

NCERT Solutions For Class 9th Science

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In-Text Questions Solved

Ncert Textbook Page 118

Question 1. 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-rupees coin and a one-rupee coin?

Answer:

- (a) A stone of the same size
- (b) a train
- (c) a five-rupees coin

As the mass of an object is a measure of its inertia, objects with more mass have more inertia.

Question 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 the football towards the goal. The goalkeeper of the opposite team collects the football and kicks it towards a player of his own team”.

Also identify the agent supplying the force in each case.

Answer:

Agent supplying the force	Change in velocity of ball
1. First player kicks a football.	→ Velocity from '0' changes to 'u'
2. Second player kicks the football towards the goal.	→ Velocity changes again
3. The goalkeeper collects the football.	→ Velocity becomes 0
4. Goalkeeper kicks it towards a player of his team.	→ Change in velocity takes place

The velocity of football changed four times.

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

Answer: When the tree's branch is shaken vigorously the branch attains motion but the leaves stay at rest. Due to the inertia of rest, the leaves tend to remain in its position and hence detach from the tree to fall down.

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

Answer: When a moving bus brakes to a stop: When the bus is moving, our body is also in motion, but due to sudden brakes, the lower part of our body comes to rest as soon as the bus stops. But the upper part of our body continues to be in motion and hence we fall in forward direction due to inertia of motion.

When the bus accelerates from rest we fall backwards: When the bus is stationary our body is at rest but when the bus accelerates, the lower part of our body being in contact with the floor of the bus comes in motion, but the upper part of our body remains at rest due to inertia of rest. Hence we fall in backward direction.

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Question 1. If action is always equal to the reaction, explain how a horse can pull a cart?

Answer: The third law of motion states that action is always equal to the reaction but they act on two different bodies.

In this case the horse exerts a force on the ground with its feet while walking, the ground exerts an equal and opposite force on the feet of the horse, which enables the horse to move forward and the cart is pulled by the horse.

Question 2. Explain, why is it difficult for a fireman to hold a hose, which ejects a large amount of water at a high velocity.

Answer: The water that is ejected out from the hose in the forward direction comes out with a large momentum and an equal amount of momentum is developed in the hose in the opposite direction and hence the hose is pushed backward. It becomes difficult for a fireman to hold a hose which experiences this large momentum.

Question 3. From a rifle of mass 4 kg, a bullet of mass 50 g is fired with an initial velocity of 35 m/s. Calculate the initial recoil velocity of the rifle.

Answer:

(m_1) Mass of rifle = 4 kg

(m_2) Mass of bullet = 50 g = 0.05 kg

(v_2) Velocity of bullet = 35 m/s

(v_1) Recoil velocity of rifle = ?

According to the law of conservation of momentum

Momentum of rifle = momentum of bullet

$$m_1 v_1 = m_2 v_2$$

$$4 \text{ kg} \times v_1 = 0.05 \times 35 \text{ m/s}$$

$$\therefore v_1 = \frac{0.05 \times 35}{4} = \frac{1.75}{4}$$

$$v_1 = 0.4375 \text{ m/s}$$

$$\therefore \text{Recoil velocity of rifle} = 0.4375 \text{ m/s}$$

Question 4. Two objects of masses 100 g and 200 g are moving along the same line and direction with velocities of 2 m/s and 1 m/s respectively.

They collide and after the collision the first object moves at a velocity of 1.67 m/s. Determine the velocity of the second object.

Answer:

$$m_1 = 100 \text{ g} = 0.1 \text{ kg}$$

$$m_2 = 200 \text{ g} = 0.2 \text{ kg}$$

$$u_1 = 2 \text{ m/s}$$

$$u_2 = 1 \text{ m/s}$$

After collision

$$v_1 = 1.67 \text{ m/s}$$

$$v_2 = ?$$

$$m_1 u_1 + m_2 u_2 = m_1 v_1 + m_2 v_2$$

$$(0.1 \times 2) + (0.2 \times 1) = (0.1 \times 1.67) + (0.2 \times v_2)$$

$$\therefore 0.2 + 0.2 = 0.167 + 0.2v_2$$

$$0.4 - 0.167 = 0.2v_2$$

$$\frac{0.4 - 0.167}{0.2} = v_2$$

$$\therefore \frac{0.233}{0.2} = 1.165 \text{ m/s}$$

\therefore The velocity of the second object is 1.165 m/s.

Questions From NCRT Textbook

Question 1. An object experiences a net zero external unbalanced force. Is it possible for the object to be travelling with a non-zero velocity? If yes, state the conditions that must be placed on the magnitude and direction of the velocity. If no, provide a reason.

Answer: When an object experiences a net zero external unbalanced force, in accordance with second law of motion its acceleration is zero. If the object was initially in a state of motion, then in accordance with the first law of motion, the object will continue to move in same direction with same speed. It means that the object may be travelling with a non-zero velocity but the magnitude as well as direction of velocity must remain unchanged or constant throughout.

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

Answer: The carpet with dust is in state of rest. When it is beaten with a stick the carpet is set in motion, but the dust particles remain at rest. Due to inertia of rest the dust particles retain their position of rest and falls down due to gravity.

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

Answer: In moving vehicle like bus, the motion is not uniform, the speed of vehicle varies and it may apply brake suddenly or takes sudden turn. The luggage will resist any change in its state of rest or motion, due to inertia and this luggage has the tendency to fall sideways, forward or backward. To avoid the fall of the luggage, it is tied with the rope.

Question 4. A batsman hits a cricket ball which then rolls on a level ground. After covering a short distance, the ball comes to rest. The ball slows to a stop because

(a) the batsman did not hit the ball hard enough.

(b) velocity is proportional to the force exerted on the ball.

(c) there is a force on the ball opposing the motion.

(d) there is no unbalanced force on the ball, so the ball would want to come to rest.

Answer: (c) there is a force on the ball opposing the motion.

Question 5. A truck starts from rest and rolls down a hill with a constant acceleration. It travels a distance of 400 m in 20 s. Find its acceleration. Find the force acting on it if its mass is 7 tonnes (Hint : 1 tonne = 1000 kg).

Answer:

$$u = 0 \text{ m/s}$$

$$s = 400 \text{ m}$$

$$t = 20 \text{ s}$$

$$a = ?$$

$$F = ?$$

$$m = 7 \text{ tonnes}$$

$$= 7 \times 1000 \text{ kg}$$

$$= 7000 \text{ kg}$$

$$s = ut + \frac{1}{2}at^2$$

$$400 = (0 \times 20) + \frac{1}{2}a(20)^2$$

$$= \frac{400 \times 2}{(20)^2} = a \quad \therefore a = 2 \text{ m/s}^2$$

$$\text{Force} \rightarrow F = ma$$

$$= 7000 \times 2 = 14000 \text{ N}$$

Question 6. A stone of 1kg is thrown with a velocity of 20 ms⁻¹ across the frozen surface of a lake and comes to rest after travelling a distance of 50 m. What is the force of friction between the stone and the ice?

Answer:

$$m = 1 \text{ kg}$$

$$u = 20 \text{ m/s}$$

$$s = 50 \text{ m}$$

$$v = 0$$

$$v^2 - u^2 = 2as$$

$$(0)^2 - (20)^2 = 2a(50)$$

$$\therefore -400 = 100a$$

$$F = ?$$

$$\therefore a = \frac{-400}{100} = -4 \text{ m/s}^2$$

$$a = ?$$

$$\text{Force of friction, } F = m \times a$$

$$= 1 \text{ kg} \times -4 \text{ m/s}^2$$

$$= -4 \text{ N}$$

Question 7. 40000 kg engine pulls a train of 5 wagons, each of 2000 kg, along a horizontal track. If the engine exerts a force of 40000 N and the track offers a friction force of 5000 N, then calculate:

Answer:

(a) The net accelerating force = Force exerted by the engine – friction force
= 40000 N – 5000 N
= 35000 N

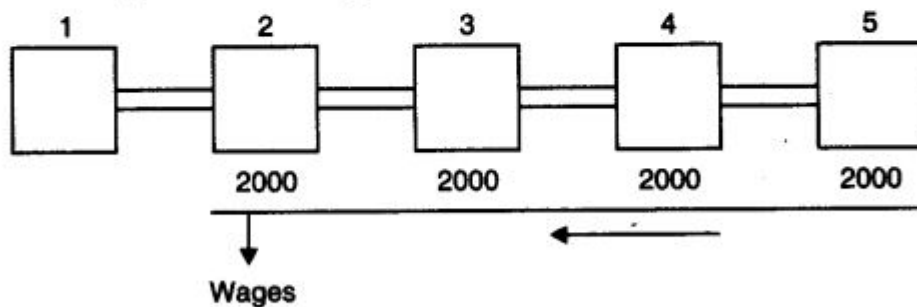
(b) The acceleration of the train (a) = ?
 $F = 35000 \text{ N}$

Mass of 5 wagons pulled by engine = 5×2000
= 10000 kg

$\therefore F = ma$
 $35000 = 10000 \times a$

$\therefore a = \frac{35000}{10000} = 3.5 \text{ m/s}^2$

(c) The force of wagon 1 on wagon 2



$F = ?$

Mass of wagon 2 $\rightarrow (2000 \times 4)$

$a = 3.5 \text{ m/s}^2$

$F = ma$
= 8000×3.5
= 28000 N

Question 8. An automobile vehicle has a mass of 1500 kg. What must be the force between the vehicle and road if the vehicle is to be stopped with a negative acceleration of 1.7 ms^{-2} ?

Answer:

mass = 1500 kg

$a = -1.7 \text{ m/s}^2$

$F = ?$

$F = m \times a$
= $1500 \times (-1.7)$
= -2550 N

The force between the vehicle and road is -2550 N.

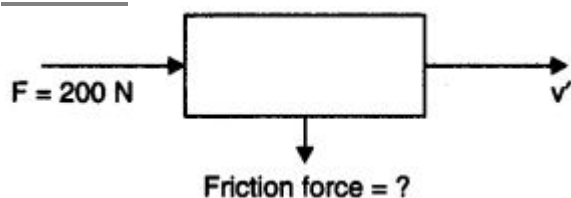
Question 9.What is the momentum of an object of mass m , moving with a velocity v ?

- (a) $(mv)^2$ (b) mv^2 (c) $1/2 mv^2$ (d) mv

Answer: (d) mv

Question 10.Using a horizontal force of 200 N, 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?

Answer:



As the wooden cabinet moves across the floor at a constant velocity and the force applied is 200 N. Hence the frictional force that will be exerted on the cabinet will be less than 200 N.

Question 11.Two objects each of mass 1.5 kg, are moving in the same straight line but in opposite directions. The velocity of each object is 2.5 ms^{-1} before the collision during which they stick together. What will be the velocity of the combined object after collision?

Answer:

Mass of the objects $m_1 = m_2 = 1.5 \text{ kg}$

Velocity of first object $v_1 = 2.5 \text{ m/s}$

Velocity of second object $v_2 = -2.5 \text{ m/s}$

$$\begin{aligned}\text{Momentum before collision} &= m_1 v_1 + m_2 v_2 \\ &= (1.5 \times 2.5) + (1.5 \times -2.5) = 0\end{aligned}$$

$$\text{Momentum after collision} = m_1 + m_2 = 1.5 + 1.5 = 3.0 \text{ kg}$$

$$\text{After collision } v = ?$$

According to law of conservation of momentum

$$\text{Momentum before collision} = \text{Momentum after collision}$$

$$0 = 3 \times v$$

$$\therefore v = 0$$

Question 12. According to the third law of motion when we push on an object, the object pushes back on us with an equal and opposite force. If the object is a massive truck parked along the roadside, it will probably not move. A student justifies this by answering that the two opposite and equal forces cancel each other. Comment on this logic and explain why the truck does not move.

Answer: The mass of truck is too large and hence its inertia is too high. The small force exerted on the truck cannot move it and the truck remains at rest. For the truck to attain motion, an external large amount of unbalanced force need to be exerted on it.

Question 13. A hockey ball of mass 200 g travelling at 10 ms^{-1} is struck by a hockey stick so as to return it along its original path with a velocity at 5 ms^{-1} . Calculate the change of momentum occurred in the motion of the hockey ball by the force applied by the hockey stick.

Answer:

$$\text{Mass of ball } m = 200 \text{ g} = 0.2 \text{ kg}$$

$$\text{Initial speed of ball } u = 10 \text{ m/s}$$

$$\text{Final speed of ball } v = -5 \text{ m/s}$$

$$\text{Initial momentum of the ball} = mu$$

$$= 0.2 \text{ kg} \times 10 \text{ m/s}$$

$$= 2 \text{ kg m/s}$$

$$\text{Final momentum of the ball} = mv$$

$$= 0.2 \text{ kg} \times (-5 \text{ m/s})$$

$$= -1 \text{ kg m/s}$$

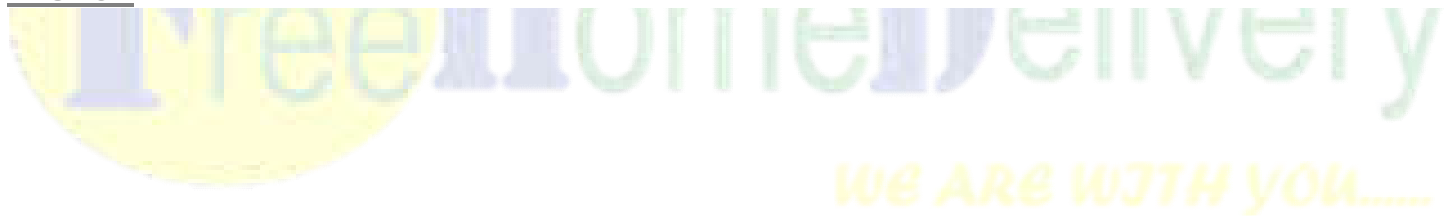
$$\text{Hence, change in momentum} = \text{Difference in the momentum}$$

$$= 2 - (-1)$$

$$= 2 + 1 = 3 \text{ kg m/s}$$

Question 14. A bullet of mass 10 p travelling horizontally with a velocity of 150 m^{-1} strikes a stationary wooden block and comes to rest in 0.03 s. Calculate the distance of penetration of the bullet into the block. Also calculate the magnitude of the force exerted by the wooden block on the bullet.

Answer:



$$m = 10 \text{ g} = \frac{10}{1000} = 0.01 \text{ kg}$$

$$u = 150 \text{ m/s}$$

$$v = 0 \text{ m/s}$$

$$t = 0.03 \text{ s}$$

$$v = u + at$$

$$0 = 150 + a(0.03)$$

$$a = \frac{-150}{0.03} = -5000 \text{ m/s}^2$$

$$s = ?$$

$$F = ?$$

$$v^2 - u^2 = 2as$$

$$\therefore (0)^2 - (150)^2 = 2 \times 5000 \times s$$

$$\therefore s = \frac{150 \times 150}{2 \times 5000}$$

$$s = \frac{22500}{10000}$$

$$s = 2.25 \text{ m.}$$

\therefore The penetration distance of the bullet in the wooden block = 2.25 m.

$$\text{Magnitude of force } F = ma$$

$$= \frac{10}{1000} \times 5000$$

$$F = 50 \text{ N.}$$

Question 15. An object of mass 1 kg travelling in a straight line with a velocity of 10 ms⁻¹ collides with, and sticks to, a stationary wooden block of mass 5 kg. Then they both move off together in the same straight line. Calculate the total momentum just before the impact and just after the before the impact and just after the impact. Also, calculate the velocity of the combined object.

Answer:

$$m_1 = 1 \text{ kg}$$

$$v_1 = 10 \text{ m/s}$$

$$\text{Mass of wooden block} = 5 \text{ kg}$$

$$m_2 = 5 \text{ kg} + 1 \text{ kg (combined object)} = 6 \text{ kg}$$

$$\text{Velocity of combined object} = v_2 = ?$$

$$p_1 \text{ and } p_2 = ?$$

$$\text{Momentum before impact } p = m_1 v_1$$

$$= 1 \times 10 = 10 \text{ kg m/s}$$

$$\therefore \text{Momentum before impact} = \text{Momentum after impact}$$

$$m_1 v_1 = m_2 v_2$$

$$10 \text{ kg m/s} = 6 v_2$$

$$\therefore \frac{10}{6} = v_2$$

$$\therefore v_2 = 1.67 \text{ m/s}$$

Question 16. An object of mass 100 kg is accelerated uniformly from a velocity of 5 ms^{-1} to 8 ms^{-1} in 6 s. Calculate the initial and final momentum of the object. Also, find the magnitude of the force exerted on the object.

Answer:

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$$m = 100 \text{ kg}$$

$$u = 5 \text{ m/s}$$

$$v = 8 \text{ m/s}$$

$$t = 6 \text{ s}$$

$$\rho_1 = ?$$

$$\rho_2 = ?$$

$$F = ?$$

$$\begin{aligned} \therefore \text{Initial momentum } \rho_1 &= mu \\ &= 100 \times 5 = 500 \text{ kg m/s} \end{aligned}$$

$$\begin{aligned} \text{Final momentum } \rho_2 &= mv \\ &= 100 \times 8 = 800 \text{ kg m/s} \end{aligned}$$

$$\begin{aligned} \text{Force exerted on the object } F &= ma \\ &= 100 \left(\frac{u - v}{t} \right) \\ &= 100 \left(\frac{8 - 5}{6} \right) = 100 \times \frac{3}{6} \end{aligned}$$

$$F = 50 \text{ N}$$

Question 17. Akhtar, Kiran and Rahul were riding in a motorcar that was moving with a high velocity on an expressway when an insect hit the windshield and got stuck on the windscreen. Akhtar and Kiran started pondering over the situation. Kiran suggested that the insect suffered a greater change in momentum as compared to the change in momentum of the motorcar (because the change in the velocity of insect was much more than that of the motorcar). Akhtar said that since the motorcar was moving with a larger velocity, it exerted a larger force on the insect. And as a result the insect died. Rahul while putting an entirely new explanation said that both the motorcar and the insect experienced the same force and a change in their momentum. Comment on these suggestions.

Answer: Rahul gave the correct reasoning and explanation that both the motorcar and the insect experienced the same force and a change in their momentum. As per the law of conservation of momentum.

When 2 bodies collide:

Initial momentum before collision = Final momentum after collision

$$m_1 u_1 + m_2 u_2 = m_1 v_1 + m_2 v_2$$

The equal force is exerted on both the bodies but, because the mass of insect is very small it will suffer greater change in velocity.

Question 18. How much momentum will a dumb-bell of mass 10 kg transfer to the floor if it falls from a height of 80 cm? Take its downward acceleration to be 10 ms^{-2} .

Answer:

Mass of dumb-bell = 10 kg

Height,

$$h = 80 \text{ cm} = 0.8 \text{ m}$$

$$a = 10 \text{ m/s}^2$$

$$u = 0$$

$$v^2 - u^2 = 2as$$

$$v^2 - (0)^2 = 2 \times 10 \times 0.8$$

$$v^2 = 16$$

\therefore

$$v = 4 \text{ m/s}$$

Momentum $\rho = mv$

$$= 10 \times 4$$

$$= 40 \text{ kgm/s}$$

Additional Exercises

Question 1. The following is the distance-time table on an object in motion:

<i>Time in seconds</i>	<i>Distance in metres</i>
0	0
1	1
2	8
3	27
4	64
5	125
6	216
7	343

(a) What conclusion can you draw about the acceleration? Is it constant, increasing, decreasing, or zero?

(b) What do you infer about the forces acting on the object?

Answer: As per given table initial speed of the object is zero. Applying the relation

$$S = ut + \frac{1}{2}at^2 \quad \text{or} \quad S = \frac{1}{2}at^2 \quad (\text{because } u = 0)$$

We have $a = \frac{2s}{t^2}$

$$\therefore \text{For 1st second } a_1 = \frac{2s_1}{t_1^2} = \frac{2 \times 1}{1^2} = 2 \text{ ms}^{-2}$$

$$\text{For first 2 second } a_1 = \frac{2s_2}{t_2^2} = \frac{2 \times 8}{2^2} = 4 \text{ ms}^{-2}$$

$$\text{For first 3 seconds } a_3 = \frac{2s_3}{t_3^2} = \frac{2 \times 27}{3^2} = 6 \text{ ms}^{-2}$$

and so on.

Question 2. Two persons manage to push a motorcar of mass 1200 kg at a uniform velocity along a level road. The same motorcar can be pushed by three persons to produce an acceleration of 0.2 ms^{-2} . With what force does each person push the motorcar? (Assume that all persons push the motorcar with the same muscular effort.)

Answer: Let each person applies a force F on a motorcar of mass, $m = 1200 \text{ kg}$.

When two persons push the car, they just manage to move it at a uniform velocity. It means that their combined force $2F$ is just balanced by force of friction due to road and car moves with a uniform velocity.

When three persons push the car, they apply a total force $3F$ on the car.

$$\begin{aligned} \text{Now net unbalanced force' on the car} &= \text{force applied by three persons} - \text{frictional force} \\ &= 3F - 2F = F \end{aligned}$$

As now acceleration $a = 0.2 \text{ ms}^{-2}$, hence

$$F = ma = 1200 \times 0.2 = 240 \text{ N}$$

Hence each person pushes the car with a force of 240 N.

Question 3. A hammer of mass 500 g, moving at 50 ms^{-1} , strikes a nail. The nail stops the hammer in a very short time of 0.01 s. What is the force of the nail on the hammer?

