your weight be greater, near earth or near moon? What about mass?

Ans: Near Earth, both weight and mass would be greater compared to near the Moon. Weight is a measure of the gravitational force exerted on an object, which is directly proportional to the mass of the object and the gravitational acceleration at that location. Near Earth, the gravitational acceleration is greater than near the Moon, hence weight would be greater near Earth.

Q10. When Ronaldo kicks the ball, at the highest point of balls both Earth and ball attracts each other with the same magnitude of force. Why then the ball moves towards Earth and not the Earth?

Ans:

The reason the ball moves towards the Earth and not significantly the other way around is due to their respective masses. The Earth has a much larger mass compared to the soccer ball.

According to Newton's second law of motion ($F = ma$), the same force results in much smaller acceleration for an object with a larger mass compared to one with a smaller mass. Given that the Earth's mass is approximately 6×10^{24} kilograms, while a soccer ball is about 0.43 kilograms, the acceleration experienced by the Earth due to this mutual force is extremely tiny and practically imperceptible