Important Questions Class 9 Science Chapter 8: Here are the important topics to focus on from Class 9 Science Chapter 8 Force and Laws of Motion. It is important to understand the concept of force and its various types, such as balanced and unbalanced forces and how they affect the motion of objects.

The chapter covers Newton's Third Law of Motion which explains the action-reaction principle observed in daily life situations like walking or the propulsion of a rocket. The concept of momentum and its conservation during collisions is another crucial area, with several numerical problems highlighting its application. By practicing these topics and related questions students can strengthen their understanding of the laws of motion and improve their problem-solving skills, especially for exams.

Important Questions Class 9 Science Chapter 8 Overview

These important questions for Class 9 Science Chapter 8 Force and Laws of Motion have been created by subject experts of Physics Wallah.

By practicing these expert-curated questions students can solidify their knowledge of the chapter and enhance their ability to tackle exam-related questions with confidence.

Important Questions Class 9 Science Chapter 8 PDF

Here is a set of important questions for Class 9 Science Chapter 8 Force and Laws of Motion that will help you revise the chapter thoroughly. Practicing these questions will enhance your understanding and problem-solving abilities for the exam. For a detailed set of questions you can download the PDF from the link provided below:

Important Questions Class 9 Science Chapter 8 PDF

Important Questions Class 9 Science Chapter 8 Force and Laws of Motion

Very Short Answer Questions (1 Mark)

Q.1. A batsman hits a cricket ball which then rolls on level ground. After covering a short distance, the ball comes to rest. The ball slows to a stop because –

The batsman did not hit the ball hard enough.

Velocity is proportional to the force exerted on the ball.

There is a force on the ball opposing the motion.

There is no unbalanced force on the ball, so the ball would want to come to rest.

Ans: (c) There is a force on the ball opposing the motion.

Q.2. What is the momentum of an object of mass m, moving with a velocity v?

(mv)2(mv)2

mv2mv2

12mv212mv2

mvv

Ans: (d) mvmv

Q.3. Using a horizontal force of 200N200N, we intend to move a wooden cabinet across a floor at a constant velocity. What is the friction force that will be exerted on the cabinet?

Ans: In order to move the cabinet across the floor at a constant velocity, the net force experienced by it must be zero. Thus a frictional force of 200N200N must be exerted on the cabinet to move it across the floor at a constant velocity, against the horizontal force of 200N200N.

Q.4. What is the S.I. unit of momentum?

kgmskgms

mskgmskg

kgms−1kgms−1

kgmskgms

Ans: (c) kgms−1kgms−1

Q.5. What is the numerical formula for force?

F=maF=ma

F=maF=ma

F=ma2F=ma2

F=m2aF=m2a

Ans: (a) F=maF=ma

Short Answer Questions (2 Marks)

Q. 1. An object experiences a net zero external unbalanced force. Is it possible for the object to be traveling with a non-zero velocity? If yes, state the conditions that must be placed on the magnitude and direction of the velocity.

Ans:

Yes, it is possible for an object to be traveling with a non-zero velocity if it experiences a net zero external unbalanced force. According to Newton's First Law of Motion, an object in motion continues to move with constant velocity unless acted upon by an external force. Therefore, if the object was already moving with a constant velocity, it can continue to do so as long as no unbalanced external force acts on it. The velocity will remain unchanged in both magnitude and direction.

Q. 2. When a carpet is beaten with a stick, dust comes out of it. Explain.

Ans:

When a carpet is beaten with a stick, dust particles come out due to Newton's First Law of Motion (the law of inertia). Initially, both the dust particles and the carpet are at rest. When the carpet is hit, it moves suddenly, but the dust particles, due to inertia, tend to remain at rest. This resistance causes the dust particles to separate from the carpet and move outward, making them appear to fly off.

Q. 3. Why is it advised to tie any luggage kept on the roof of a bus with a rope?

Ans:

It is advised to tie luggage on the roof of a bus with a rope due to Newton's First Law of Motion (inertia). When the bus moves, the luggage acquires the inertia of motion. If the bus suddenly stops or decelerates, the luggage tends to continue moving forward because of inertia, which may cause it to fall off. Similarly, during turns or sudden changes in speed, the luggage resists changes in its motion and can fall off. Tying it with a rope prevents such accidents by securing the luggage.