Answer:

Mass of hammer $m = 500 \text{ g} = 0.5 \text{ kg}$

Initial velocity of hammer $u = 50 \text{ ms}^{-1}$

Final velocity of hammer $v = 0$ and time $t = 0.01 \text{ s}$

$$\therefore \text{Acceleration of the hammer, } a = \frac{v - u}{t} = \frac{0 - 50}{0.01} = -5000 \text{ ms}^{-2}$$

\therefore Force applied by the nail on hammer

$$\begin{aligned} F &= ma = (0.5) \times (-5000) \\ &= -2500 \text{ N} \end{aligned}$$

-ve sign of force suggests that the force is opposing the motion of hammer.

Question 4. A motorcar of mass 1200 kg is moving along a straight line with a uniform velocity of 90 km/h. Its velocity is slowed down to 18 km/h in 4 s by an unbalanced external force. Calculate the acceleration and change in momentum. Also calculate the magnitude of the force required.

Answer:

$$\text{Initial velocity of car } u = 90 \text{ km/h} = 90 \times \frac{5}{18} \text{ ms}^{-1} = 25 \text{ ms}^{-1}$$

$$\text{Final velocity of car} = 18 \text{ kmh}^{-1} = 18 \times \frac{5}{18} = 5 \text{ ms}^{-1}$$

$$\text{and time} \quad t = 4 \text{ s}$$

$$\text{Acceleration} \quad a = \frac{v - u}{t} = \frac{5 - 25}{4} = -5 \text{ ms}^{-2}$$

Change in momentum of car

$$\begin{aligned} mv - mu &= m(v - u) \\ &= 1200(5 - 25) = -24000 \text{ kg ms}^{-1} \end{aligned}$$

$$\text{Magnitude of force } F = ma = 1200 \times (-5) = -600 \text{ N}$$

-ve sign of acceleration, change in momentum and force suggests that the force is opposing the motion of motor car.

Question 5. A large truck and a car, both moving with a velocity of magnitude v , have a head-on collision and both of them come to a halt after that. If the collision lasts for 1 s:

(a) Which vehicle experiences the greater force of impact?

(b) Which vehicle experiences the greater change in momentum?

(c) Which vehicle experiences the greater acceleration?

(d) Why is the car likely to suffer more damage than the truck?

Answer:

- (a) During head on collision forces applied by truck and car are action-reaction forces. Hence both vehicles experience same (equal) force of impact.
- (b) Here initial velocity of both car and truck is same equal to v and final velocity of both is zero. But mass of truck is much more than that of car, hence change in momentum of truck is more than change in momentum of car.
- (c) For same force of impact, the acceleration of car will have greater magnitude because its mass is less.
- (d) Car suffers more damage than the truck, as acceleration of car is more, its velocity falls to zero in a shorter time and consequently, its momentum changes in a shorter time.

More Questions Solved

I. Multiple Choice Questions

Choose the correct option:

1. The S.I. unit of force is

(a) kgm/s (b) kgm/s^2

(c) Newton (d) Newton-meter

2. The product of mass and velocity gives a physical quantity

(a) force (b) inertia

(c) momentum (d) Newton

3. The rate of change of momentum of an object is proportional to

(a) mass of the body (b) velocity of the body

(c) net force applied on the body (d) none of these .

4. If two balls of different masses are dropped on sand, the depths of penetration is same if:

(a) heavier ball is dropped faster than lighter ball

(b) lighter ball is dropped faster than heavier ball

(c) the product ' mv ' is same for both bodies

(d) none of these

5. The coin remains at rest in the figure shown. This is due to



(a) inertia of rest

(b) two forces act on the coin which balance each other

(c) no unbalanced force acts on it

(d) all of these

6. A force of 50 N moves a body.

(a) Frictional force exerted on the body is less than 50 N

(b) Frictional force exerted on the body is more than 50 N

(c) None of these

(d) Both (a) and (b)

7. Fielder giving a swing while catching a ball is an example of

(a) inertia (b) momentum

(c) Newton's II law of motion (d) Newton's I law of motion

8. Action and reaction forces

(a) acts on same body (b) act on different bodies

(c) act in same direction (d) both (a) and (c)

9. When we stop pedaling the bicycle it stops because

(a) the earth's gravitational force acts on it

(b) it is not accelerated

(c) no unbalanced force acts on it

(d) frictional force acts on it

10. A football and a stone have same mass

(a) both have same inertia (b) both have same momentum

(c) both have different inertia (d) both have different momentum

Answer. 1—(c), 2—(c), 3—(c), 4-(c), 5-(d), 6-(a), 7-(c), 8-(b), 9-(d), 10-(a).

II. Very Short Answer Type Questions

Question 1. Define force.

Answer: It is a push or pull on an object that produces acceleration in the body on which it acts. 4

Question 2. What is S.I. unit of force?

Answer: S.I. unit of force is Newton.

Question 3. Define one Newton.

Answer: A force of one Newton produces an acceleration of 1 m/s^2 on an object of mass 1 kg. .

$1 \text{ N} = 1 \text{ kg m/s}^2$

Question 4. What is balanced force?

Answer: When forces acting on a body from the opposite direction do not change the state of rest or of motion of an object, such forces are called balanced forces.

Question 5. What is frictional force?

Answer: The force that always opposes the motion of object is called force of friction.

Question 6. What is inertia?

Answer: The natural tendency of an object to resist a change in their state of rest or of uniform motion is called inertia.

Question 7. State Newton's first law of motion.

Answer: An object remains in a state of rest or of uniform motion in a straight line unless acted upon by an external unbalanced force.

Question 8. State Newton's second law of motion.

Answer: The rate of change of momentum of an object is proportional to the applied unbalanced force in the direction of the force.

Question 9. What is momentum?

Answer: The momentum of an object is the product of its mass and velocity and has the same direction as that of the velocity. The S. I. unit is kg m/s . ($p = mv$)

Question 10. State Newton's III law of motion.

Answer: To every action, there is an equal and opposite reaction and they act on two different bodies.

Question 11. Which will have more inertia a body of mass 10 kg or a body of mass 20 kg?

Answer: A body of mass 20 kg will have more inertia.

Question 12. Name the factor on which the inertia of the body depends.

Answer: Inertia of a body depends upon the mass of the body.

Question 13. Name two factors which determine the momentum of a body.

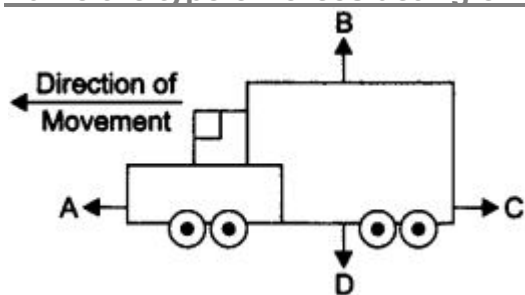
Answer: Two factors on which momentum of a body depend is mass and velocity. Momentum is directly proportional to the mass and velocity of the body.

Question 14. What decides the rate of change of momentum of an object?

Answer: The rate of change of momentum of an object is proportional to the applied unbalanced force in the direction of force.

Question 15. The diagram shows a moving truck. Forces A, B, C and D are acting on the truck.

Name the type of forces acting on a truck.



Answer: The forces A, B, C and D acting on the truck are:

A → driving force

B → reacting force

C → frictional force

D → weight/gravitational force

III. Short Answer Type Questions

Question 1. State the difference in balanced and unbalanced force.

Answer:

Balanced force	Unbalanced force
<ol style="list-style-type: none">Forces acting on a body from the opposite directions are same.It does not change the state of rest or of motion of an object.	<ol style="list-style-type: none">Forces acting on a body from two opposite directions are not same.It do change the state of rest or of motion of an object.

Question 2. What change will force bring in a body?

Answer: Force can bring following changes in the body:

1. It can change the speed of a body.
2. It can change the direction of motion of a body.
3. It can change the shape of the body.

Question 3. When a motorcar makes a sharp turn at a high speed, we tend to get thrown to one side. Explain why?

Answer: It is due to law of inertia. When we are sitting in car moving in straight line, we tend to continue in our straight-line motion. But when an unbalanced force is applied by the engine to change the direction of motion of the motorcar. We slip to one side of the seat due to the inertia of our body.

Question 4. Explain why it is dangerous to jump out of a moving bus.

Answer: While moving in a bus our body is in motion. On jumping out of a moving bus our feet touches the ground and come to rest. While the upper part of our body stays in motion and moves forward due to inertia of motion and hence we can fall in forward direction.
Hence, to avoid this we need to run forward in the direction of bus.

Question 5. Why do fielders pull their hand gradually with the moving ball while holding a catch?

Answer: While catching a. fast moving cricket ball, a fielder on the ground gradually pulls his hands backwards with the moving ball. This is done so that the fielder increases the time during which the high velocity of the moving ball decreases to zero. Thus, the acceleration of the ball is decreased and therefore the impact of catching the fast moving ball is reduced.

Question 6. In a high jump athletic event, why are athletes made to fall either on a cushioned bed or on a sand bed?

Answer: In a high jump athletic event, athletes are made to fall either on a cushioned bed or on a sand bed so as to increase the time of the athlete's fall to stop after making the jump. This decreases the rate of change of momentum and hence the force.

Question 7. How does a karate player breaks a slab of ice with a single blow?

Answer: A karate player applied the blow with large velocity in a very short interval of time on the ice slab which therefore exerts large amount of force on it and suddenly breaks the ice slab.

Question 8. What is law of conservation of momentum?

Answer: Momentum of two bodies before collision is equal to the momentum after collision.
In an isolated system, the total momentum remain conserved.

Question 9. Why are roads on mountains inclined inwards at turns?

Answer: A vehicle moving on mountains is in the inertia of motion. At a sudden turn there is a tendency of vehicle to fall off the road due to sudden change in the line of motion hence the roads are inclined inwards so that the vehicle does not fall down the mountain.

Question 10. For an athletic races why do athletes have a special posture with their right foot resting on a solid supporter?

Answer: Athletes have to run the heats and they rest their foot on a solid supports before start so that during the start of the race the athlete pushes the support with lot of force and this support gives him equal and opposite push to start the race and get a good start to compete for the race.

Question 11. Why do you think it is necessary to fasten your seat belts while travelling in your vehicle?

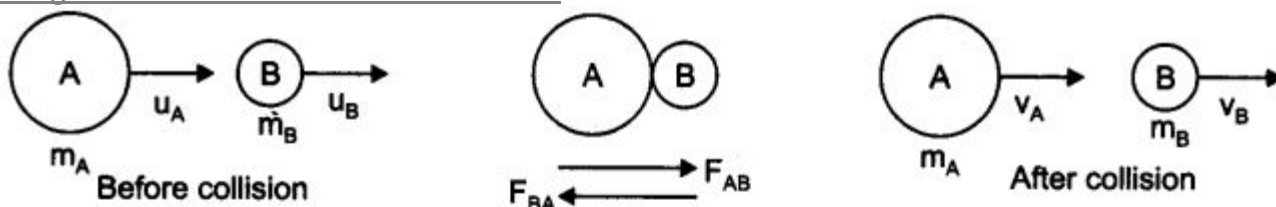
Or

How are safety belts helpful in preventing any accidents?

Answer: While we are travelling in a moving car, our body remains in the state of rest with respect to the seat. But when driver applies sudden breaks or stops the car our body tends to continue in the same state of motion because of its inertia. Therefore, this sudden break may cause injury to us by impact or collision. Hence, safety belt exerts a force on our body to make the forward motion slower.

Question 12. Explain how momentum gets conserved in collision of two bodies.

Answer: Consider two bodies i.e., balls A and B, the mass and initial velocities are $m_A u_A$ and $m_B u_B$ respectively before collision. The two bodies collide and force is exerted by each body. There is change in their velocities due to collision.



The momentum of ball A before collision is $m_A u_A$ and final momentum is $m_A v_A$. The rate of change of momentum, during the collision for 'A' will be $m_A \frac{(v_A - u_A)}{t}$.

Initial momentum of B is $m_B u_B$ and final momentum is $m_B v_B$.

Rate of change of momentum of B will be $m_B \frac{(v_B - u_B)}{t}$.

According to the third law of motion, the force F_{AB} exerted by ball A on ball B and the force F_{BA} exerted by the ball B on ball A must be equal and opposite to each other. Therefore

$$F_{AB} = F_{BA}$$

$$\text{or } m_A \frac{(v_A - u_A)}{t} = m_B \frac{(v_B - u_B)}{t}$$

$$\therefore m_A u_A + m_B u_B = m_A v_A + m_B v_B$$

$\therefore (m_A u_A + m_B u_B)$ is the total momentum of the two balls A and B before collision and $(m_A v_A + m_B v_B)$ is their total momentum after collision.

\therefore The total momentum of the two balls remains unchanged or conserved provided no other external force acts.

Question 13. When you kick a football it flies away but when you kick a stone you get hurt why?

Answer: This is because stone is heavier than football and heavier objects offer larger inertia. When we kick a football its mass is less and inertia is also less so force applied by our kick acts on it and hence it shows larger displacement but in case of stone, it has larger mass and offers larger inertia. When we kick (action) the stone it exerts an equal and opposite force (reaction) and hence it hurts the foot.

Question 14. If a person jumps from a height on a concrete surface he gets hurt. Explain.

Answer: When a person jumps from a height he is in state of inertia of motion. When he suddenly touches the ground he comes to rest in a very short time and hence the force exerted by the hard concrete surface on his body is very high, and the person gets hurt.

Question 15. What is the relation between Newton's three laws of motion?

Answer: Newton's first law explains about the unbalanced force required to bring change in the position of the body.

Second law states/explains about the amount of force required to produce a given acceleration.

And Newton's third law explains how these forces acting on a body are interrelated.

Question 16. Give any three examples in daily life which are based on Newton's third law of motion.

Answer: Three examples based on Newton's third law are :

1. **Swimming:** We push the water backward to move forward.
action – water is pushed behind
reaction – water pushes the swimmer ahead
2. **Firing gun:** A bullet fired from a gun and the gun recoils.
action – gun exerts force on the bullet
reaction – bullet exerts an equal and opposite force on the gun
3. **Launching of rocket**
action – hot gases from the rocket are released
reaction – the gases exert upward push to the rocket

Question 17. A bullet of mass 20 g is horizontally fired with a velocity 150 m/s from a pistol of mass 2 kg. What is the recoil velocity of the pistol?

Answer:

Bullet	Pistol
$m_1 \text{ mass} = 20 \text{ g} = 0.02 \text{ kg}$	$m_2 = 2 \text{ kg}$
$u_1 = 0$	$u_2 = 0$
$v_1 = + 150 \text{ m/s}$	$v_2 = ?$

Total momentum of the pistol and bullet before firing, when the gun is at rest

$$\begin{aligned} &= m_1 u_1 + m_2 u_2 \\ &= (0.02 \times 0) + (2 \times 0) \\ &= 0 \text{ kg m/s} \end{aligned}$$

Total momentum of the pistol and bullet after it is fired

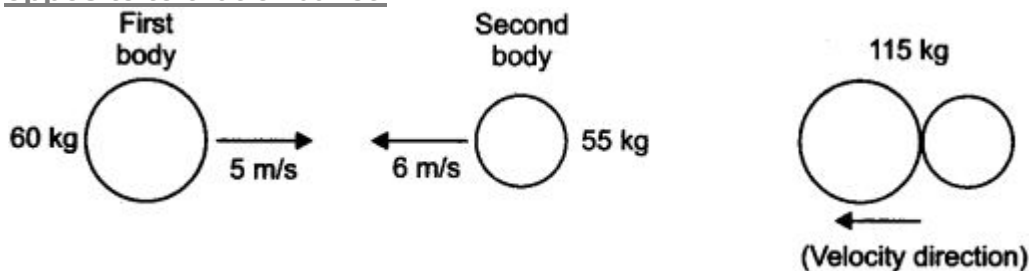
$$\begin{aligned} &= m_1 v_1 + m_2 v_2 \\ &= (0.02 \text{ kg} \times 150) + (2 \text{ kg} \times v) \\ &= 3 + 2v \end{aligned}$$

\therefore Total momentum after firing = Total momentum before firing

$$3 + 2v = 0$$

$$\therefore v = \frac{-3}{2} = -1.5 \text{ m/s}$$

Question 18. Negative sign indicates that the direction in which the pistol would recoil is opposite to that of bullet.



Two bodies as shown in the figure collide with each other and join thereafter. With what velocity will they move after combining together?

Answer:

$$m_1 = 60 \text{ kg}$$

$$m_2 = 55 \text{ kg}$$

$$u_1 = + 5 \text{ m/s positive direction}$$

$$u_2 = - 6 \text{ m/s negative direction}$$

$$v = ?$$

$$v = ?$$

Total momentum of two bodies before collision

$$= m_1 u_1 + m_2 u_2$$

$$= 60 \times 5 + 55 \times - 6$$

$$= - 30 \text{ kg m/s}$$

If v is the velocity of two joined bodies. After collision, the total momentum will be

$$= m_1 v_1 + m_2 v_2 \quad (\because v_1 = v_2)$$

$$= (m_1 + m_2) v$$

$$= (60 + 55) \text{ kg} \times v \text{ m/s}$$

$$= 115 v$$

\therefore According to law of conservation of momentum

$$m_1 u_1 + m_2 u_2 = m_1 v_1 + m_2 v_2$$

$$- 30 \text{ kg m/s} = 115 v$$

$$\therefore v = \frac{-30}{115} = - 0.26 \text{ m/s}$$

\therefore Two bodies will move with velocity 0.26 m/s in the direction of the second body.

IV. Long Answer Type Questions

Question 1. Explain Newton's second law of motion and with the-help of an example show how it is used in sports.

Answer: Newton's second law of motion: The rate of change of momentum of an object is proportional to the applied unbalanced force in the direction of the force.

Let us assume:

Object of mass m , is moving along a straight line with an initial velocity ' u '. It is uniformly accelerated to velocity v in time ' t ' by the application of force.

F throughout the time ' t '.

Initial momentum of the object = $p_1 = mu$

Final momentum of the object = $p_2 = mv$

$$\begin{aligned}\text{The change in momentum} &\propto p_2 - p_1 \\ &\propto mv - mu \\ &= m(v - u)\end{aligned}$$

The rate of change of momentum $\propto \frac{m(v - u)}{t}$

\therefore Applied force $F \propto \frac{m(v - u)}{t}$

$$F = \frac{km(v - u)}{t}$$

$$\therefore F = kma \qquad \therefore a = \frac{v - u}{t}$$

k = constant of proportionality

$F = \text{kg m/s}^2 = \text{Newton}$

Use of second law of motion in sports:

In cricket field, the fielder gradually pulls his hands backward while catching a ball. The fielder catches the ball and gives swing to his hand to increase the time during which the high velocity of the moving ball decreases to zero.

The acceleration of the ball is decreased and therefore the impact of catching the fast moving ball is reduced.

If not done so, then the fast moving ball will exert large force and may hurt the fielder.

Question 2. State all 3 Newton's law of motion. Explain inertia and momentum.

Answer:

Newton's I 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.

Newton's II law of motion: The rate of change of momentum of an object is proportional to the applied unbalanced force in the direction of the force.

Newton's III law of motion: To every action, there is an equal and opposite reaction and they act on two different bodies.

Inertia: The natural tendency of an object to resist a change in their state of rest or of uniform motion is called inertia.

Momentum: The momentum of an object is the product of its mass and velocity and has the same direction as that of the velocity. Its S.I. unit is kgm/s. $p = m \times v$

Question 3. Define force. Give its unit and define it. What are different types forces?

Answer: Force: It is a push or pull on an object that produces acceleration in the body on which it

acts.

A force can do 3 things on a body

(a) It can change the speed of a body.

(b) It can change the direction of motion of a body.

(c) It can change the shape of the body.

The S.I. unit of force is Newton.

Newton: A force of one Newton produces an acceleration of 1 m/s^2 on an object of mass 1 kg .

$1 \text{ N} = 1 \text{ kg m/s}^2$

Types of forces:

1. **Balanced force:** When the forces acting on a body from the opposite direction do not change the state of rest or of motion of an object, such forces are called balanced forces.
2. **Unbalanced force:** When two opposite forces acting on a body move a body in the direction of the greater force or change the state of rest, such forces are called as unbalanced force.
3. **Frictional force:** The force that always opposes the motion of object is called force of friction.

Question 4. What is inertia? Explain different types of inertia. Give 3 examples in daily life which shows inertia.

Answer:

Inertia: The natural tendency of an object to resist change in their state of rest or of motion is called inertia.

The mass of an object is a measure of its inertia. Its S.I. unit is kg.

Types of inertia:

Inertia of rest: The object at rest will continue to remain at rest unless acted upon by an external unbalanced force.

Inertia of motion: The object in the state of uniform motion will continue to remain in motion with same speed and direction unless it is acted upon by an external unbalanced force. .

Three examples of inertia in daily life are:

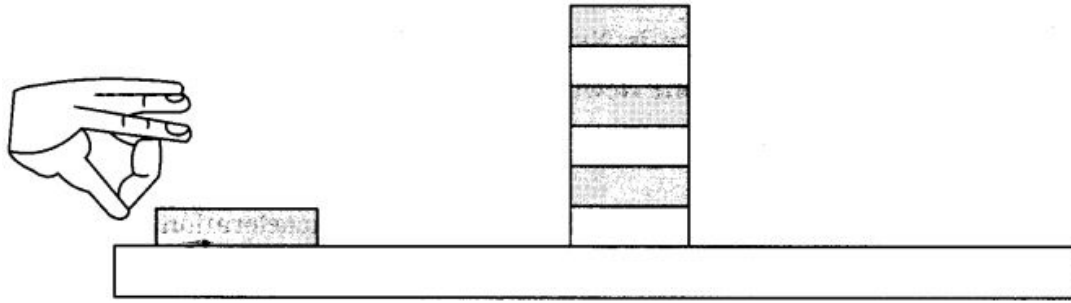
1. When we are travelling in a vehicle and sudden brakes are applied we tend to fall forward.
2. When we shake the branch of a tree vigorously, leaves fall down.
3. If we want to remove the dust from carpet we beat the carpet so that dust fall down.

V. Activity-based Questions

Question 1.

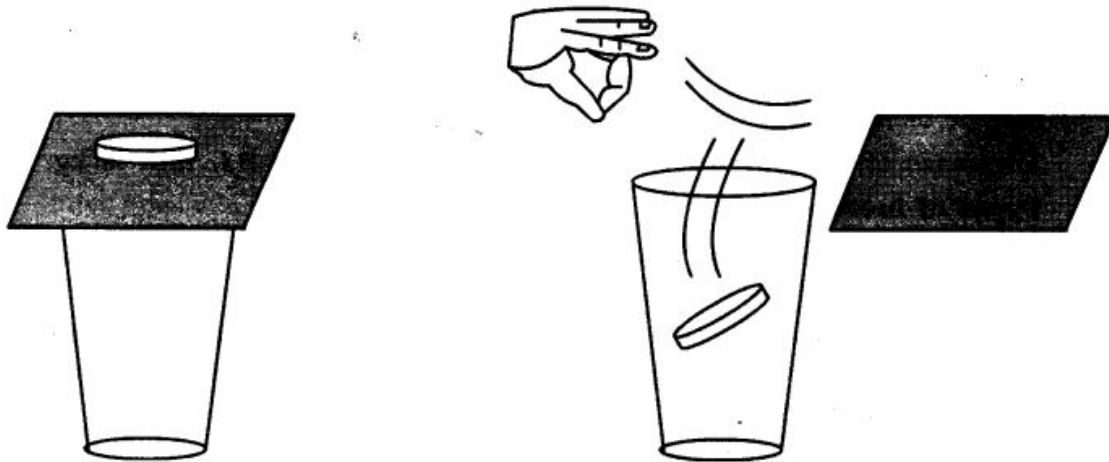
- Make a pile of similar carom coins on a table, as shown in the figure.
- Attempt a sharp horizontal hit at the bottom of the pile using another carom coin or striker. If the hit is strong enough the bottom coin moves out quickly. Once the lowest coin is removed, the inertia of the other coins makes them 'fall' vertically on the table.

Inertia: It is the tendency of a body to maintain its state of rest or of motion.



Question 2.

- Set a five-rupees coin on a stiff card covering an empty glass tumbler standing on a table as shown in the figure.
- Give the card a sharp horizontal flick with a finger. If we do it fast then the card shoots away, allowing the coin to fall vertically into the glass tumbler due to its inertia.
- The inertia of the coin tries to maintain its state of rest even when the card flows off.



Quick flicking of card leads to fall of coin in glass.

Answer: The force applied on the card due to flicking changes the inertia of the card but the coin resist a change and stay at the rest i.e. inertia of rest and due to gravity falls down in the tumbler.

Question 3.

- Place a water-filled tumbler on a tray.
- Hold the tray and turn around as fast as you can.
- We observe that the water spills. Why?

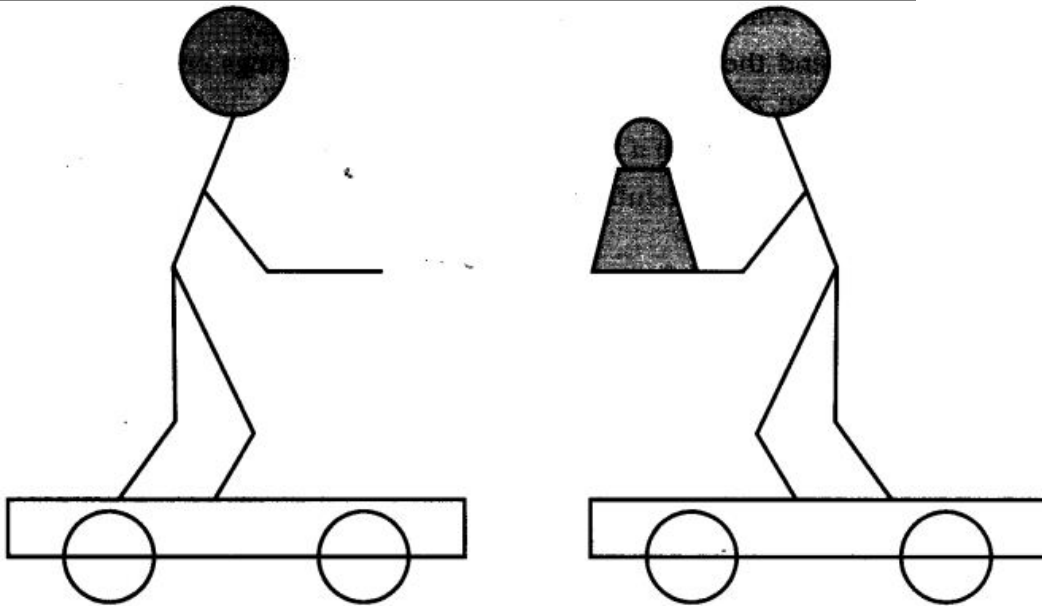
Answer: The water-filled in tumbler and tray are at rest. On moving/turning around the tray at faster speed the water spills because the tray and the tumbler comes into motion while the water in the tumbler remain at inertia of rest.

Question 4.

- Request two children to stand on two separate carts as shown on the next page.
- Give them a bag full of sand or some other heavy object. Ask them to play a game of catch with the bag.
- Does each of them receive an instantaneous reaction as a result of throwing the sand bag (action)?
- You can paint a white line on cartwheels to observe the motion of the two carts when the children throw the bag towards each other.

Answer. Yes, in this case each of them receives an instantaneous reaction as a result of throwing the sand bag.

This activity explain Newton's III law of motion i.e., the force is exerted forward in throwing the bag full of sand and the person who is throwing it gets pushed backward.

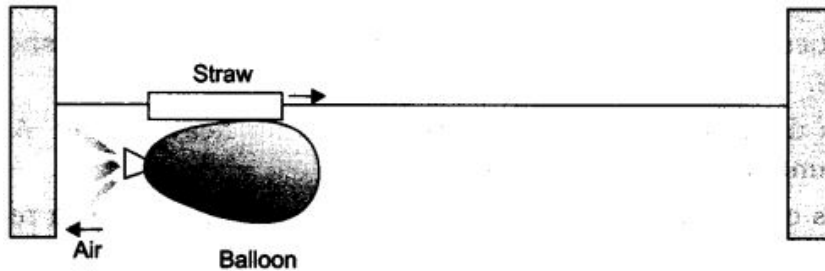


Action and reaction taking place simultaneously on two different bodies

Question 5.

- Take a big rubber balloon and inflate it fully. Tie its neck using a thread. Also using adhesive tape, fix a straw on the surface of this balloon.
- Pass a thread through the straw and hold one end of the thread in your hand or fix it on the wall.
- Ask your friend to hold the other end of the thread or fix it on a wall at some distance. The arrangement is shown in the figure below.
- Now remove the thread tied on the neck of balloon. Let the air escape from the mouth of the balloon.

- Observe the direction in which the straw moves.



Observation:

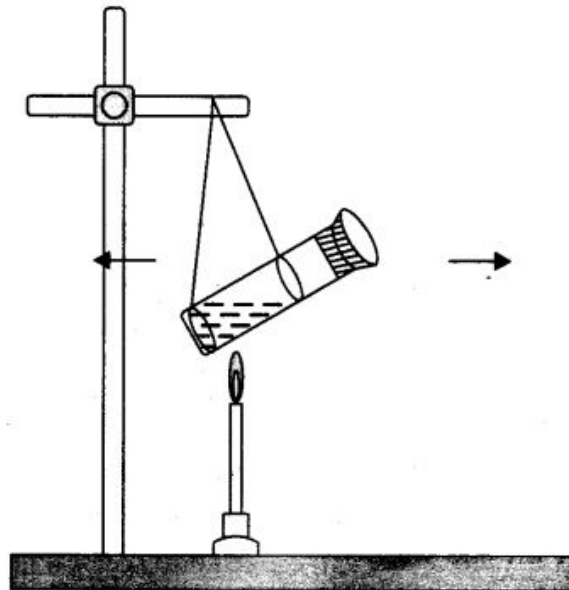
When the air escapes out from the balloon the straw moves in the opposite direction of the air moved out of the balloon.

This activity explains the law of conservation of momentum and Newton's III law of motion.

Initial momentum = Final momentum

Question 6.

- Take a test tube of good quality glass material and put a small amount of water in it.
- Place a stop cork at the mouth of it.
- Now suspend the test tube horizontally by two strings or wires as shown in the figure on next page.
- Heat the test tube with a burner until water vaporises and the cork blows out.
- Observe that the test tube recoils in the direction opposite to the direction of the cork.



Observation:

The cork is pushed out in forward direction by the hot steam. The test tube is pushed in the backward direction.

It explain Newton's III law of motion and conservation of momentum.

VI. Value-based Questions

Question 1. Class V students were playing cricket with the cork ball in the school campus. Charu a senior student told them about the accidents that can occur due to cork ball in the campus and also advised them to bring soft cosco ball to play the game.

(a) Why it was safe to play with soft ball and not with hard cork ball?

(b) A player pulls his hands backwards after holding the ball shot at high speed. Why?

(c) What value of Charu is seen in this act?

Answer:

(a) The soft ball will have less inertia as compared to the heavy ball and it would not hurt the players.

(b) By pulling the hand backwards it reduces the force exerted by the ball on hands.

(c) Charu showed the value of being responsible and helpful by nature.

Question 2. Saksham saw his karate expert friend breaking a slate. He tried to break the slate but Saksham's friend stopped him from doing so and told him that it would hurt, one needs lot of practice in doing so.

(a) How can a karate expert break the slate without any injury to his hand?

(b) What is Newton's third law of motion?

(c) What value of Saksham's friend, is seen in the above case?

Answer:

(a) A karate player applies the blow with large velocity in a very short interval of time on the slate, therefore large force is exerted on the slate and it breaks.

(b) To every action there is an equal and opposite reaction, both act on different bodies.

Saksham's friend showed the value of being responsible and caring friend.

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In – Text Questions Solved

Ncert TextBook Page 141

Question 1. Why is it difficult to hold a school bag having a strap made of a thin and strong string?

Answer: The force exerted by a thin and strong string is distributed to very less area and hence the force applied due to the bag is more, the pressure exerted on the body by thin straps will be more and hence will be more painful.

As pressure is inversely proportional to area, if the area is reduced pressure

increases $\left(\text{pressure} \propto \frac{1}{\text{Area}} \right)$

Question 2. What do you mean by buoyancy?

Answer: The upward force exerted by any fluid (liquid, gas) on an object is known as upthrust or buoyancy.

Question 3. Why does an object float or sink when placed on the surface of water?

Answer: The density of the objects and water decides the floating or sinking of the object in water. The density of water is 1 gm/cm³.

- If the density of an object is less than the density of water then the object will float.
- If the density of an object is more than the density of water then the object will sink.

Ncert TextBook Page 142**Question 1. You find your mass to be 42 kg on a weighing machine. Is your mass more or less than 42 kg?**

Answer: The weighing machine actually measures the weight of the body as the acceleration due to gravity 'g' is acting on the body. Hence the mass reading of 42 kg given by a weighing machine is same as the actual mass of the body. As mass is the quantity of inertia, it remains the same.

Question 2. You have a bag of cotton and an iron bar, each indicating a mass of 100 kg when measured on a weighing machine. In reality, one is heavier than other. Can you say which one is heavier and why?

Answer: The heaviness of the bag can be given by density

$$\text{Density} = \frac{\text{mass}}{\text{volume}}$$

Mass of both cotton bag and iron bag is same. But the volume of cotton bag is more than the iron bag.

Hence density is inversely proportional to volume. The bag of iron will be heavier.

Questions From Ncert Text book**Question 19. In what direction does the buoyant force on an object immersed in a liquid act?**

Answer: The buoyant force on an object immersed in a liquid acts upwards, i.e. opposite to the direction of the force exerted by the object.

Question 20. Why does a block of plastic released under water come up to the surface of water?

Answer. The floating or sinking of a body in the water is decided by the density of both the body and water's buoyant force acting on the body by the liquid.

The density of plastic is less than the water and the buoyant force exerted by water on the plastic block is greater than the force exerted by plastic on the water.

Question 21. The volume of 50 g of a substance is 20 cm³. If the density of water is 1 g/cm³, will the substance float or sink?

Answer.

$$\text{Mass} = 50 \text{ g}$$

$$\text{Volume} = 20 \text{ cm}^3$$

$$\text{Density} = \frac{\text{Mass}}{\text{Volume}}$$

$$\therefore \text{Density of a given substance} = \frac{50 \text{ g}}{20 \text{ cm}^3}$$

$$= 2.5 \text{ g/cm}^3$$

$$\text{Density of water} = 1 \text{ g/cm}^3$$

As the density of a given substance is more than the density of water. The substance will sink in water.

Question 22. The volume of a 500 g sealed packet is 350 cm³. Will the packet float or sink in water if the density of water is 1 g/cm³? What will be the mass of the water displaced by this packet?

Answer:

Mass of the packet = 500 g

Volume of the packet = 350 cm³

Density of the packet = ?

$$\text{Density} = \frac{\text{Mass}}{\text{Volume}} = \frac{500 \text{ g}}{350 \text{ cm}^3} = 1.428 \text{ g/cm}^3.$$

Density of water = 1 g/cm³

The packet will sink in water as the density of packet is greater than the density of water.


Mass of the water displaced by this packet

$$\begin{aligned} &= \text{Volume of the packet} \times \text{Density of water} \\ &= 350 \text{ cm}^3 \times 1 \text{ g/cm}^3 \\ &= 350 \text{ g} \end{aligned}$$

More Questions Solved

I. Multiple Choice Questions

Choose the correct option:

- 
- The device used to measure the purity of milk is
(a) hydrometer (b) lactometer
(c) hygrometer (d) maltometer
 - The cork floats while the nail sinks in the water, this is due to
(a) density of cork is more than nail
(b) density of nail is more than cork.
(c) density of cork is less than the density of water.
(d) density of iron is less than the density of water.
 - The relative density of silver is 10.8 and the density of water is 10³ kg/m³. The density of silver is
(a) 1.8 x 10⁴ N/m³ (b) 10.8 x 10³ N/m³
(c) 1.8 x 10⁴ kg/m³ (d) 10.8 x 10⁴ kg/m³
 - Buoyant force exerted by different fluids on a given body is
(a) same (b) different
(c) zero (d) negligible
 - Liquid A is denser than liquid B, a body of wood is dipped in both the liquids? The buoyant force experienced by the body in
(a) liquid A is more (b) liquid B is more

(c) liquid A is less (d) none of the above

Answer. 1 -(b), 2—(c), 3—(b), 4-(b), 5—(a).

II. Very Short Answer Type Questions

Question 1. What is the S.I. unit of thrust?

Answer: Newton.

Question 2. What is the S.I. unit of pressure?

Answer: The S.I. unit of pressure = N/m^2 = Pascal.

Question 3. Define thrust.

Answer: The net force exerted by a body in a particular direction is called thrust.

Question 4. Define pressure.

Answer: The force exerted per unit area is called pressure.

Question 5. Why is it easier to swim in sea water than in river water?

Answer: The density of sea water is more due to dissolved salts in it as compared to the density of river water. Hence the buoyant force exerted on the swimmer by the sea water is more which helps in floating and makes swimming easier.

Question 6. Why a truck or a motorbike has much wider tyres?

Answer: The pressure exerted by it can be distributed to more area, and avoid the wear and tear of tyres.

Question 7. Why are knives sharp?

Answer: To increase the pressure, area is reduced,
As pressure $\propto 1/\text{Area}$ hence the pressure or force exerted on a body increases.

Question 8. Why is the wall of dam reservoir thicker at the bottom?

Answer: The pressure of water in dams at the bottom is more, to withstand this pressure the dams have wider walls.

Question 9. Why do nails have pointed tips?

Answer: The force exerted when acts on a smaller area, it exerts larger pressure. So the nails have pointed tips.

Question 10. While swimming why do we feel light?

Answer: The swimmer is exerted by an upward force by water, this phenomenon is called buoyancy and it makes the swimmer feel light.

Question 11. Define density and give its unit.

Answer: The density of a substance is defined as mass per unit volume. Its unit is kg/m^3 .

Question 12. What is relative density?

Answer: The relative density of a substance is the ratio-of its density to that of water.

$$\text{Relative density} = \frac{\text{density of a substance}}{\text{density of water}}$$

III. Short Answer Type Questions

Question 1. A ship made of iron does not sink but the iron rod sinks in water, why?

Answer: The iron rod sinks due to high density and less buoyant force exerted by the water on it, but in case of ship the surface area is increased, the upthrust experienced by the body is more. So it floats on water

Question 2. Camels can walk easily on desert sand but we are not comfortable walking on the sand. State reason.

Answer: Camels feet are broad and the larger area of the feet reduces the force/ pressure exerted by the body on the sand. But when we have to walk on the same sand, we sink because the pressure exerted by our body is not distributed but is directional.

Question 3. What is lactometer and hydrometer?

Answer: Lactometer is a device used to find the purity of a given sample of milk. Hydrometer is a device used to find the density of liquids.

Question 4. The relative density of silver is 10.8. What does this mean?

Answer: It means that the density of silver is 10.8 times more than that of water. T

Question 5. The relative density of gold is 19.3. The density of water is 10^3 kg/m^3 . What is the density of gold in S.I. unit?

Answer:

Relative density of gold = 19.3

$$\text{Relative density of gold} = \frac{\text{Density of gold}}{\text{Density of water}}$$

$$\begin{aligned}\therefore \text{Density of gold} &= \text{Relative density of gold} \times \text{Density of water} \\ &= 19.3 \times 10^3 \text{ kg/m}^3 \\ &= 19300 \text{ kg/m}^3.\end{aligned}$$

Question 6. State Archimedes' principle.

Answer: Archimedes' principle—When a body is immersed fully or partially in a fluid, it experiences an upward force that is equal to the weight of the fluid displaced by it. It is used in designing of ships and submarines.

Question 7. Two cork pieces of same size and mass are dipped in two beakers containing water and oil. One cork floats on water but another sink in oil. Why?

Answer: The cork floats on water because the density of cork is less than the density of water, and another cork sinks in the oil because the density of cork is more than the oil.

Question 8. What are fluids? Why is Archimedes' principle applicable only for fluids? Give the application of Archimedes' principle.

Answer: Fluids are the substances which can flow e.g., gases and liquids are fluids. Archimedes' principle is based on the upward force exerted by fluids on any object immersed in the fluid. Hence it is applicable only for fluids.
Applications of Archimedes' principle:

1. It is used in designing of ship and submarine.
2. It is used in designing lactometer, used to determine the purity of milk,
3. To make hydrometers, used to determine the density of liquids.

IV. Long Answer Type Questions

Question 1. With the help of an activity prove that the force acting on a smaller area exerts a larger pressure?

Answer: Consider a block of wood kept on a table top. The mass of the wooden block is 5 kg. Its dimension is 40 cm x 20 cm x 10 cm.

Now, we have to find the pressure exerted by the wooden block on the table top by keeping it vertically and horizontally.

The mass of the wooden block = 5 kg

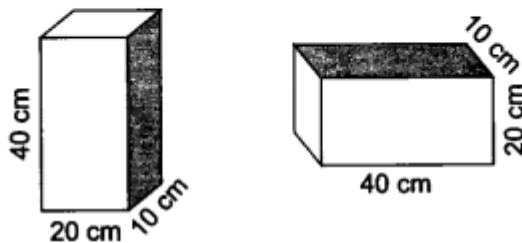
Weight of the wooden block applies a thrust on the table top

$$\begin{aligned}\therefore \text{Thrust} &= F = m \times g \\ &= 5 \text{ kg} \times 9.8 \text{ m/s}^2 = 49 \text{ N}\end{aligned}$$

(case a)—When the wooden box is kept vertically with sides 20 cm x 10 cm.

$$\begin{aligned}\text{Area of a side} &= \text{length} \times \text{breadth} \\ &= 20 \text{ cm} \times 10 \text{ cm} \\ &= 200 \text{ cm}^2 = 0.02 \text{ m}^2\end{aligned}$$

$$\text{Pressure} = \frac{\text{Thrust}}{\text{Area}} = \frac{49 \text{ N}}{0.02 \text{ m}^2} = 2450 \text{ N/m}^2$$



(case b)—When the block is kept horizontally with side 40 cm x 20 cm.

$$\begin{aligned}\text{Area} &= \text{length} \times \text{breadth} \\ &= 40 \text{ cm} \times 20 \text{ cm} \\ &= 800 \text{ cm}^2 = 0.08 \text{ m}^2\end{aligned}$$

$$\text{Pressure} = \frac{\text{Thrust}}{\text{Area}} = \frac{49 \text{ N}}{0.08 \text{ m}^2} = 612.5 \text{ N/m}^2$$

\therefore The pressure exerted by the box in case (a) is more as compared to the pressure exerted in case (b).

The area is reduced and the pressure exerted is more.