Q. 4. A stone of $1kg1kg$ is thrown with a velocity of $20ms−120ms−1$ across the frozen surface of a lake and comes to rest after traveling a distance of $50m50m$. What is the force of friction between the stone and the ice?

Ans:

Given:

Mass of stone: $m=1kgm=1kg$

Initial velocity of stone: $u=20ms-1u=20ms-1$

Final velocity of stone: $v=0ms-1v=0ms-1$ (as it comes to rest)

Distance traveled on ice: $s=50ms=50m$

To find: Force of friction between stone and ice.

First, we need to find the deceleration:

It is known that – $v2=u2+2asv2=u2+2as$

Thus, $02=(20)2+2a(50)02=(20)2+2a(50)$

$\Rightarrow 0=400+100a\Rightarrow 0=400+100a$

$\Rightarrow -400=100a\Rightarrow -400=100a$

$\Rightarrow a=-4ms-2\Rightarrow a=-4ms-2$

The negative sign implies deceleration.

Next, finding the frictional force:

$F=maF=ma$

$\Rightarrow F=(1)(-4)\Rightarrow F=(1)(-4)$

$\Rightarrow F=-4N\Rightarrow F=-4N$

Thus, the force of friction between stone and ice is $-4N-4N$.

Q. 5. An automobile vehicle has a mass of $1500kg1500kg$. What must be the force between the vehicle and road if the vehicle is to be stopped with a negative acceleration of $1.7ms-21.7ms-2$?

Ans:

Given:

Mass of vehicle:$m=1500kgm=1500kg$

Negative acceleration:$a=-1.7ms-2a=-1.7ms-2$

To find: Force of friction between road and vehicle.

It is known that - $F=maF=ma$

$\Rightarrow F=(1500)(-1.7)\Rightarrow F=(1500)(-1.7)$

$\Rightarrow F=-2550N\Rightarrow F=-2550N$

Thus the force between the vehicle and road if the vehicle is to be stopped with a negative acceleration of $1.7ms-21.7ms-2$is $-2550N-2550N$.

Q. 6. An object of mass $100kg100kg$ is accelerated uniformly from a velocity of $5ms-15ms-1$ to $8ms-18ms-1$ in $6s6s$. Calculate the initial and final momentum of the object. Also, find the magnitude of the force exerted on the object.

Ans:

Given:

Mass of object:$m=100kgm=100kg$

Initial velocity of object:$u=5ms-1u=5ms-1$

Final velocity of object: $v=8ms-1v=8ms-1$

Time duration of acceleration:$t=6st=6s$

To find:

- Initial momentum
- Final momentum
- Force exerted on the object

It is known that – $momentum=mass\times velocitymomentum=mass\times velocity$

$Initial\_momentum=mass\times initial\_velocityInitial\_momentum=mass\times initial\_velocity$

$\Rightarrow Initial\_momentum=100\times 5\Rightarrow Initial\_momentum=100\times 5$

$\Rightarrow Initial\_momentum=500kgms-1\Rightarrow Initial\_momentum=500kgms-1$

$Final\_momentum=mass\times final\_velocityFinal\_momentum=mass\times final\_velocity$

$\Rightarrow Final\_momentum=100\times 8\Rightarrow Final\_momentum=100\times 8$

$\Rightarrow Final\_momentum=800kgms-1\Rightarrow Final\_momentum=800kgms-1$

Now, the force – $F=maF=ma$

$F=m(v-ut)F=m(v-ut)$

$\Rightarrow F=100(8-56)\Rightarrow F=100(8-56)$

$\Rightarrow F=100(36)\Rightarrow F=100(36)$

$\Rightarrow F=50N\Rightarrow F=50N$

Thus,

- Initial momentum:$500kgms-1500kgms-1$
- Final momentum: $800kgms-1800kgms-1$
- Force exerted on object: $50N$

Q.7. State Newton's second law of motion?

Ans:

Newton's Second Law of Motion states that the acceleration of an object is directly proportional to the net external force acting on it and inversely proportional to its mass. This means that when an unbalanced external force is applied to an object, it causes a change in its velocity, or in other words, accelerates the object. The law also explains that the rate of change of momentum of an object is equal to the applied force.

Mathematically, it is expressed as:
F = ma,
where **F** is the force applied, **m** is the mass of the object, and **a** is the acceleration produced.