This shows that pressure $\propto 1/\text{area}$.

Pressure will be larger if the area is reduced.

Application:

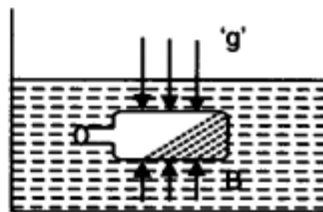
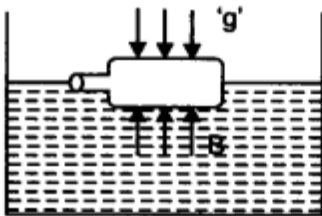
- Nails have pointed tips.
- Knives have sharp edges.
- Needles have pointed tips.

V. Activity – Based Questions

Question 1.

- Take an empty plastic bottle. Close the mouth of the bottle with an airtight stopper. Put it in a bucket filled with water. You see that the bottle floats.
- Push the bottle into the water. You feel an upward push. Try to push it further down. You will find it difficult to push deeper and deeper. This indicates that water exerts a force on the bottle in the upward direction. The upward force exerted by the water goes on increasing as the bottle is pushed deeper till it is completely immersed.
- Now, release the bottle. It bounces back to the surface.
- Does the force due to the gravitational attraction of the earth act on this bottle? If so, why doesn't the bottle stay immersed in water after it is released? How can you immerse the bottle in water?

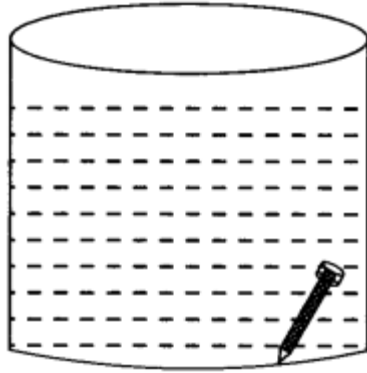
Answer: Yes, the bottle is attracted downwards by the earth's gravitational force. On pushing the bottle with force in the water it does not remain there but comes up because of the upward force exerted by water on the bottle. This upward force is called upthrust or buoyant force. When the upward force or buoyant force is greater than the downward force 'g' the bottle will float. But if downward force is greater than upward force, the bottle will sink. The upward force (buoyant force) acting on the bottle can be reduced by increasing the force on the bottle or by filling the bottle with sand, water etc.



Question 2.

- Take a beaker filled with water.
- Take an iron nail and place it on the surface of the water.
- Observe what happens.

Answer: The iron nail sinks as the density of nail is more and the downward force exerted on nail is more than the buoyant force.



Question 3.

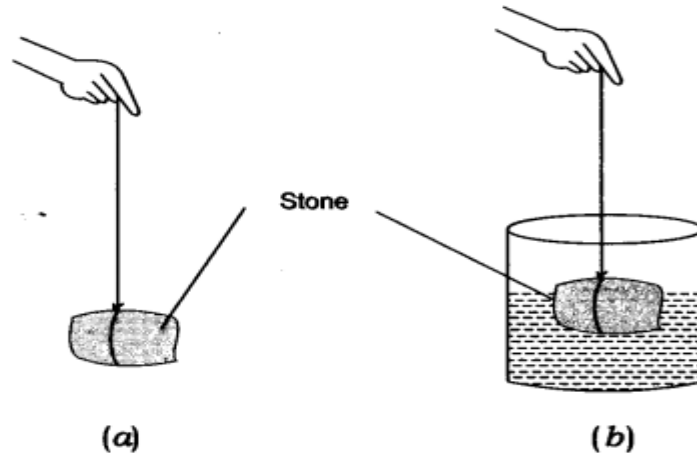
- Take a beaker filled with water.
- Take a piece of cork and an iron nail of equal mass.
- Place them on the surface of water.
- Observe what happens.

Answer: The iron nail sinks as the density of nail is more and the downward force exerted on nail is more than the buoyant force. The cork floats as the density of cork is less and the buoyant force exerted on it is more than the downward force.

Question 4.

- Take a piece of stone and tie it to one end of a rubber string or a spring balance.

- Suspend the stone by holding the balance or the string as shown in the figure (a).



- Note the elongation of the string or the reading on the spring balance due to the weight of the stone.
- Now, slowly dip the stone in the water in a container as shown in Fig. (b).
- Observe what happens to the elongation of the string or the reading on the balance.

Observations :

- In Fig. (a) the elongation of the string is 6 cm.
- In Fig. (b) when the stone is dipped in water the length of string reduced to 5 cm.
- The length of the string in case (b) decreases due to the upward force exerted by water on the stone called as buoyant force.

VI. Value – Based Questions

Question 1. A milkman sold his milk in the city and always carried lactometer with him. The customers trusted him and his business flourished.

- What is lactometer?
- What is the principle of working of lactometer?
- What value of milkman is seen in this case?

Answer.

- Lactometer is a device that measures the purity of milk.
- The principle of lactometer is 'Archimedes' principle'. It states that when a body is immersed fully or partially in a fluid, it experiences an upward force that is equal to the weight of the fluid displaced by it.
- Milkman is very honest and trustworthy.

Question 2. Reeta was wearing a high heel shoe for a beach party, her friend told her to wear flat shoes as she will be tired soon with high heels and will not feel comfortable,

- Why would one feel tired with high heel shoes on beach?
- Give the unit of pressure.
- What value of Reeta's friend is seen in the above act?

Answer:

- The high heel shoes would exert lot of pressure on the loose sand of beach and will sink more in the soil as compared to flat shoes. Hence large amount of force will be required to walk with heels.
- Unit of pressure is Pascal.
- Reeta's friend showed the value of being helpful, concerned and intelligent.

Question 3. In the school fair, there was a game in which one need to find the heaviest ball without holding them in hand. Three balls were given and few disposable glasses were kept. Tarun saw his friend struggling to win the game but he was unable to find the heaviest ball. Tarun helped him by dipping the three balls one by one in the glass'es full of water upto the brim and finally they won the game.

(a) Why did Tarun told his friend to dip the balls one by one in completely filled glass of water?

(b) Name the principle used here.

(c) What value of Tarun is reflected in this case?

Answer:

(d) Tarun wanted to measure the amount of water displaced by each ball when dipped in water.

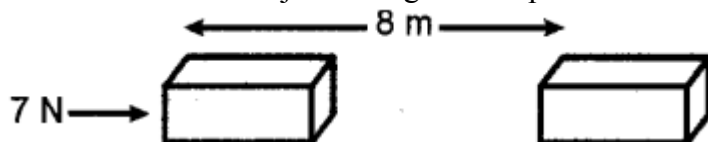
(b) The principle used is 'Archimedes' principle'.

(c) Tarun showed the value of being helpful, kind and intelligent.

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Q1: A force of 7 N acts on an object. The displacement is, say 8 m, in the direction of the force. Let us take it that the force acts on the object through the displacement. What is the work done in this case?



Given displacement = 8 m, Force = 7 N

Now, Work done = Force \times Displacement
 $= 7 \times 8 = 56 \text{ J}$

Work is said to be done when a force causes displacement of an object in the direction of applied force.

Q2. Write an expression for the work done when a force is acting on an object in the direction of its displacement.

Work done = Force x Displacement

Q3. Define 1J of work.

When a force of 1N causes a displacement of 1m, in its own direction the work done is said to be one joule.

Q4. A pair of bullocks exerts a force of 140 N on a plough. The field being ploughed is 15 m long. How much work is done in ploughing the length of the field?

Work done = Force x Displacement = $140 \times 15 = 2,100 \text{ J}$

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Q1. What is the kinetic energy of an object?

The energy possessed by a body by virtue of its motion is called kinetic energy.

Q2. Write an expression for the kinetic energy of an object.

The expression is $KE = \frac{1}{2} mv^2$, where 'm' is the mass and 'v' is the velocity of the body.

Q3. The kinetic energy of an object of mass, m moving with a velocity of 5 ms^{-1} is 25 J. What will be its kinetic energy when its velocity is doubled? What will be its kinetic energy when its velocity is increased three times?

Given $v = 5 \text{ m s}^{-1}$, $m = ?$, $KE = 25 \text{ J}$

Using the expression $KE = \frac{1}{2} mv^2$, we have

$$m = \frac{2 \times KE}{v^2} = \frac{2 \times 25}{(5)^2} = 2 \text{ kg}$$

(i) When velocity is double i.e., $v = 10 \text{ m s}^{-1}$, then we have

$$KE = \frac{1}{2} mv^2 = \frac{1}{2} \times 2 \times (10)^2 = 100 \text{ J}$$

(ii) When velocity is tripled i.e., $v = 15 \text{ m s}^{-1}$, then we have

$$KE = \frac{1}{2} mv^2 = \frac{1}{2} \times 2 \times (15)^2 = 225 \text{ J}$$

Q1. What is power?

Power is defined as the rate of doing work

Q2. Define 1 watt of power.

When a work of 1 joule is done in 1 s, the power is said to be one watt.

Q3. A lamp consumes 1000 J of electrical energy in 10 s. What is its power?

Given $W = 1000\text{J}$, $t = 10\text{s}$, $P = ?$

We know, $P = W/t = 1000/10 = 100\text{W}$

Q4. Define average power.

When a machine or person does different amounts of work or uses energy in different intervals of time, the ratio between the total work or energy consumed to the total time is average power.

Q1. Look at the activities listed below. Reason out whether or not work is done in the light of your understanding of the term 'work'.

Suma is swimming in a pond.

A donkey is carrying a load on its back.

A wind mill is lifting water from a well.

A green plant is carrying out photosynthesis.

An engine is pulling a train.

Food grains are getting dried in the sun.

A sailboat is moving due to wind energy.

Work is done because the displacement of swimmer takes place in the direction of applied force.

If the donkey is not moving, no work is done as the displacement of load does not take place in the direction of applied force.

Work is done, as the displacement takes place in the direction of force.

No work is done, because no displacement takes place.

Work is done, because displacement takes place in the direction of applied force.

No work is done, because displacement does not take place.

Work is done, because displacement takes place in the direction of the force.

Q2. An object thrown at a certain angle to the ground moves in a curved path and falls back to the ground. The initial and the final points of the path of the object lie on the same horizontal line. What is the work done by the force of gravity on the object?

Since the body returns to a point which is on the same horizontal line through the point of projection, no displacement has taken place against the force of gravity, therefore, no work is done by the force due to gravity.

Q3. A battery lights a bulb. Describe the energy changes involved in the process.

Within the electric cell of the battery the chemical energy changes into electrical energy. The electric energy on flowing through the filament of the bulb, first changes into heat energy and then into the light energy.

Q4. Certain force acting on a 20 kg mass changes its velocity from 5 m s^{-1} to 2 m s^{-1} . Calculate the work done by the force.

Work done by the force is equal to the change in kinetic energy produced in the body.

Now, $m = 20 \text{ kg}$, $u = 5 \text{ m s}^{-1}$, $v = 2 \text{ m s}^{-1}$, $W = ?$

Using the expression $W = \frac{1}{2} mv^2 - \frac{1}{2} mu^2$, we have

$$W = \frac{1}{2} m(v^2 - u^2) = \frac{1}{2} \times 20 ((2)^2 - (5)^2)$$

Or $W = -210 \text{ J}$

The negative sign indicates that work has been done in slowing the body.

Q5. A mass of 10 kg is at a point A on a table. It is moved to a point B. If the line joining A and B is horizontal, what is the work done on the object by the gravitational force? Explain your answer.

The work done is zero. This is because the gravitational force and displacement are perpendicular to each other.

Q6. The potential energy of a freely falling object decreases progressively. Does this violate the law of conservation of energy? Why?

It does not violate the law of conservation of energy. Whatever is the decrease in PE due to loss of height, same is the increase in the KE due to increase in velocity of the body.

Q7. What are the various energy transformations that occur when you are riding a bicycle?

The chemical energy of the food changes into heat and then to muscular energy. On paddling, the muscular energy changes into mechanical energy

Q8. Does the transfer of energy take place when you push a huge rock with all your might and fail to move it? Where is the energy you spend going?

Energy transfer does not take place as no displacement takes place in the direction of applied force. The energy spent is used to overcome inertia of rest of the rock.

Q9. A certain household has consumed 250 units of energy during a month. How much energy is this in joules?

Energy consumed in a month = 250 units

= 250 kW h

= 250 kW × 1 h

= 250 × 1000 W × 3600 s

= 900,000,000 J = 9.0×10^8 J

Q10. An object of mass 40 kg is raised to a height of 5 m above the ground. What is its potential energy? If the object is allowed to fall, find its kinetic energy when it is half-way down.

Q11. What is the work done by the force of gravity on a satellite moving round the earth? Justify your answer.

Q12. Can there be displacement of an object in the absence of any force acting on it? Think. Discuss this question with your friends and teacher.

The answer is both Yes and No. Yes because when an object moves in deep space from one point to another point in a straight line, the displacement takes place, without the application of force. No, because force cannot be zero for displacement on the surface of earth. Some force is essential.

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Q13 A person holds a bundle of hay over his head for 30 minutes and gets tired. Has he done some work or not? Justify your answer.

The person does not do work because no displacement takes place in the direction of applied force as the force acts in the vertically upward direction.

Q14. An electric heater is rated 1500 W. How much energy does it use in 10 hours?

Q15. Illustrate the law of conservation of energy by discussing the energy changes which occur when we draw a pendulum bob to one side and allow it to oscillate. Why does the bob eventually come to rest? What happens to its energy eventually? Is it a violation of the law of conservation of energy?

When the pendulum bob is pulled (say towards left), the energy supplied is stored in it in the form of PE on account of its higher position. When the pendulum is released so that it starts moving towards right, then its PE changes into KE such that in mean position, it has maximum KE, and Zero PE. As the pendulum moves towards extreme right, its KE changes into PE such that at the extreme position, it has maximum PE and zero KE. When it moves from this extreme position to mean position, its PE again changes to KE. This illustrates the law of conservation of energy. Eventually, the bob comes to rest, because during each oscillation a part of the energy possessed by it is transferred to air and in overcoming friction at the point of suspension. Thus, the energy of the pendulum is

dissipated in air.

The law of conservation of energy is not violated because the energy merely changes its form and is not destroyed.

Q16. An object of mass, m is moving with a constant velocity, v . How much work should be done on the object in order to bring the object to rest?

Q17. Calculate the work required to be done to stop a car of 1500 kg moving at a velocity of 60 km/h.
Q18.

Q19. Soni says that the acceleration in an object could be zero even when several forces are acting on it. Do you agree with her? Why?

Q20. Find the energy in kWh consumed in 10 hours by four devices of power 500 W each.

Q21. A freely falling object eventually stops on reaching the ground. What happens to its kinetic energy?

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IN-TEXT QUESTIONS SOLVED

NCERT TextBook Class 9 Science Page 162

Question 1. How does the sound produced by a vibrating object in a medium reach your ear?

Answer: Air is the commonest material through which sound propagates. When vibrating objects, like prongs of a tuning fork move forward, they push the molecules of the air in front of them. This in turn compresses the air, thus creating a region of high pressure and high density called compression. This compression in the air travels forward. When the prongs of the tuning fork move backward, they create a region of low pressure in the air, commonly called rarefaction.

This region has low pressure, low density, and more volume. As the tuning fork continues to vibrate, the regions of compression in the air alternate with the regions of rarefaction. These regions alternate

at the same place. The energy of vibrating tuning fork travels outward. This energy which reaches the ears, makes the eardrums to vibrate and thus we hear sound

NCERT TextBook Class 9 Science Page 163

Question 1. Explain how sound is produced by your school bell.

Answer: Air is the commonest material through which sound propagates. When school bell is rung, it pushes the molecules of the air in front of it. This in turn compresses the air, thus creating a region of high pressure and high density called compression. This compression in the air travels forward. When the bell moves back, it creates a region of low pressure in the air, commonly called rarefaction. This region has low pressure, low density, and more volume. As the bell continues to vibrate, the regions of compression in the air alternate with the regions of rarefaction. These regions alternate at the same place. The energy of vibrating bell travels outward. This energy which reaches the ears, makes the eardrums to vibrate and thus we hear sound.

Question 2. Why are sound waves called mechanical waves ?

Answer: Some mechanical energy is required to make an object vibrate. Sound energy cannot be produced on its own. The mechanical energy of vibrating object travels through a medium and finally reaches the ear. Therefore, the sound waves are called mechanical waves.

Question 3. Suppose you and your friend are on the moon. Will you be able to hear any-sound produced by your friend ?

Answer: No, I will not be able to hear sound, because moon has no atmosphere. Therefore, no sound waves can travel to your ears and, therefore, no sound is heard.

NCERT TextBook Class 9 Science Page 166 -I

Question 1. Which wave property determines (a) loudness, (b) Pitch ?

Answer: (a) The amplitude of the wave determines the loudness; more the amplitude of a wave, more is the loudness produced.

(b) The pitch is determined by the frequency of the wave. Higher the frequency of a wave more is its pitch and shriller is the sound.

Question 2. Guess which sound has a higher pitch; guitar or car horn ?

Answer: Car horn has a higher pitch than a guitar, because sound produced by the former is shriller than the latter.

NCERT TextBook Class 9 Science Page 166 -II

Question 1. What are wavelength, frequency, time period and amplitude of a sound wave ?

Answer: Frequency: The number of compressions or rarefactions taken together passing through a point in one second is called frequency.

Time Period: It is the time taken by two consecutive compressions or rarefactions to cross a point.

Amplitude: It is the magnitude of maximum displacement of a vibrating particle about its mean position.

Question 2. How are the wavelength and frequency of a sound wave related to its speed ?

Answer: Speed of sound = Frequency \times Wavelength

Question 3. Calculate the wavelength of a sound wave whose frequency is 220 Hz and speed is 440 m s⁻¹ in a given medium.

Answer: Frequency = 220 Hz

Speed of sound = 440 m s⁻¹

We know speed of sound = Frequency \times Wavelength = 220 \times Wavelength

$$\text{Wavelength} = \frac{V}{f} = \frac{440}{220} = 2\text{m}$$

Question 4. A person is listening to a tone of 500 Hz sitting at a distance of 450 m from the source of the sound. What is the time interval between successive compressions from the source ?

Answer:

$$v = 500 \text{ Hz}$$

$$\lambda = 450 \text{ m}$$

$$v = \frac{\lambda}{T}$$

$$T = \frac{\lambda}{v} = \frac{450}{500} = 0.9 \text{ second.}$$

Question 5. Distinguish between loudness and intensity of sound.

Answer: The loudness depends on energy per unit area of the wave and on the response of the ear but intensity depends only on the energy per unit area of the wave and is independent of the response of the ear.

Question 6. In which of the three media, air, water or iron, does sound travel the fastest at a particular temperature ?

Answer: Sound travels fastest in iron as compared to water and air.

An echo is returned in 3 s. What is the distance of the reflecting surface from the source, given the speed of sound is 342 m s^{-1}

Question 7. Why are the ceilings of concert halls curved ?

Answer: The ceilings of concert halls are curved because sound after reflection from it reaches all the corners of the hall and is audible to each person in the hall.

Question.8.What is the audible range of the average human ear ?

Answer. An average human ear can hear sound waves between frequencies 20 Hz to 20,000 Hz.

Question 9. What is the range of frequencies associated with (a) Infra sound ? (b) Ultrasound ?

Answer: (a) Infra sound : Sound waves between the Frequencies 1 and 20 Hz.

(b) Ultrasound : Sound waves of the frequencies above 20,000 Hz.

Exercises

Question 1. What is sound and how is it produced ?

Answer: Sound is mechanical energy which produces a sensation of hearing. When an Object is set into vibrations, sound is produced.

Question 3. Cite an experiment to show that sound needs a material medium for its propagation.

Answer: Take an electric circuit which consists of a cell, a switch and an electric bell arranged inside a bell jar, which stands on the platform of an evacuating pump. The switch of the bell is pressed to close the electric circuit. When there is air within the bell jar, sound is heard. Air is now pumped out of the bell jar. When the air is completely removed from the bell jar, no sound is heard as it is obvious from fig. because the medium of air which has to carry energy from the bell to the bell jar is removed. It shows that sound needs material medium for its propagation.

Question 4. Why is sound wave called a longitudinal wave ?

Answer: Sound wave is called longitudinal wave because the particles of the medium vibrate in the direction of the propagation of wave.

Question 5. Which characteristic of the sound helps you to identify your friend by his voice while sitting with others in a darkroom ?

Answer: The characteristic of sound is quality or timbre.

Question 6. Flash and thunder are produced simultaneously. But thunder is heard a few seconds after the flash is seen, why ?

Answer: Speed of sound is 330 m/sec in air medium at 0°C. Whereas speed of light is 3×10^8 m/sec. When we compare the speed of light with that of speed of sound, speed of light is greater than that of speed of sound. Therefore thunder is heard a few seconds after the flash is seen.

Question 7. A person has a hearing range from 20 Hz to 20 kHz. What are the typical wavelengths of sound waves in air corresponding to these two frequencies? Take the speed of sound in air as 344 ms^{-1} .

Answer:

When $\nu = 20 \text{ Hz}$

Speed of sound in air = 344 m/s.

wavelength, $\lambda = ?$

$$\text{Speed} = \text{Wavelength} \times \text{Frequency}$$

$$\therefore \text{Wavelength} = \frac{\text{Speed}}{\text{Frequency}} = \frac{344}{20} = 17.2 \text{ m.}$$

when $\nu = 20 \text{ kHz}$

Speed of sound in air = 344 m/s.

$\lambda = ?$

$$(\text{speed}), \nu = \nu \times \lambda$$

$$\lambda = \frac{\nu}{\nu} = \frac{344}{20,000} = 0.0172 \text{ m.}$$

Thus, the wavelength of sound corresponding to 20 Hz and 20 kHz is 17.2 m and 0.0172 m respectively.

Question 8. Two children are at opposite ends of an aluminium rod. One strikes the end of the rod with a stone. Find the ratio of times taken by the sound wave in air and in aluminium to reach the second child.

Answer:

Speed of sound in air, $V_1 = 346$ m/sec.

Speed of sound in aluminium, $V_2 = 6420$ m/sec.

Let the length of the aluminium rod = x m.

We know that speed = $\frac{\text{distance}}{\text{time}}$

\therefore Time = $\frac{\text{distance}}{\text{speed}}$

Time taken in air = $\frac{x}{346}$ sec. (\because distance = x m)

Time taken in aluminium = $\frac{x}{6420}$ sec.

$$\text{Required ratio} = \frac{\frac{x}{346}}{\frac{x}{6420}} = \frac{x}{346} \times \frac{6420}{x} = 18.55$$

Question 9. The frequency of a source/sound is 100 Hz. How many times does it vibrate in a minute?

Answer:

Frequency of sound = 100 Hz.

Time taken = 1 minute = 60 sec

We know, Frequency = $\frac{\text{No. of oscillations}}{\text{Time taken}}$

\therefore No. of oscillations = $v \times t$
= 100×60
= 6000 times.

Question 10. Does sound follow the same laws of reflection as light does? Explain.

Answer: Yes. Sound follows the same laws of reflection as that of light because,

(i) Angle of incidence of sound is always equal to that of angle of reflection of sound waves.

(ii) The direction in which sound is incident, the direction in which it is reflected and normal all lie in the same plane.

Question 11. When a sound is reflected from a distant object, an echo is produced. Let the distance between the reflecting surface and the source of sound production remains the same. Do you hear echo sound on a hotter day?

Answer:

$$\text{Time} = \frac{\text{Distance}}{\text{Speed}}$$

Time is inversely proportional to the speed. As the temperature increases, the speed increases. Thus on a hot day due to high temperature the speed of sound increases. Hence the time will decrease and we can hear the echo sooner.

Question 12. Give two practical applications of reflection of sound waves.

Answer: Reflection of sound is used in megaphones, horns and musical instruments such as trumpets and shehna. It is used in stethoscope for hearing patient's heartbeat. Ceilings of the concert halls are curved, so that sound after reflection reaches all corners of the hall. (Any two practical applications can be written).

Question 13. A stone dropped from the top of a tower 500 m high into a pond of water at the base of the tower. When is the splash heard at the top? Giving, $g = 10 \text{ ms}^{-2}$ and speed of sound = 340 m s^{-1} .

Answer:

Distance covered by the stone = 500 m.

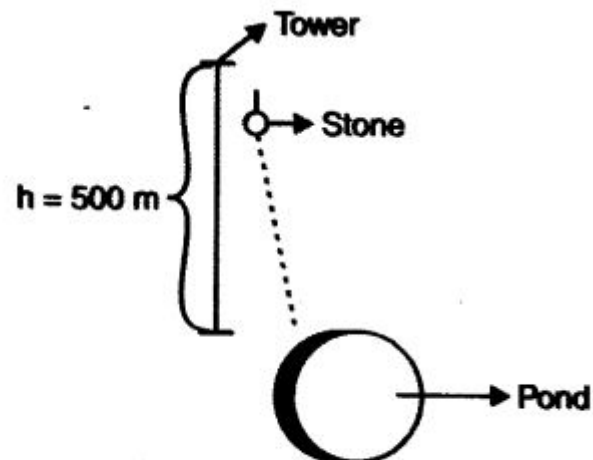
Initial velocity = 0 m/sec.

Acceleration due to gravity = 10 m/sec^2 .

$$s = ut + \frac{1}{2} gt^2.$$

$$500 = 0 \times t + \frac{1}{2} \times 10 \times t^2$$

$$\frac{500}{5} = t^2 \Rightarrow t = 10 \text{ sec.}$$



Thus in 10 sec. the stone reaches the pond.

Speed of sound = 340 m/sec.

Time taken by sound to cover a distance of

$$500 \text{ m} = \frac{500}{340} = 1.47 \text{ sec}$$

∴ Total time taken = 10 + 1.47 = 11.47 sec.

In 11.47 sec the splash will be heard on the top.

Question 14. A sound wave travels at a speed of 339 ms^{-1} . If its wavelength is 1.5 cm, what is the frequency of the wave? Will it be audible?

Answer:

Speed of sound = 339 m/sec.

Wavelength λ = 1.5 cm = 0.015 m.

$$\text{Frequency} = \frac{\text{Speed}}{\text{Wavelength}} = \frac{339}{0.015} = 22600 \text{ Hz.}$$

It will not be audible.

Question 15. What is reverberation? How can it be reduced?

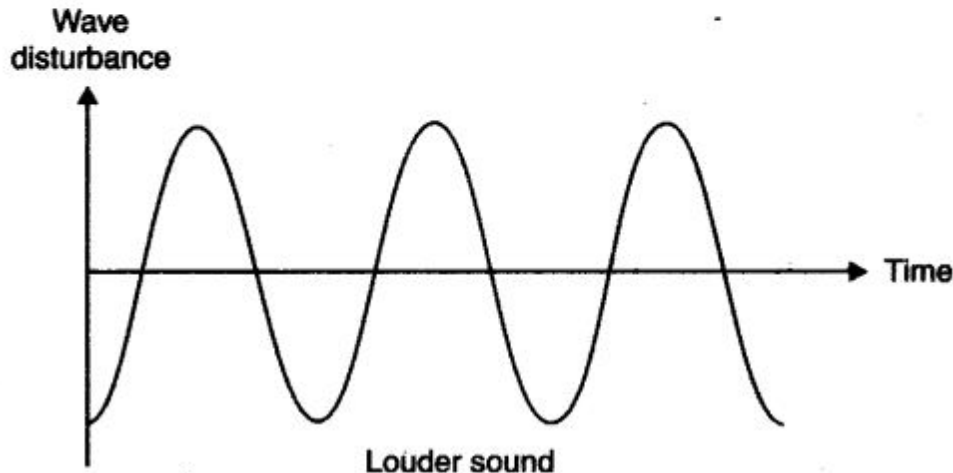
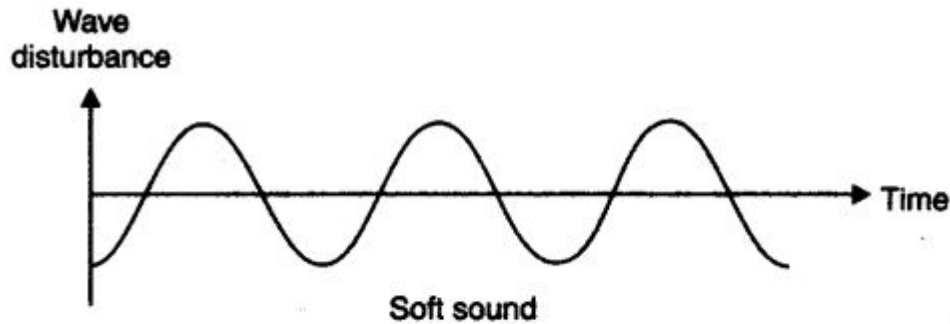
Answer: The persistence of sound in an auditorium is the result of repeated reflections of sound and is called reverberation.

To reduce the undesirable effects due to reverberation, roofs and walls of the auditorium are generally covered with sound absorbent materials like compressed fiberboard, rough plaster or draperies. The seat materials are also selected having sound absorption properties.

Question 16. What is loudness of sound? What factors does it depend on?

Answer: The loudness of sound is determined by its amplitude. The amplitude of the sound wave depends upon the force with which an object is made to vibrate. Loud sound can travel a larger distance as it is associated with higher energy. A sound waves spreads out from its source. As it

moves away from the source its amplitude as well as its loudness decreases.



Question 17. Explain how bats use ultrasound to catch a prey.

Answer: Bats search out its prey by emitting and detecting reflections of ultrasonic waves. The high-pitched ultrasonic squeaks of bat are reflected from the obstacles or prey and return to bat's ear. The nature of reflection tells the bat where the obstacle or prey is and what it is like.

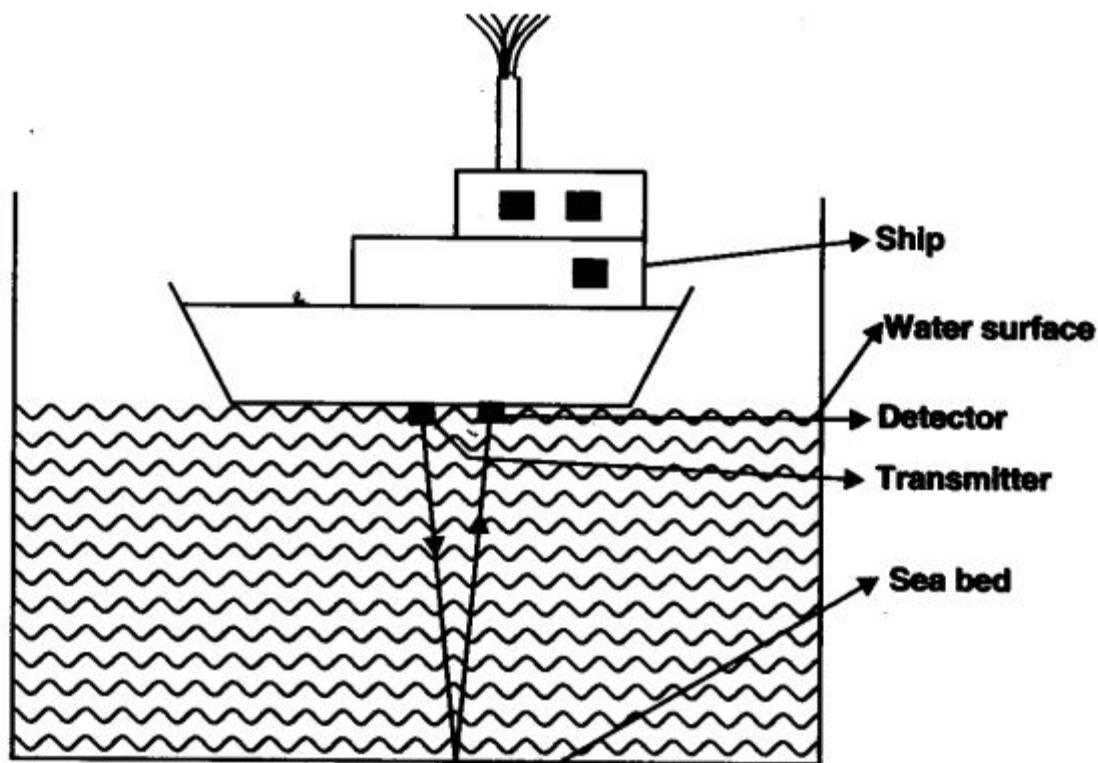
Question 18. How is ultrasound used for cleaning?

Answer: Ultrasound is used to clean parts located in hard-to-reach places (i.e.) spiral tube, odd shaped parts, electronic components etc. Objects to be cleaned are placed in a cleaning solution and ultrasonic waves are sent into the solution. Due to the high frequency, the dust particles, grease get detached and drop out. The objects thus get thoroughly cleaned.

Question 19. Explain the working and application of a sonar.

Answer: Working: SONAR Consists of a transmitter and a detector and is installed in a boat or a ship as shown in the fig. The transmitter produces and transmits ultrasonic waves. These waves travel through water and after striking the object on the seabed, get reflected back and are sensed by the detector. The detector converts the ultrasonic waves into electrical signals which are appropriately

interpreted. The distance of the object that reflected the sound wave can be calculated by knowing the speed of sound in water and the time interval between the transmission and reception of the ultrasound.



Ultrasound sent by the transmitter and received by the detector

Let, Depth of the sea = d

Speed of sound in sea water = v

Time taken for transmission and reception of signal = t

$$\therefore \text{Time taken to travel a distance, } d = \frac{t}{2}$$

$$\therefore \text{Depth of the sea, } d = \frac{t}{2} \times v \quad (\because \text{distance} = \text{speed} \times \text{time})$$

Question 20. A sonar device on a submarine sends out a signal and receives an echo 5 s later. Calculate the speed of sound in water if the distance of the object from the submarine is 3625 m.

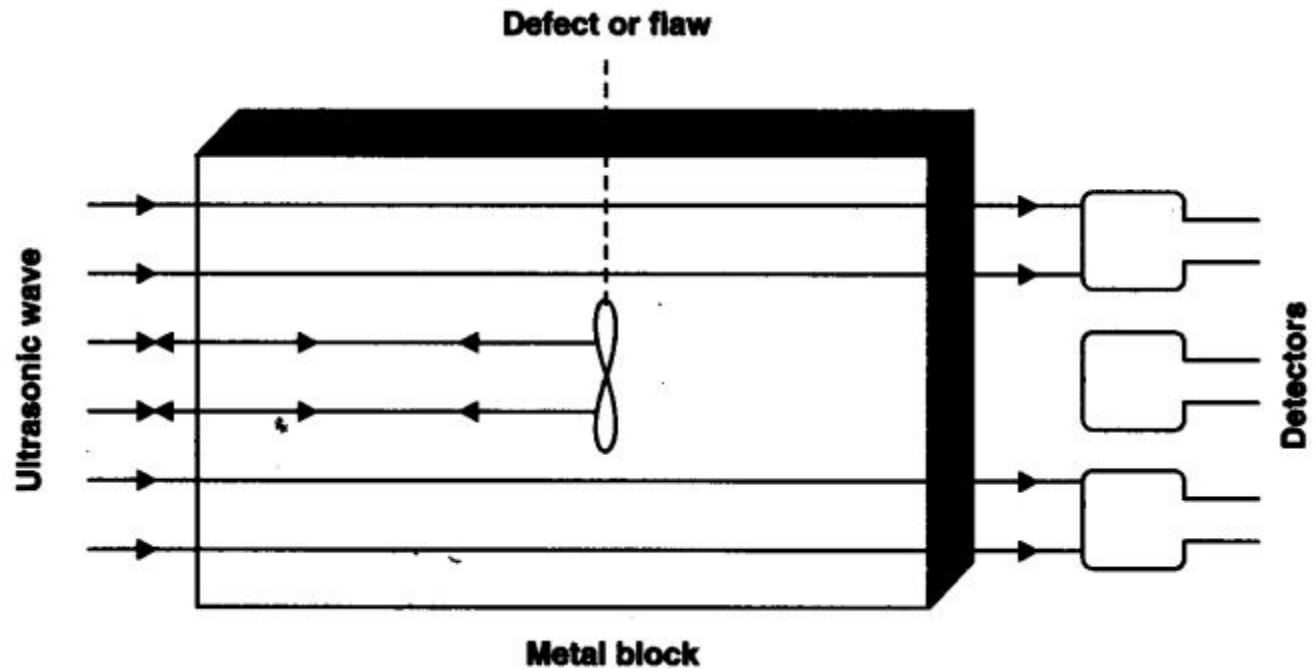
Answer: Time taken between transmission and reception of signal = 5 sec.

Distance of the object from the submarine = 3625 m.

$$\text{Speed of sound in water} = \frac{\text{Distance travelled}}{\text{Time taken}} = \frac{7250}{5} = 1450 \text{ m/sec}$$

Question.21. Explain how defects in a metal block can be detected using ultrasound.

Answer. Ultrasounds can be used to detect cracks and flaws in metal blocks. Metallic components are used in the construction of big structures like buildings, bridges, machines and scientific equipment's. The cracks or holes inside the metal blocks, which are invisible from outside reduces the strength of the structure. Ultrasonic waves are allowed to pass through the metallic block and detectors are used to detect the transmitted waves. If there is even a small defect, the ultrasound gets reflected back indicating the presence of the flaw or defect.



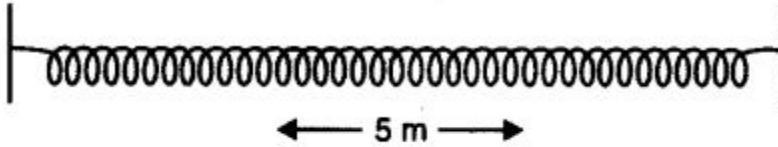
Question 22. Explain how the human ear works.

Answer: The outer ear is called "pinna. It collects the sound from the surroundings. The collected sound passes through the auditory canal. At the end of the auditory canal there is a thin membrane called the eardrum or the tympanic membrane. When a compression of the medium reaches the eardrum the pressure on the outside of the membrane increases and forces the eardrum inward. Similarly, the eardrum moves outward when a rarefaction reaches it. In this way the eardrum vibrates. The vibrations are amplified several times by three bones (the hammer, anvil and stirrup) in the middle ear. The middle ear transmits the amplified pressure variations received from the sound wave to the inner ear. In the inner ear, the pressure variations are turned into electrical signals by the cochlea. These electrical signals are sent to the brain via the auditory nerve and the brain interprets them as sound.

MORE QUESTIONS SOLVED

I. MULTIPLE CHOICE QUESTIONS Choose the correct option:

Question 1. A wave in slinky travelled to and fro in 5 sec the length of the slinky is 5 m. The velocity of wave is



- (a) 10 m/s (b) 5 m/s
(c) 2 m/s (d) 25 m/s

Answer: (c)

Question 2. Loud sound can travel a larger distance, due to

- (a) higher amplitude (b) higher energy
(c) high frequency (d) high speed

Answer (c)

Question 3. We can distinguish between sound having same pitch and loudness, this characteristic of sound is

- (a) tone (b) note
(c) pitch (d) timber

Answer: (b)

Question 4. Speed of sound depends upon

- (a) temperature of medium
(b) pressure of medium
(c) temperature of source producing sound
(d) temperature and pressure of medium

Answer: (d)

Question 5. Speed (s), wavelength' (X) and frequency (v) of sound are related as

- (a) $s = u \times v$ (b) $v = s \times u$
(c) $u = s \times v$ (d) $u = s/v$

Answer: (c)

Question 6. To hear a distinct echo the time interval between the original sound and the reflected sound must be:

(a) 0.2 s (b) 1 s
(c) 2 s (d) 0.1 s
Answer: (d)

Question 7. Reverberation of sound is used in
(a) stethoscope (b) trumpets
(c) megaphone (d) all of these
Answer: (d)

Question 8. Children under the age of 5 can hear upto:
(a) 20 kHz (c) 20 Hz
(b) 25 kHz (d) 25 Hz
Answer: (b)

Question 9. Dolphins, bats and porpoise uses
(a) ultrasound (c) both (a) and (b)
(b) infrasound (d) none of these
Answer: (a)

Question 10. The part of human ear that converts sound vibrations into electrical signals are:
(a) Tympanic membrane (c) Stirrup
(b) Hammer (d) Cochlea
Answer: (d)

II. VERY SHORT ANSWER TYPE QUESTIONS

Question 1. Is sound wave longitudinal or transverse?
Answer: Sound wave is longitudinal in nature.

Question 2. What is the relation between frequency (ν) and time period of a sound wave?
Answer: $\nu = 1/T$
Frequency is inversely proportional to time period.

Question 3. In which of the three media air, water or steel does sound travel the fastest?

Answer: Sound travels fastest in steel.

Question 4. Which has a higher pitch—the sound of a whistle or that of a drum?

Answer: The sound of whistle has higher pitch.

Question 5. What is pitch?

Answer: The way our brain interprets the frequency of an emitted sound is called the pitch.

Question 6. How can we distinguish one sound from another having the same pitch and loudness?

Answer: The quality or timber of sound helps us to distinguish one sound from another having the same pitch and loudness.

Question 7. What is the audible range of frequency for human beings?

Answer: The audible range of frequencies for human beings is 20 Hz to 20,000 Hz.

Question 8. What is one Hz?

Answer: Hz is the unit of frequency, called as Hertz. One Hertz is equal to one cycle per second.

Question 9. Define speed of sound.

Answer: The speed of sound is defined as the distance travelled per unit time by compression or rarefaction.

Question 10. What is 'note' of sound?

Answer: The sound produced due to a mixture of several frequencies is called a note, it is pleasant to listen to.

Question 11. Find the frequency of a wave whose time period is 0.002 second.

Answer:

$$\text{Frequency} = \frac{1}{\text{Time period}}$$

$$\text{Frequency} = \frac{1}{0.002} = 500 \text{ Hz}$$

Question 12. What is the time period of sound wave?

Answer: The time taken by two consecutive compressions or rarefactions to cross a fixed point is called the time period of the wave.

Question 13. What is the minimum distance required to hear distinct echo?

Answer: The minimum distance of the obstacle from the source of sound should be 17.2 m.

Question 14. What is reverberation?

Answer: The repeated reflection that results in the persistence of sound is called reverberation.

Question 15. What is SONAR?

Answer: SONAR is—Sound Navigation and Ranging. It is a device that uses ultrasonic waves to measure the distance, direction and speed of underwater objects by getting the reflection of sound.

Question 16. What is ‘ultrasonic’ and ‘infrasonic’ sound wave?

Answer: Sound waves with frequencies below the audible range (less than 20 Hz) are termed as “infrasonic” and those sound waves with frequencies above the audible range (more than 20000 Hz) are termed as “ultrasonic”.

Question 17. What should be the time interval between the originated sound and the reflected sound to be heard distinctly?