Q.8. Define force and what are the various types of forces?

Ans:

Force is defined as a push or pull exerted on an object that can produce a change in its state of motion or shape. This includes altering the speed, direction, or overall movement of the object. Forces can act in various ways, depending on their nature and origin.

The various types of forces include:

Mechanical Force: This is the force applied to an object by a person or another object, which can result in motion or deformation. Examples include pushing a door or pulling a cart.

Gravitational Force: This is the attractive force that pulls objects toward one another, most notably the force that pulls objects toward the Earth. It is dependent on the masses of the objects and the distance between them.

Frictional Force: This is the force that opposes the relative motion of two surfaces in contact. It acts parallel to the surfaces and can be static (preventing motion) or kinetic (opposing motion).

Electrostatic Force: This is the force between charged objects. Like charges repel each other, while opposite charges attract. This force is fundamental in understanding electric interactions.

Electromagnetic Force: This force encompasses both electric and magnetic forces and is responsible for the interactions between charged particles. It plays a crucial role in electricity, magnetism, and light.

Nuclear Force: This is the strong force that holds protons and neutrons together in an atomic nucleus. It is one of the strongest forces in nature but operates over a very short range.

Short Answer Questions (3 Marks)

Q.1. Which of the following has more inertia:a. A rubber ball and a stone of the same size?

Ans: Inertia depends on the mass of the object. The larger the mass, the greater its inertia. In this case, the stone has greater inertia than the rubber ball, as the stone weighs more despite both being the same size.

b. A bicycle and a train?
Ans: Similarly, inertia is determined by mass. The train has greater inertia than the bicycle because it is significantly heavier.

c. A five-rupee coin and a one-rupee coin?
Ans: The five-rupee coin exhibits greater inertia than the one-rupee coin, as it has more mass.

Q.2. In the following example, try to identify the number of times the velocity of the ball changes:

"A football player kicks a football to another player of his team, who kicks it towards the goal. The goalkeeper of the opposite team collects the football and kicks it towards a player of his own team."**Ans:** In this example, the velocity of the football changes four times:

First Change: When the first player kicks the ball. **Agent:** The foot of the player.

Second Change: When the second player kicks the ball towards the goal. **Agent:** The foot of the second player.

Third Change: When the goalkeeper collects the ball. **Agent:** The hands of the goalkeeper.

Fourth Change: When the goalkeeper kicks it towards a teammate. **Agent:** The foot of the goalkeeper.

Q.3. Explain why some of the leaves may get detached from a tree if we vigorously shake its branch.

Ans: When the branch is shaken, the branches move while the leaves, due to inertia, resist this change in motion and tend to stay at rest. The force applied causes the branches to move quickly in a different direction, resulting in the leaves detaching from the tree as they cannot keep up with the motion.

Q.4. Why do you fall in the forward direction when a moving bus brakes to a stop and fall back when it accelerates from rest?

Ans: When the bus stops suddenly, passengers are pushed forward because their upper bodies remain in motion while their lower bodies, in contact with the seat, stop. Conversely, when the bus accelerates, the upper bodies remain at rest due to inertia, causing passengers to be pushed backward as the bus moves forward.

Q.5. If action is always equal to the reaction, explain how a horse can pull a cart.

Ans: Although the horse exerts an action force on the cart and feels an equal reaction force, it also applies a force on the ground with its hooves. The ground pushes back with a greater reaction force that propels the horse forward. The horse's action force on the ground allows it to pull the cart effectively, as the net force acting on the cart enables it to move in the direction of the horse's pull.

Benefits of Important Questions Class 9 Science Chapter 8

Improved Performance: Practicing these questions helps students become familiar with the exam format and question types leading to improved performance on actual exam day.

Enhanced Problem-Solving Skills: Regular practice of important questions develops problem-solving skills, enabling students to tackle complex questions with confidence during exams.

Time Management: Familiarity with important questions allows students to practice answering them within time limits, improving their time management skills during the exam.

Identification of Weak Areas: By working through important questions students can identify specific areas where they may need further revision or clarification allowing for targeted study.

Confidence Boost: Mastery of important questions can significantly boost students confidence, helping to reduce anxiety and improve overall exam performance.

Clarification of Concepts: Answering important questions can clarify any lingering doubts or misconceptions, ensuring students have a solid understanding of the material before the exam.