Answer: To hear a distinct sound the time interval between the originated sound and the reflected sound must be at least 0.1 second.

III. SHORT ANSWER TYPE QUESTIONS

Question 1. What is a medium? Give two examples.

Answer: The matter or substance through which sound is transmitted is called a medium. It can be solid, liquid or gas. Example, air, water, metals.

Question 2. Define wave-motion.

Answer: A wave is a disturbance that moves through a medium when the particles of the medium set neighbouring particles into motion. The particles of the medium do not move forward but the disturbance is carried forward.

Question 3. What is 'sonic boom'?

Answer: When an object just attains a supersonic speed, it causes shock waves in air. As a result there is large change in air pressure. This results in sonic boom.

Question 4. Why does sound become faint with distance?

Answer: Sound is a form of energy. As it moves away from the source its amplitude as well as its loudness decreases. The energy also get transformed in vibration of the particles of the medium.

Question 5. Why do we say that sound waves are longitudinal?

Answer: Longitudinal waves need medium for propagation. The sound energy travel in the same line as the particles oscillate.

————— > Sound energy

<—————> Particles oscillation

It forms compression and rarefaction for the longitudinal wave motion. Sound wave shows all the characteristics of longitudinal wave so it is called as longitudinal wave.

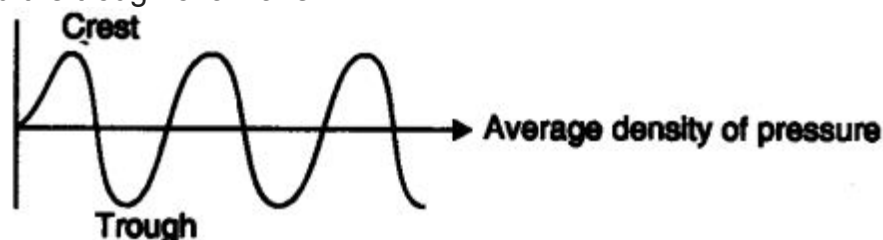
Question 6. Differentiate between longitudinal wave and transverse wave.

Answer:

Longitudinal Wave	Transverse Wave
<ol style="list-style-type: none">1. It needs medium for propagation.2. Particles of the medium move in a direction parallel to the direction of propagation of the disturbance. <i>Example, sound wave.</i>	<ol style="list-style-type: none">1. It may or may not need medium for propagation.2. Particles of the medium move in a perpendicular direction to the direction of propagation of the disturbance. <i>Example, light wave, seismic wave.</i>

Question 7. What is crest and trough?

Answer: When a wave is propagated as represented below. A peak is called the crest and a valley is called the trough of a wave.



Question 8. The maximum oscillation disturbance of particles of air forms crest and trough. What is echo? Why don't we get echo in small room?

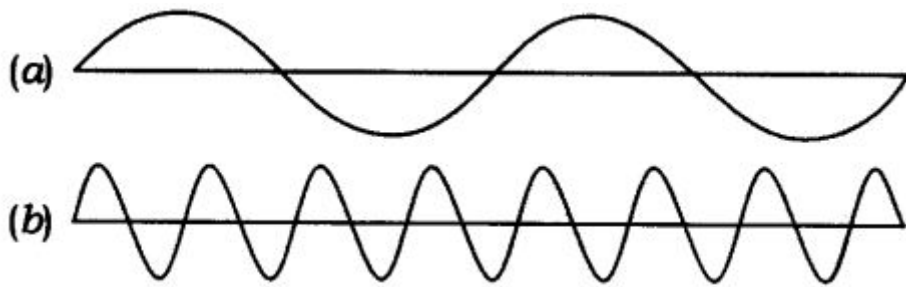
Answer: The distinct sound heard after reflection of sound from the source is called echo. For echo, the distance of reflecting surface from the source should be more than 17.2 m.

Question 9. What is velocity of sound? Why does sound travel faster in summer season than in winter?

Answer: Velocity of sound is- the speed of sound in a given medium at a given temperature. As the temperature increases the speed of sound also increases, hence in summer the sound travels faster than in winter.

Question 10. Draw a graphical representation of the wave shape for (a) low pitched sound and (b) a high pitched sound.

Answer:



Low pitched sound

High pitched sound.

Question 11. Give two applications of echo/reflection of sound.

Answer: (i) Ships use reflection of sound technique “SONAR” which helps in locating the depth, distance, direction and speed of underwater objects.

(ii) Ceilings of concert halls are curved so that sound after reflection reaches all corners of the hall.

Question 12. Define amplitude time period and frequency of sound wave.

Answer: Amplitude: The magnitude of the maximum disturbance in the medium on either side of the mean value is called amplitude of the wave. Its unit is meter.

Time Period: The time taken by two consecutive compressions or rarefactions to cross a fixed point is called the time period of the wave.

Frequency: The number of oscillation, occurring per unit time is called the frequency of sound wave.

Question 13. A sound wave causes the density of air at a place to oscillate 1200 times in 2 minutes. Find the time period and frequency of the wave.

Answer:

$$\text{Frequency} = \frac{1200}{2 \times 60} = 10 \text{ Hz.}$$

$$\text{Time period} = ? \quad \text{Frequency} = \frac{1}{T}$$

$$\therefore T = \frac{1}{\text{Frequency}} = \frac{1}{10} = 0.1 \text{ s.}$$

Question 14. Give 3 uses of ultrasound.

Answer: Use of ultrasound:

1. Ultrasound is used to detect cracks and flaws in metal blocks.

2. It is used in ‘echo-cardiography’, the ultrasonic waves are made to reflect from various parts of the

heart and form the image of the heart.

3. It is used in 'ultrasonography', to detect the image of organs or to detect the abnormalities in the organs. It is also used to examine the foetus during pregnancy to detect congenital defects.

Question: 15. What is the function of middle ear?

Answer: Middle ear consist of three small bones called hammer, anvil and stirrup. These three bones receive the sound vibrations and increase the strength of these vibrations to amplify the vibrations received by ear-drum. These amplified vibrations are further passed to the inner ear.

A ship sends out ultrasound that return from the seabed and is detected after 3.42 s.

Question 16. If the speed of ultrasound through seawater is 1531 m/s. What is the distance of the seabed from the ship?-

Answer: Time between transmission and detection $t = 3.42$ s.

Speed of ultrasound in seawater = 1531 m/s.

Distance travelled by the ultrasound = $2 \times \text{depth of sea} = 2d$.

$$2d = \text{speed of sound} \times \text{time}$$

$$= 1531 \times 3.42 = 5236 \text{ m}$$

$$\therefore 2d = 5236 \text{ m}$$

$$\therefore d = \frac{5236}{2} = 2618 \text{ m.}$$

The distance of the seabed from the ship is 2618 m.

Question 17. Distinguish between tone, note and noise.

Answer: Tone: A sound of single frequency is called a tone.

Note: The sound which is produced due to a mixture of several frequencies is called a note.

Noise: The sound which is produced due to a mixture of several frequencies but is unpleasant to the ear is called noise.

Question 18: Establish the relationship between speed, wavelength and frequency of sound.

Answer: Speed of sound —» The distance travelled by a wave or a point on a wave (compression or

rarefaction) per unit time.

$$\text{Speed } v = \frac{\text{Distance}}{\text{Time}}$$

$$v = \frac{\lambda}{T}$$

Distance = wavelength of the sound wave, it is the distance travelled by sound wave in one time period (T) of the wave.

$$\therefore v = \frac{\lambda}{T} \quad \left(\text{as } v = \right.$$

$$\therefore v = \lambda \nu, \text{ Frequency} = \frac{1}{\text{Time period}}$$

$$\text{Speed} = \text{Wavelength} \times \text{Frequency.}$$

Question 19. Which wave property determines

(a) loudness? (b) pitch?

Name the characteristic of the sound which help you to distinguish your friend's voice while talking in a dark room.

Answer: (a) Loudness is determined by amplitude.

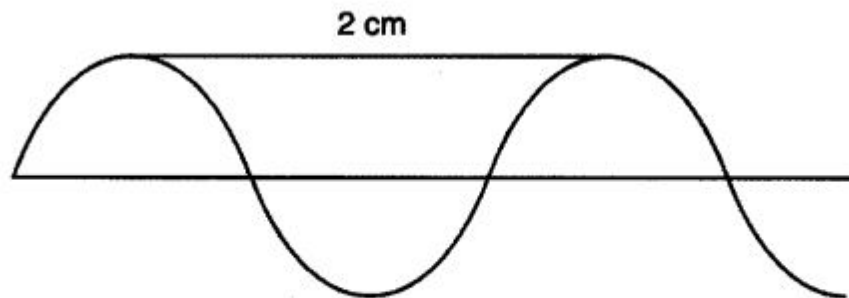
(b) Pitch is determined by frequency.

The quality or timber of sound helps us to distinguish our friend's voice while talking in a dark room.

Question 20. A sound produces 13 crests and 15 troughs in 3 seconds. When the second crest is produced the first is 2 cm away from the source? Calculate.

(a) the wavelength (b) the frequency (c) the wave speed.

Answer:



(a) Wavelength = distance between two consecutive crests or troughs is 2 cm

$$(b) \text{ Frequency} = \frac{\text{Number of troughs}}{\text{Time}} = \frac{15}{3} = 5 \text{ Hz}$$

$$(c) \text{ Wave speed} = \frac{\text{Distance}}{\text{Time}}$$

$$\text{Distance travelled by wave} = 15 \times 2 = 30 \text{ cm}$$

$$\text{Time} = 3 \text{ seconds}$$

$$\therefore \text{ Wave speed} = \frac{30}{3} = 10 \text{ cm/s.}$$

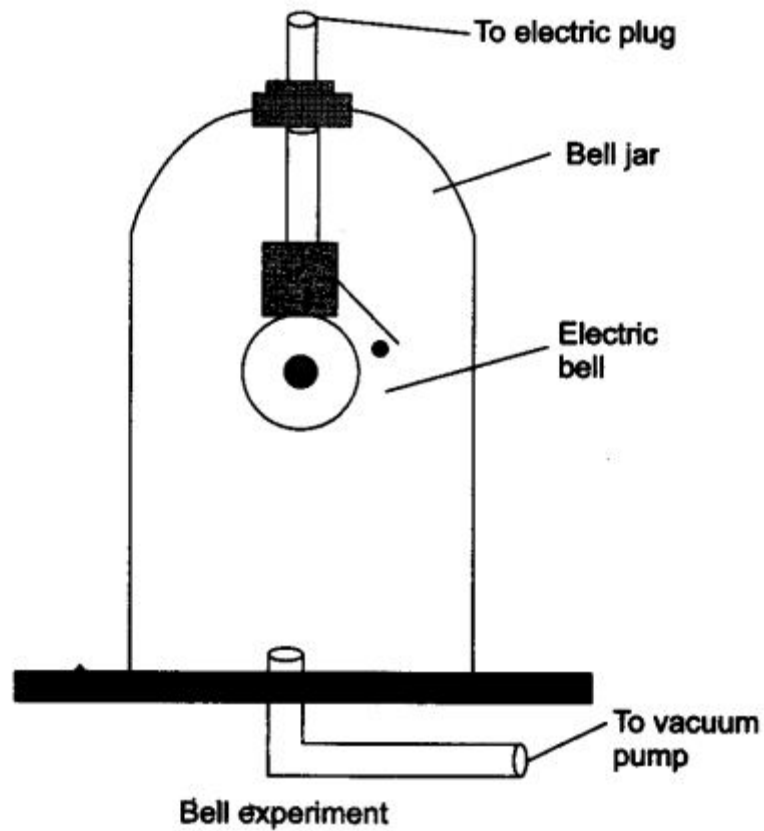
IV. LONG ANSWER TYPE QUESTIONS

Question 1. Sound cannot travel in vacuum. Describe an experiment to demonstrate this.

Answer: Sound is a mechanical wave and needs a material medium to propagate. It cannot travel in vacuum and can be shown by the following experiment.

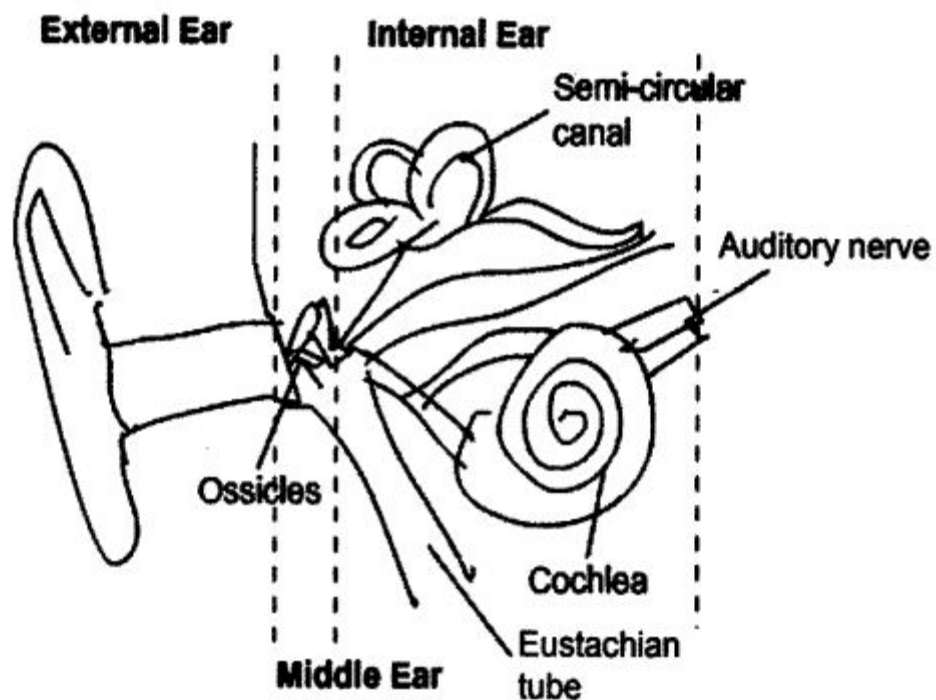
- Take an electric bell and an airtight glass bell jar. The electric bell is suspended inside the airtight bell jar. Switch 'ON' the electric bell.
- Now, connect the bell jar to vacuum pump.
- Pump out the air from the jar, the sound becomes fainter, although the same current passes through the bell.
- Pump out some more air from the jar, a very feeble sound is heard.

- When the air is completely removed from the jar, no sound is heard.



Question 2. Explain the structure of the human ear with the help of a diagram.

Answer:



(a) Outer Ear: Pinna, auditory canal and tympanic membrane.

Pinna: It collects the sound from the surroundings.

Auditory Canal: The sound waves collected passes through this canal.

Tympanic Membrane: It is a thin membrane which receives the vibrations of sound. A compression reaches the eardrum, the pressure on the outside of the membrane increases and pushes the eardrum inward, and moves out when the rarefaction reaches.

(b) Middle Ear: Consists of three small bones called hammer, anvil and stirrup. The vibrations are received by these three bones and the strength of vibrations is increased i.e., the sound is amplified and passed to inner ear.

(c) Inner Ear: It consist of cochlea and auditory nerve.

Chochlea receives the amplified vibrations and convert them into electrical signals. These electrical signals are sent to the brain via the auditory nerve and the brain interprets the signals as sound.

Question 3. Given that sound travels in air at 340 m/sec, find the wavelength of the waves in air produced by 20 kHz sound source. If the same source is put in a water tank, what would be the wavelength of the sound waves in water? (Speed of sound in water = 1480 m/s.)

Answer:

Speed of sound in air = 340 m/s.

Frequency = 20 kHz = 20×10^3 Hz

Wavelength = ?

\therefore Speed = Wavelength \times Frequency

$$v = \lambda \nu$$

$$\therefore \lambda = \frac{v}{\nu} = \frac{\text{Speed}}{\text{Frequency}} = \frac{340}{20 \times 10^3} = 0.017 \text{ m.}$$

Speed of sound in water = 1480 m/s

Frequency = 20×10^3 Hz

Wavelength = ?

\therefore Speed = Wavelength \times Frequency

$$\begin{aligned} \text{Wavelength} &= \frac{\text{Speed}}{\text{Frequency}} \\ &= \frac{1480}{20 \times 10^3} = 0.074 \text{ m.} \end{aligned}$$

Question 4. A child watching Dussehra celebration from a distance sees the effigy of Ravana burst into flames and hears the explosion associated with it 2 sec after that. How far was he

from the effigy if the speed of sound in air that night was 335 m/sec?

Answer:

Speed of sound in air = 335 m/s.

time required to reach the sound = 2 sec

distance of the source of sound =?

$$\therefore \text{Speed} = \frac{\text{Distance}}{\text{Time}}$$

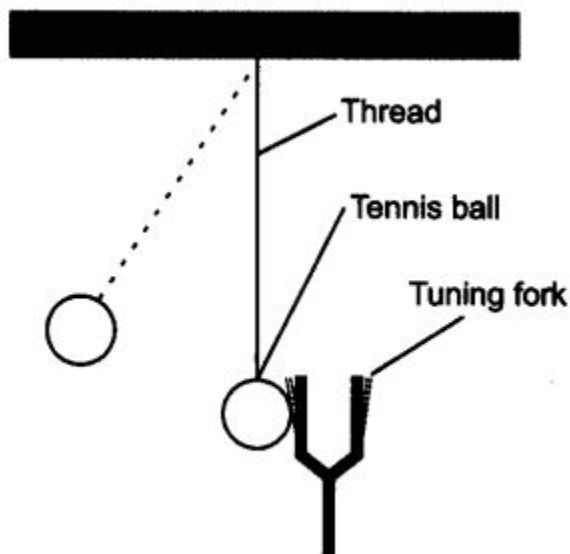
$$\begin{aligned}\therefore \text{Distance} &= \text{Speed} \times \text{Time} \\ &= 335 \times 2 \text{ sec} \\ &= 670 \text{ m.}\end{aligned}$$

A child was 670 m away from the spot where effigy burnt.

V. ACTIVITY-BASED QUESTIONS

Question 1. • Take a tuning fork and set it vibrating by striking its prong on a rubber pad. Bring it near your ear.

- Do you hear any sound?
- Touch one of the prongs of the vibrating tuning fork with your finger and share your experience with your friends.
- Now, suspend a table tennis ball or a small plastic ball by a thread from a support. Touch the ball gently with the prong of a vibrating tuning fork.
- Observe what happens and discuss with your friends.

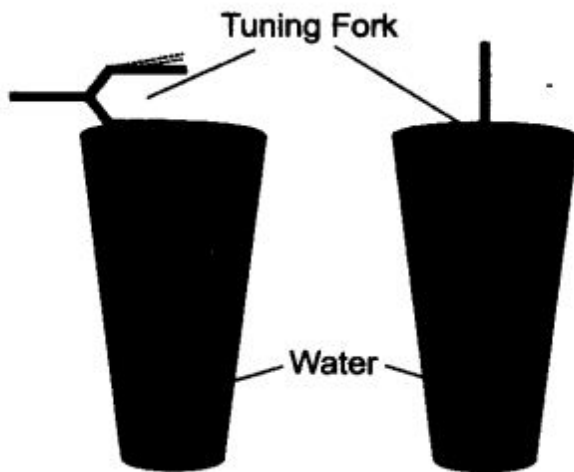


Answer: • Yes, we heard sound.

- If we touch the ball with tuning fork set into vibration, the ball gets displaced from its mean position and starts moving.

Question 2. • Fill water in a beaker or a glass up to the brim. Gently touch the water surface with one of the prongs of the vibrating tuning fork.

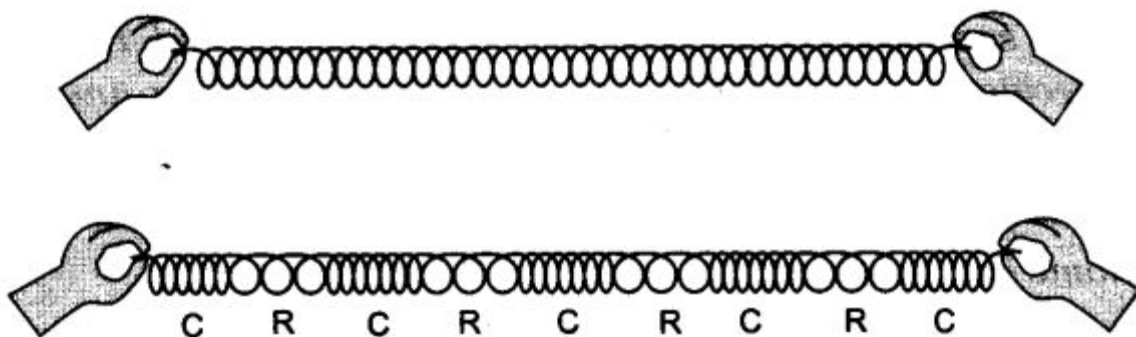
- Next dip the prongs of the vibrating tuning fork in water. .
- Observe what happens in both the cases.
- Discuss with your friends why this happens.
- Arrange them on a table near a wall.
- Keep a clock near the open end of one of the pipes and try to hear the sound of the clock through the other pipe.
- Adjust the position of the pipes, so that you can best hear the sound of the clock.
- Now, measure the angles of incidence and reflection and see the relationship between the angles.



Answer: In both the cases, sound will be produced by the tuning fork which produces ripples. But in case (1) ripples are produced which will move up and down and in case (2) ripples are produced which will move in sideways.

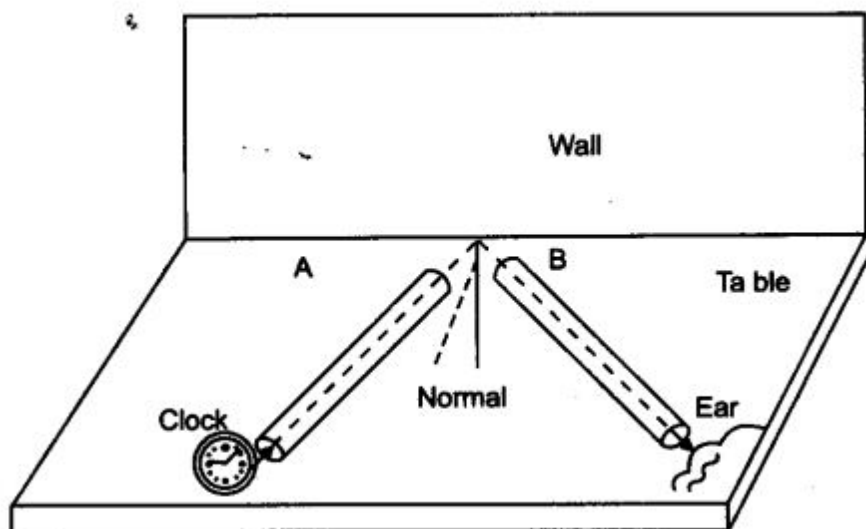
Question 3. • Take a slinky. Ask your friend to hold one end. You hold the other end. Now stretch the slinky and give it a sharp push towards your friend.

- What do you notice? If you move your hand pushing and pulling the slinky alternatively, what will you observe?
- If you mark a dot on the slinky, you'll observe that the dot on the slinky will move back and forth parallel to the direction of propagation of the disturbance.



Answer: When we give a small jerk a hump is produced and this travels forward. When we give a sharp push continuous disturbance is produced. When we give a push or pull to the slinky, slinky starts moving in the forward and backward direction parallel to the direction of propagation of the disturbance.

Question 4. • Take two identical pipes. The length of the pipes should be sufficiently long.



• Lift the pipes on the right vertically to a small height and observe what happens.

Answer: (i) Reflection of sound is similar to reflection of light i.e. Angle of incidence = Angle of reflection.

(ii) If we lift the pipe vertically to a small height, we will not be able to hear the sound through the other end of the pipe because Angle of incidence \neq Angle of reflection. Therefore the reflected ray will not travel through the pipe B.

VI. VALUE-BASED QUESTIONS

Question 1. Raj noticed that his pet dog was frightened and trying to hide in safe place in his house when some crackers were burst in the neighbourhood. He realized the problem and he decided not to burst crackers during diwali or for any other celebrations.

- (a) What must be the range of crackers sound?
- (b) Name two diseases that can be caused due to noise pollution.
- (c) Name the values of Raj reflected in above act.

Answer: (a) The range of crackers sound must be between 20 Hz to 20 kHz.

(b) Two diseases that can occur due to noise pollution are heart attack and high blood pressure.

(c) Raj reflects the value of respecting sensitivity for animals and caring for animals.

Question 2. It is not advisable to construct houses near airports, in spite of that many new residential apartments are constructed near airports. Sumit files RTI and also complains the municipal office about the same.

- (a) Why one should not reside near airport?
- (b) Name other two places where there is noise-pollution.
- (c) What value of Sumit is reflected in this act?

Answer: (a) The landing and taking off of the air-planes causes lot of noise pollution which may lead to deafness, high blood pressure and other health problems.

(b) The other two places where there is noise-pollution is, residing near the heavy traffic routes and railway stations or lines.

(c) Sumit shows participating citizen and moral responsibility values.



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WE ARE WITH YOU.....

In-Text Questions Solved

Ncert Textbook Page 178:

Question 1. State any two conditions for good health

Answer: Two conditions essential for good health are:

1. State of physical, mental and social well-being.
2. Better surroundings or -environment.

Question2. State any two conditions essential for being free of disease.

Answer. The two conditions essential for being free of disease are:

1. Personal and -domestic .hygiene.
2. Clean environment and surroundings

Question 3. Are the answers to the above questions necessarily the same or different ? Why ?

Answer: The answer to the above questions are different because a person may be free of disease but his mental, social or economical health may not be good.

Ncert Textbook Page 180

Question 1. List any three reasons why you would think that you are sick and ought to see a doctor. If only one of these symptoms were present, would you still go to the doctor? Why or why not?

Answer: The 3 reasons why one would think that he is sick are—(1) headache, (2) cold and cough, (3) loose-motions.

This indicates that there may be a disease but does not indicate what the disease is. So one would still visit the doctor for the treatment and to know the cause of above symptom.

Even in case of single symptom one needs to go to the doctor to get proper treatment.

Question 2. In which of the following case do you think the long-term effects on your health are likely to be most unpleasant?

- If you get jaundice
- If you get lice
- If you get acne.

Why.

Answer: In the above cases, lice and acne are acute problems of our health which can be cured in short duration. But jaundice is the disease that can have most unpleasant effect on our health as it affects the most important organ of our body i.e., liver. This disease is a chronic one.

Ncert Textbook Page 187

Question 1. Why are we normally advised to take bland and nourishing food when we are sick?

Answer: We are advised to take bland and nourishing food when we are sick because our body needs energy to release cells to overcome the infection, the wear and tear of body organ. The nourishing food provides nutrients to our body that will further provide energy and make new cells. No spices in the food makes its digestion process faster, does not release acids in the body that can interfere in the treatment and cure.

Question 2. What are the different means by which infectious diseases are spread?

Answer: The different means by which infectious diseases spread are:

- (a) Through air:** They are also called air-borne diseases. The air carries bacteria, virus and the diseases that can be caused are: common cold, influenza, tuberculosis etc.
- (b) Through food and water:** When one eats/drinks contaminated food/water, that contains bacteria, virus, worm etc. it can cause diseases like cholera typhoid, hepatitis.
- (c) Through contact:** Many diseases spread by contact of infected person with the healthy person. Example, fungal infections, skin diseases, scabies etc.
- (d) By sexual contact:** Many diseases can be transmitted, example, syphilis, AIDS.
- (e) By body fluids:** Fluids like blood, semen, mother's milk, when infected, can also cause diseases. Example, AIDS.
- (f) Vectors:** The organism that spreads a disease by carrying pathogens from one place to another is called vector. Example, mosquitoes are vectors that carry pathogens like protozoa.

Question 3. What precautions can you take in your school to reduce the incidence of infectious diseases?

Answer: The precautions that one can take in school to reduce the incidence of infectious diseases are

- (a) By using handkerchief while coughing sneezing.
- (b) Washing hands before eating tiffins.
- (c) Staying at home if anyone suffers from infectious diseases.
- (d) Getting vaccinated before the infection affects.
- (e) Keeping the school surroundings clean, checking for stagnant water.

Question 4. What is immunisation?

Answer: When the body attains immunity against any disease, due to vaccination. This process is called immunisation.

Question 5. What are the immunisation programmes available at the nearest health centre in your locality? Which of these diseases are the major health problems in your area?

Answer: The immunization programmes available at the nearest health care centres are:

1. Child immunization programme starts from 0 to 12 years.
2. Polio eradication programme
3. H₁N₁ screening programme

Age	
<p>Infant</p> <p>6 weeks—9 weeks</p> <p>9-12 months</p>	

In major areas tuberculosis cases are reported in a large number which is a major concern.

Questions From Ncert Textbook

Question 1. How many times did you fall ill in the last one year? What were the illnesses?

(a) Think of one change you could make in your habits in order to avoid any of/ most of the above illnesses.

(b) Think of one change you would wish for in your surroundings in order to avoid any of/most of the above illness.

Answer: The illness was 2-3 times, common-cold, occurred in a year.

(a) One change I would make in my habits in order to avoid the above illness is that I would take proper diet rich in vitamin C and would avoid too cold food.

(b) The surroundings should be neat, and clean,

Question 2. A doctor/nurse/health worker is exposed to more sick people than others in the community. Find out how she/he avoids getting sick herself/himself?

Answer: A doctor/nurse/health worker when exposed to sick people they keep their nose and mouth covered, take care of hygiene, wash hands with soap before drinking water or eating food. They use mask, gloves, etc to avoid the direct contact with the person suffering from infectious diseases.

Question 3. Conduct a survey in your neighbourhood to find out what the three most common diseases are. Suggest three steps that could be taken by your local authorities to . bring down the incidence of these diseases.

Answer:

Common-diseases In neighbourhood	
1. Malaria	
2. Typhoid	
3. Cough and cold	

Question 4. A baby is not able to tell bis/her.caretakers that she/he is sick. What would help us to find out

(a) that the baby is sick?

(a) what is the sickness?

Answer:

- (a) The symptoms like body temperature, fever, cough, cold, loose-motions, non-stop crying improper or no food intake etc. would help up to find that the baby is sick.
- (b) The symptoms could help us to find out the sickness of the body.

Question 5. Under which of the following conditions is a person most likely to fall sick?

- (a) When she is recovering from malaria.
- (b) When she has recovered from malaria and is taking care of someone suffering from chicken-pox.
- (c) When she is on a four-day fast after recovering from malaria and is taking care of someone suffering from chicken-pox.

Why?

Answer: (c) When she is on a four-day fast after recovering from malaria and is taking care of someone suffering from chicken-pox.

As the person is not taking proper diet which is required for her proper health and healing of body. Her chances of getting chicken-pox also high as her body's immunity has lowered.

Question 6. Under which of the following conditions are you most likely to fall sick?

- (a) When you are taking examinations.
- (b) When you have travelled by bus and train for two days.
- (c) When your friend is suffering from measles.

Why?

Answer: (c) When your friend is suffering from measles, as it is an infectious disease.

More Questions Solved

I. Multiple Choice Questions

Choose the correct option:

1. The disease that affects our lungs is
(a) AIDS (b) rabies
(c) polio (d) tuberculosis
2. The BCG vaccine is given for the immunity against
(a) hepatitis (b) jaundice
(c) tuberculosis (d) malaria
3. Malaria is caused due to
(a) protozoa (b) Anopheles mosquito
(c) both (a) and (b) (d) none of the above
4. Trypanosoma, Leishmania and Plasmodium are the examples of
(a) virus (b) bacteria
(c) protozoa (d) worm
5. Diarrhoea, cholera, typhoid, are the diseases that have one thing in common, that is:

- (a) All of them are caused by bacteria.
 - (b) All of them are transmitted by contaminated food and water.
 - (c) All of them are cured by antibiotics.
 - (d) All of the above.
6. The bacteria among the following is
- (a) Plasmodium (b) Trypanosoma
 - (c) Rabies virus (d) Salmonella typhi
7. HIV virus attacks one of the following cells in our body:
- (a) Red blood cell (b) White blood cell
 - (c) Liver cell (d) Long cell
8. The pathogens of disease are
- (a) bacteria (b) virus
 - (c) protozoa (d) all of the above
9. Penicillin is a drug that can
- (a) interfere in the biological pathway of bacteria
 - (b) an antibiotic that can kill bacteria
 - (c) both (a) and (b)
 - (d) none of the above
10. The disease caused due to worm is
- (a) tetanus (b) rabies
 - (c) sleeping sickness (d) filariasis

Answer. 1—(d), 2—(c), 3—(c), 4—(c), 5—(d), 6—(d), 10—(d).

II. Very Short Answer Type Questions

Question 1. Define health.

Answer. Health means a state of physical, mental and social well-being.

Question 2. Define disease.

Answer: Disease means being uncomfortable.

Question 3. What do you mean by symptoms of disease?

Answer: Symptoms of disease are the signs of a disease which indicates the presence of a particular disease.

Question 4. What are acute diseases?

Answer: Those diseases which last for very short period of time are called acute diseases. Example, headache and cold.

Question 5. What are chronic diseases?

Answer: The diseases which last for very long period of time are called chronic disease
Example, tuberculosis and jaundice.

Question 6. What are pathogens?

Answer: The disease causing microbes are called pathogens. Example, bacteria, virus, fungi, worms.

Question 7. What are vectors?

Answer: The organisms that spread or carry pathogens from one place to another, from infected person to healthy person is called vector.
Example, mosquito, housefly etc.

Question 8. What are infectious diseases?

Answer: Diseases which can spread from one person to another and microbes are the immediate cause for these diseases are called infectious diseases. Example, typhoid

Question 9. What are non-infectious diseases?

Answer: Diseases which do not spread from one person to another is called non-infectious diseases.
Example, cancer.

Question 10. Name any one disease caused due to genetic abnormality.

Answer: Haemophilia.

Question 11. Name two diseases caused by protozoa.

Answer: Malaria and amoebiasis.

Question 12. Name two diseases caused due to bacteria.

Answer. Tuberculosis, typhoid.

Question 13. Name two disease caused due to virus.

Answer: Polio, chickenpox.

Question 14. Name two disease caused by fungi.

Answer: Scabies and skin infection.

Question 15. What are antibiotics?

Answer: Antibiotics are drugs that block the biochemical pathways important for bacteria. These are used to cure diseases caused due to bacteria.

Question 16. Give the full form of AIDS.

Answer: AIDS-Acquired Immuno Deficiency Syndrome (Syndrome means collection of symptoms).

Question 17. Name the pathogen that causes sleeping sickness.

Answer: The protozoan → Trypanosoma.

Question 18. Name the organism that causes kala-azar.

Answer: Leishmania.

Question 19. Name two air-borne diseases.

Answer: Common cold, cough,* tuberculosis.

Question 20. Name two diseases that are organ specific.

Answer:

Jaundice – liver

Tuberculosis – lungs

Question 21. Which virus causes AIDS?

Answer: HIV virus causes AIDS

HIV—Human Immuno Deficiency Virus.

III. Short Answer Type Questions

Question 1. Give the difference between acute disease and chronic disease.

Answer:

Acute disease
1. It may last for few days.
2. It does not have major effect on body.

Question 2. State two main causes of disease.

Answer: Two main causes of disease are immediate cause and contributory cause. Immediate cause: This is due to the organisms that enter our body and cause disease. Example, virus, protozoa, bacteria.

Contributory cause: These are the secondary factors which lead these organisms to enter our body. Example, dirty water, unclean surrounding, contaminated food etc.

Question 3. Define vaccine and name two vaccines.

Answer: Vaccine is a chemical /drug given in advance to a body to give immunity against certain diseases.

Vaccines given to children are:

- (a) BCG—for tuberculosis prevention
- (b) Polio drops—for polio prevention

Question 4. What is antibiotic penicillin? Give its function.

Answer: Penicillin antibiotic blocks the bacterial processes that build the cell wall. Due to this drug, the bacteria is unable to make a protective cell wall and dies easily. It is used to cure the diseases and infections caused by bacteria.

Question 5. Bacteria is a cell, antibiotics can kill these bacteria (cell), Human body is also made of cells how does it affect our body?

Answer: Antibiotics block the biochemical pathway of bacteria by which it makes a protective cell wall around it. Antibiotic does not allow the bacteria to make this cell wall because of which they die. Human body cell don't make any cell wall so antibiotics cannot have any such effect on our body.

Question 6. How does cholera becomes an epidemic in a locality?

Answer: Cholera is an infectious disease that spreads due to unsafe water. It can spread in a locality; if a person suffering from cholera lives in the locality and the excreta of this person, get mixed with the drinking water used by people living nearby. The cholera-causing microbe enters the new hosts through the water they drink and cause disease in them.

Question 7. Name the organs affected due to the following diseases:

Malaria, jaundice, Japanese encephalitis, typhoid.

Answer:

1. **Malaria:** Infects liver and red blood cells
2. **Jaundice:** Infects the liver.
3. **Japanese encephalitis:** Infects the brain
4. **Typhoid:** Infects blood.

Question 8. Why are sick patients advised to take bed rest?

Answer: Doctors advise to take bed rest for sick patients so that they can conserve their energy which can be used for healing of their body organs which were affected due to certain disease.

Question 9. How do we kill microbes that enter our body and cause diseases?

Answer: Microbes can be killed by using medicines. These microbes are of different categories—virus, bacteria, fungi or protozoa. Each of these groups of organisms has some essential biochemical life processes which is peculiar to a particular group and is not shared by others. These pathways are not used by us. By using drugs that block the microbial synthesis pathway without affecting us can kill the microbes.

Question 10. What are disease specific means of prevention?

Answer: The disease specific means of prevention are the use of vaccines. The vaccines, are used against tetanus, diphtheria, whooping cough, measles, polio and many others.

Question 11. Why can't we make antiviral medicines/drugs?

Answer: The viruses lie on the border line of living and non-living organisms. The viruses can live, grow and multiply only inside the host body. They cannot be grown or cultured and their biological pathways cannot be affected. Hence, the antiviral medicines/drugs is difficult to make.

Question 12. Write a short note on malaria as a disease, its symptoms and control.

Answer: Malaria is caused by protozoa that lives in blood. This parasite enters our body through a female Anopheles mosquito bite which is the vector, visits water to lay eggs, the protozoa enters our blood stream when female mosquito bites us. This protozoa affects our liver and red blood cells.

Symptoms: Very high fever with periodic shivering, headache and muscular pain. –

Control: Use of quinine drug, keeping the surroundings clean with no stagnant water, use of mosquito repellent creams, nets, can control the spread of this disease.

Question 13. What is AIDS? How does a person get affected with HIV?

Answer: AIDS is Acquired Immuno Deficiency Syndrome, it is caused due to HIV— human immuno deficiency virus. This virus reduces the immunity of human body. Therefore if any microbe enters the body of a person it causes disease killing the person.

The virus is transmitted from infected person to other person by any of the following way:

- (a) Blood transfusion.
- (b) From mother (infected) to baby in the womb.
- (c) From mother's milk to lactating baby.
- (d) By sexual contact.
- (e) Sharing of needle with an infected person.

Question 14. Becoming exposed to or infected with an infectious microbe does not necessarily mean developing noticeable disease. Explain.

Answer: This is because the immune system of our body is normally fighting off microbes. Our body have cells that are specialised in killing infecting microbes. Whenever any microbes or foreign body enters our system, these cells become active and kill the microbes that could cause any damage to the body. These immune cells manage to kill off the infection and a person does not get disease.

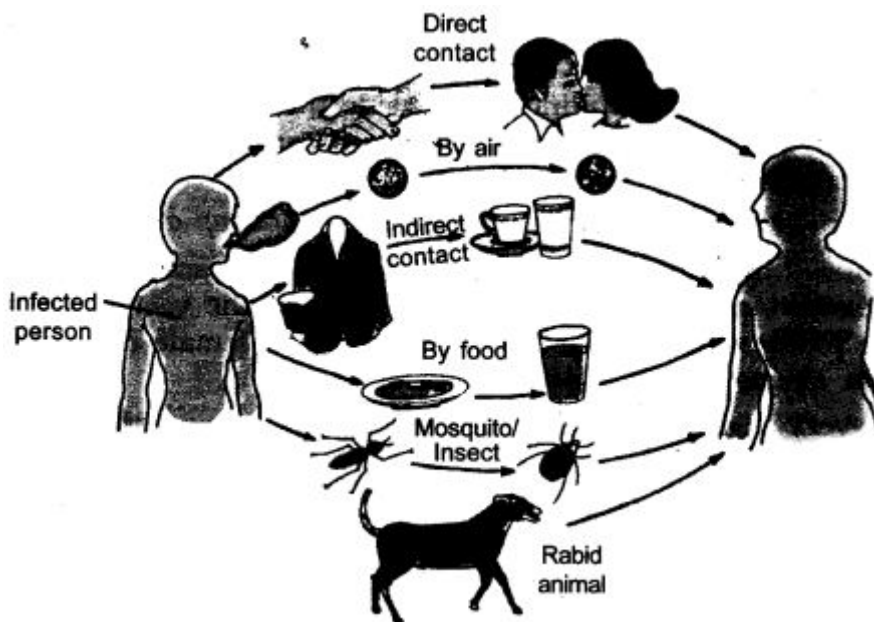
Question 15. What are three limitations for the approach to deal with infectious diseases?

Answer: The three limitations are:

- (1) If someone has a disease, their body functions are damaged and may never recover completely.
- (2) As the treatment will take time, the person suffering from a disease is likely to be bedridden for some time.
- (3) The infectious person can serve as the source from where the infection may spread to other people.

Question 16. Give the common methods of transmission of diseases.

Answer:



The common methods of transmission of diseases are:

- (1) By air – cough, cold, tuberculosis
- (2) By food and water – typhoid, jaundice
- (3) By mosquito bite – malaria
- (4) By rabid animal – rabies
- (5) By direct contact – skin infection, small pox, AIDS
- (6) By indirect contact – typhoid, chickenpox

Question 17. What are the basic conditions for good healths?

Answer: The basic conditions for good health are:

- (1) Proper balanced and nutritious diet
- (2) Personal hygiene
- (3) Clean surroundings and clean environment
- (4) Regular rest
- (5) Proper rest
- (6) Good economic status.

IV. Long Answer Type Questions

Question 1. If someone in the family gets infectious disease, what precautions will you advice to the other family members?

Answer: For an infectious diseased person in the family following precautions should be taken:

- (1) The surroundings and the house should be clean.
- (2) The infected person should be kept isolated in a separate room.
- (3) The clothes and utensils of patient should be sanitized regularly.
- (4) Separate towels and handkerchief should be used by the patient.
- (5) Children should not be allowed to visit the infected person.
- (6) Clean and boiled drinking water should be given to the patient.
- (7) A balanced and nutritious diet which will provide lot of energy should be given.
- (8) There should be silence and the patient should be given lot of bedrest to overcome the infection.

Question 2. What is a disease? Classify disease based on duration and infection cause.

Answer: Disease can be defined as the state of human health which is not at ease is not comfortable. During disease, the functioning or appearance of one or more systems of the body changes.

Classification:

(a) Based on duration:

Acute diseases: Diseases that last for only short period of time. Example, headache, common cold etc.

Chronic diseases: Diseases that last for long time is called chronic disease Example, tuberculosis.

(b) Based on cause: Disease can be grouped as infectious/communicable disease and non-infectious or non-communicable disease.

Infectious diseases: These diseases are caused due to microbes and can spread from one person to another.

Non-infectious diseases: These type of diseases do not spread in the community, but remains internal. Example, cancer, genetic abnormalities.

Question 3. What are the different ways used for the treatment and prevention of diseases?

Answer: Principles of treatment for diseases are:

- (1) To reduce the effect of the diseases.
- (2) To kill the cause of the disease i.e., to kill the microbes like bacteria, fungi, protozoa.

Principles of prevention are:

(a) General ways: It relate to preventing exposure to the microbes. This can be done in following ways:

1. **For avoiding air-borne infections**—Avoid visiting public place, cover your nose and mouth while sneezing or coughing
2. **For water-borne infection**—Drink safe, clean and boiled water.
3. **For vector-borne diseases**—Keep the surroundings clean, keep food and water covered and clean. Do not allow any water to stand as it becomes a breeding ground for mosquitoes.
4. **Self immunity**—It is self-defence mechanism in our system that can fight off and kill microbes that enter our body.

(b) Specific ways—By giving vaccines, childhood immunisation that is given to children for preventing infections and diseases.

Question 4. State the mode of transmission for the following diseases:

Malaria, AIDS, Jaundice, Typhoid, Cholera, Rabies, Tuberculosis, Diarrhoea, Hepatitis, Influenza.

Answer:

SL. No.	Diseases	
1.	Malaria	Mosquito b

2.	AIDS	Infected blood
3.	Jaundice	
4.	Typhoid	
5.	Cholera	
6.	Rabies	

7.	Tuberculosis	
8.	Diarrhoea	
9.	Hepatitis	
10.	Influenza	

Question 5. Name all the micro-organisms that causes infectious disease and name few diseases caused by each micro-organism.

Answer:

Infections Micro-organism	
Bacteria	
Virus	
Protozoa	
Fungi	

V. Value-Based Questions

Question 1. AIDS is spreading globally at very fast rate, a group of class-IX students made a

module on its prevention and posted it on social networking site.

(a) What is the cause of AIDS?

(b) Give any two preventions for it.

(c) What value of these students is reflected in this act?

Answer:

(a) HIV virus.

(b) Two preventive measures of AIDS are use of disposable injections, scanning of blood before transfusion for HIV.

(c) Students showed moral responsibility and general awareness.

Question 2. There is a ban on sale of junk food items in school canteens. A student notices that in his school canteen cold drink, chips and cup noodles were sold. He reports this matter to his teachers and school office. Thereafter the sale of junk food in canteen was stopped and monitored.

(a) Why is balanced diet necessary for maintaining healthy body?

(b) Name two diseases caused due to junk food.

(c) What values of this student is reflected?

Answer:

(a) Balanced diet provides all the nutrients to our body in appropriate amount and keeps our body healthy.

(b) Heart diseases and obesity.

(c) The student showed general awareness and responsible citizen.

Question 3. Sudha's brother who is 5 years old had high fever for two days, doctor prescribes him antibiotics. Sudha hesitantly asks for the name of the disease his brother had and why was he advised to take antibiotics without any diagnosis?

(a) Is fever a disease?

(b) What is the role of antibiotics?

(c) What value of Sudha is reflected in the above act?

Answer:

(a) Fever is not a disease it is a symptom.

(b) Antibiotics are medicines advised to be taken only when the immune system of a patient is unable to fight against the microbes.

(c) Sudha showed moral responsibility, general awareness.

Question 4. Malaria was on the outbreak in a locality of a town. People thought that the bite of mosquitoes cause malaria and started killing mosquitoes. Anita told the masses to clean the breeding grounds of mosquitoes, to add oil on the water bodies and clean all the areas, where stagnant water was present.

(a) What is the cause of malaria?

(b) Give two ways to prevent it.

(c) What value of Anita is reflected in this act?

Answer:

- (a) Malaria is caused due to the protozoa named Plasmodium.
- (b) Two ways to prevent malaria are—
 - (i) Clear all breeding grounds of mosquitoes i.e., stagnant water.
 - (ii) Use mosquito repellents.
- (c) Anita showed the values of social responsibility and self-awareness.

Question 5. Latika was suffering with chickenpox and was advised to stay at home by her doctor. Latika's friend persuades her to go for class picnic along with her and have fun. But Latika refuses and stays at home.

- (a) What is the cause of chickenpox?**
- (b) Give one precaution for it.**
- (c) What value of Latika is reflected in not going for picnic.**

Answer:

- (a) Virus causes chickenpox.
- (b) One precaution of avoiding spread of chickenpox is to stay away from public places when one is suffering from it. Take vaccination.
- (c) Latika showed moral responsibility and self awareness.

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Question 1. How is our atmosphere different from the atmosphere on Venus and Mars? (SA II – 2013)

Answer: Our atmosphere contains a mixture of many gases like nitrogen (78.08%), oxygen (20.95%), carbon dioxide (0.03%) and water vapour (in varying proportion). Whereas the atmosphere on Venus and Mars is mainly comprised of carbon dioxide. This carbon dioxide constitutes upto 95-97% of the atmosphere on Venus and Mars. It is supposed that, due to this reason no life is known to exist on these planets.

Question 2. How does the atmosphere act as a blanket ? (SA II – 2012, 13)

Answer: It is a known fact that, air is a bad conductor of heat and our atmosphere contains mainly the air. Due to this reason, the atmosphere keeps the average temperature of the Earth fairly steady during the day and even during the course of the whole year. The atmosphere prevents the sudden increase in temperature during the daylight hours and during the night, it slows down the escape of heat into outer space.

Question 3. What causes winds ? (SA II – 2012, 13)

Answer: Winds are caused due to unequal heating of atmospheric air. This phenomena can be easily seen near coastal regions during the daytime. The air above the land gets heated faster and starts rising. As this air rises, a region Of low pressure is created and air over the sea moves into this area Of low pressure. The movement of air from one region to the other Creates winds. During the day, the direction of the wind would be from the sea to the land.

Question 4. How are clouds formed ? (SA II – 2013)

Answer:The water evaporates due to heating up Of water bodies and other biological activities. The air also heats and rises. On rising, it expands and cools to form tiny droplets. These droplets grow bigger, expand and form clouds. The collection Of dust and other suspended particles facilitate the process.

Question 5. List any three human activities that you think would lead to air pollution. (SA II – 2013)

Answer: Human activities that would lead to air pollution

- (i) Excessive use and burning of fossil fuels like coal and petroleum produces different oxides of nitrogen and sulphur. These are not only dangerous to our respiratory system but also leads to acid rain.
- (ii) Incomplete combustion of various fuels forms unburnt carbon particles which lowers

the visibility, especially in cold weather when water also condenses Out of air. This is known as smog and is a visible indication Of air pollution.

(iii) Large usage Of automobiles and improperly tuning of engines leads to the formation of carbon monoxide gas and Other oxides of nitrogen which causes lot of respiratory problems.

(iv) Forest fires, excessive mining and ore refining, excessive use of chlorofluorocarbons and excessive industrialisation leads to air pollution.

Page 194:

Question 1. Why do organisms need water ? (SA II – 2012)

Answer: Organisms need water due to the following

(i) All cellular processes take place in a water medium.

(ii) All the reactions that take place within our body and within the cells occur between substances that are dissolved in water.

(iii) Substances are also transported from one part of the body to the other in a dissolved form.

(iv) Water makes up about 70% of body weight Of all living organisms.

(v) It helps in the digestion of food and absorption of nutrients in the blood. Hence, organisms need to maintain the level of water within their bodies in order to stay alive. It helps in maintaining body temperature.

Question 2. What is the major source of freshwater in the city/town/village where you live ?

Answer: The major sources of freshwater in the city (town/ village is the underground water which is mostly taken out with the help of hand pumps or tube wells. The rivers flowing in the nearby areas, lakes and ponds also serve as the source of freshwater.

Question 3. DO you know any activity which may be polluting these water sources?

Answer: There are many activities which cause pollution Of water sources such as :

(i) Dumping of waste from factories, sewage from our towns and cities into rivers or lakes.

(ii) Discharging hot water from cooling towers into the water bodies affect the breeding capacity of aquatic organisms.

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Question 1. How is soil formed ? (SA II – 2013, 2014)

Answer: The formation of soil takes place in this way :

Over long periods of time, thousands and millions Of years, the rocks at or near the surface of the are broken down by various physical, chemical and some biological processes. The end product of this breaking down is the fine particles of soil. There are many other factors which play a vital role in the formation of soil. These factors are :

(i) The Sun : It causes heating of rocks which causes cracking and ultimately breaking up into smaller pieces.

(ii) Water: It breaks rocks both by freezing and fast flow.

(iii) Wind : It causes erosion of rocks similar to as done by fast flowing water. It also carries sand from one place to the other like water does.

(iv) Living organisms : Lichens and moss plants grow on the rock surface and cause rock surface to powder down and form a thin layer of soil. The roots of big trees sometimes go into cracks in the rocks and as the roots grow bigger, the crack is forced bigger.

Question 2.What is soil erosion ? (SA II 2012)

Answer: The removal of topsoil which is rich in humus and nutrients by flowing water or wind is known as soil erosion. If this process continues further then all soil may get washed away and the rocks underneath may get exposed. It may lead to the loss of all valuable resources because nothing grows as such on the rocks.

Question 3. What are the methods of preventing or reducing soil erosion ? (SA II – 2012)

Answer: The methods of preventing soil erosion are :

(i) Afforestation : Forests reduce erosion as the roots of trees hold the soil in place.

(ii) Shelter belts : Trees planted in lines or hedges around farmland reduce erosion by reducing the speed of the wind.

(iii) Contour ploughing : Farmers plough land so that furrows lie across the natural slope of the land. These furrows trap water and do not allow it to flow down carrying the topsoil.

(iv) Terrace (or step) farming : A terraced hillside is less likely to be eroded than a natural hillside. Here a series of steps formed by horizontal strips supported by walls, catch the descending water. It gives the water sufficient time to percolate into the soil and nourish the crop.

(v) Soil cover : Soil left bare after harvesting a crop is often covered with dried vegetation to prevent erosion. Steep slopes that cannot be ploughed are covered with grass or pasture crops.

(vi) Preventing overgrazing : As the grass has a tendency to bind soil molecules, so

even a very little grass on a field prevents erosion of soil. But if the grass is overgrazed, it exposes the soil to erosion.

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Question 1. What are the different states in which water is found during the water cycle? (SA II – 2011)

Answer: All three different states of water can be seen during the water cycle. These states are :

- (i) Gaseous state (In the form Of water vapour which evaporates from the surface water). Liquid state (It is formed by the condensation of water vapour and can be Seen in the form of rain).
- (ii) Solid state (It is formed by the freezing Of liquid droplets in the upper layer of atmosphere which can be seen in the form Of snow, hail Or sleet).

Question 2. Name two biologically important compounds that contain both oxygen and nitrogen. (SA II – 2011)

Answer: Proteins and nucleic acids (DNA and RNA).

Question 3. List any three human Which would lead to an increase in the carbon dioxide content of air. (SA II – 2011)

Answer: Three human activities which would lead to an increase in the CO₂ content of air are :

- (i) Respiration : It is the natural process Of release Of CO₂ by both plants and animals. But this release is neither dangerous nor it has any adverse effect on our environment.
- (ii) Combustion of fuels : The various types of fuels are burnt to provide energy for various needs like heating, cooking, transportation and industrial fuels.
- (iii) Deforestation : Trees help in the conversion Of CO₂ into organic compounds such as glucose, starch, etc., by the process of photosynthesis. When these trees are cut non-judiciously, then the level of CO₂ increases in our environment.

Question 4. What is the greenhouse effect ? (SA II – 2011)

Answer: Some gases prevent the escape of heat from the Earth. An increase in the percentage Of such gases in the atmosphere would cause the average temperatures to increase worldwide and this is called the greenhouse effect.

Question 5. What are the two forms of oxygen found in the atmosphere ? (SA II 2011)

Answer: (i) Elemental oxygen is normally found in the form of a diatomic molecule (O_2) in the lower regions of the atmosphere to the extent of 21 %. It is non-poisonous form of oxygen.

(ii) But in the upper reaches of the atmosphere (stratosphere), it occurs in the form of ozone, containing three atoms of oxygen and having the molecular formula O_3 . It is the poisonous form of oxygen.

Some other forms of Oxygen :

It also occurs extensively in the combined form in the Earth's crust as well as also in the air in the form of carbon dioxide. In the crust, it is found as the oxides of most metals and silicon, and also as carbonate, sulphate, nitrate and other minerals. It is also an essential component of most biological molecules like carbohydrates, proteins, nucleic acids and fats (or lipids).

Question 1. Why is the atmosphere essential for life (SAII – 2011)

Answer: Atmosphere is essential for life because of the following reasons :

(i) It keeps the average temperature of the earth fairly steady during the day and even during the course of the whole year.

(ii) It prevents the sudden increase in temperature during the daylight hours.

(iii) It contains all the important gases which are required for sustaining life on earth.

These gases are :

(a) Oxygen for respiration of living organisms and oxidation.

(b) Carbon dioxide for photosynthesis in plants and for making food.

(c) Nitrogen for providing inert atmosphere and making proteins.

(iv) The stratosphere region (16-23 km from the surface of Earth) of atmosphere contains a thick layer of ozone which filters the harmful UV radiation from Sun. If these radiations reach on the surface of Earth, then they may cause cancer in animals and are also harmful for plants.

Question 2. Why is water essential for life ? (SAII – 2011)

Answer: Water is considered essential for life because of the following reasons :

(i) All cellular processes take place in water medium.

(ii) All the reactions that take place within our body and within the cells occur between substances that are dissolved in water.

(iii) Substances are also transported from one part of the body to the other in a dissolved form.

(iv) Water makes up about 70% of body weight of all living organisms.

(v) It helps in the digestion of food and absorption of nutrients in the blood. Hence, organisms need to maintain the level of water within their bodies in order to stay alive.

(vi) It helps in maintaining body temperature.

Question 3. How are living organisms dependent on the soil? Are organisms that live in water totally independent Of soil as a resource ?

Answer: Living organisms are dependent on the soil in the following ways :

- (i) Soil provides a natural habitat for various different organisms (such as bacteria, fungi, algae) which help in improving the quality of the soil. Thus, they maintain the fertility of the soil.
- (it) Number of insects, animals like rats, rabbits, etc., build their home in the soil.
- (iii) Earthworms perform all their activities in the soil. They maintain fertility also as their excreta is rich in nitrogen.
- (iv) Soil provides anchorage and nutrients to the plants for their growth and development.

Yes, all organisms that live in water are totally dependent on soil as a resoure :

The mineral nutrients are present in water in the dissolved form. But their recycling takes place only with the help Of decomposers which are present in the soil beds.

Thus, all water bodies has soil beds which contain decomposers for the recycling of nutrients and to convert them into readily absorbable forms.

Question 4. You have seen weather reports on television and in newspapers. How do you think we are able to predict the weather?

Answer: Weather observatories collect information regarding the pattern of temperature, speed of wind, air pressure, ocean features and all other features which can affect the weather. This information is collected by remote sensing and weather forecasting satellites. The information collected is then sent to the meteorological departments which prepare a weather report which is displayed on the maps. This information is further transmitted through radio and television.

Question 5. You might have heard about weather report saying ‘depressions’ in the Way of Bengal have caused rains in some areas. We know that many human activities lead to increasing levels of pollution of the air, water bodies and soil. Do you think that isolating these activities to specific and limited areas wcwld help in reducing pollution ?

Answer: Yes, definitely if these activities are isolated to specific and limited areas, then the level of pollution Of the air, water bodies and soil will ‘decrease. For example (i) If all the sewage discharge, industrial waste is collected and treated properly before diScharging into water bodies, then obviously aquatic life in these water bodies will be affected to a little extent.

(ii) If hot water from the industries (which is used for cooling machines and other devices) is collected at a common place and cooled and aerated properly before

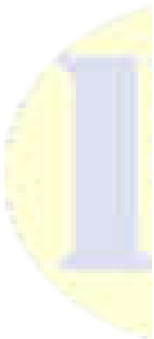
discharging into water bodies. Then this will not affect the breeding capacity of aquatic organisms.

(iii) If all the industries and commercial places of a city/town are located in a particular area which is far away from a residential area. Then all diseases resulting from air pollution could be minimised.

(iv) Above all, if we use only biodegradable substances, then they will get decomposed easily and there will be very little pollution of our precious natural resources.

Question 6. Write a note on how forests influence the quality “four air, soil and water resources.

Answer: Forests influence the quality of air, soil and water resources in the following ways :

- 
1. Influence of forests in controlling the quality of air :
 - (a) Forests help in minimising the level of CO₂ in the atmosphere. This prevents greenhouse effect and global warming.
 - (b) Forests reduce environmental temperature which in turn increases the rate of photosynthesis in plants in the surrounding regions.
 - (c) Some of the trees has the ability to absorb harmful gases present in the atmosphere, e.g., Jamun trees can absorb compounds of lead easily.
 2. Influence of forests in controlling the quality of soil :
 - (a) The roots of huge trees larger area and prevent erosion of topsoil by holding the soil particles tightly.
 - (b) Forests also regulate biogeochemical cycles which are responsible for cycling of nutrients and making them available for the plants in the soil,
 - (c) Many of the decomposing bacteria and nitrogen-fixing bacteria live in close association with the roots of the trees.
 3. Influence of forests in controlling the quality of water :
 - (a) Forests help in returning pure water back to the surface of earth through rains
 - (b) Forests help in maintaining the water cycle as well as water resources of the earth.

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In-Text Questions Solved

Ncert Textbook Page 204

Question 1. What do we get from cereals, pulses, fruits and vegetables?

Answer: Cereals give carbohydrates which provide energy.

Pulses give proteins which build our body.

Vegetables and fruits provide vitamins and minerals.

Ncert Textbook Page 205

Question 1. How do biotic and abiotic factors affect crop production?

Answer: Factors responsible for loss of grains, during storage and production are:

(a) Biotic factors like rodents, pests, insects, etc.

(b) Abiotic factors like temperature, humidity, moisture, etc.

Combination of both biotic and abiotic factors causes :

1. infestation of insects
2. weight loss
3. poor germination ability
4. degradation in quality
5. discolouration
6. poor market price

Question 2. What are the desirable agronomic characteristics for crop improvements?

Answer: Desirable agronomic characteristics for crop improvements are:

- (a) Tallness and profuse branching are desirable characters for fodder crops.
(b) Dwarfness is desired in cereals, so that less nutrients are consumed by these crops.

Ncert Textbook Page 206

Question 1. What are macro-nutrients and why are they called macro-nutrients?

Answer: Macro-nutrients are the essential elements which are utilised by plants in large quantities. Many macro-nutrients are required by the plants for the following functions:

- As the constituent of protoplasm
- N, P, S are present in proteins
- Ca is present in cell wall
- Mg is important constituent of chlorophyll

Question 2. How do plants get nutrients?

Answer: Plants get nutrients from air, water and soil. There are, sixteen nutrients essential for the growth of plants. Carbon and Oxygen are supplied by water. The remaining thirteen nutrients are supplied by soil.

Ncert Textbook Page 207

Question 1. Compare the use of manure and fertilizers in maintaining soil fertility.

Answer: Effects of using manures on soil quality:

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1. The manures enrich the soil with nutrients.
2. They provide a lot of organic matter (humus) to the soil and thus restores water retention capacity of sandy soils and drainage in clayey soil.
3. The addition of manures reduces soil erosion.
4. They provide food for soil organisms, like soil friendly bacteria.

Effects of using fertilizers on soil quality:

1. By the continuous use of fertilizers, the soil becomes powdery, dry and rate of soil erosion increases.
2. By the use of fertilizers, the organic matter decreases which further decreases the porosity of soil and the plant roots do not get oxygen properly,
3. The nature of soil changes to acidic or basic.

Ncert Textbook Page 208

Question 1. Which of the following conditions will give the most benefits? Why?

- (a) Farmers use high-quality seeds, do not adopt irrigation or use fertilizers.
- (b) Farmers use ordinary seeds, adopt irrigation and use fertilizer.
- (c) Farmers use quality seeds, adopt irrigation, use fertilizer and use crop protection measures.

Answer: In this, (c) Farmers use quality seeds, adopt irrigation, use fertilizer and use crop protection measures.

Use of any quality seeds is not sufficient until they are properly irrigated, enriched with fertilizers and protected from biotic factors. Hence, option (c) will give the most benefits.

Ncert Textbook Page 209

Question.1. Why should preventive measures and biological control methods be preferred for protecting crops?

Answer. Diseases in plants are caused by pathogens. To get rid of pathogens, some preventive measures and biological control methods are used as they are simple, economic and minimise pollution without affecting the soil quality.

Question 2. What factors may be responsible for losses of grains during storage?

Answer: The factors responsible for losses of grains during storage are:

- Abiotic factors like moisture (present in food grains), humidity (of air) and temperature.
- Biotic factors like insects, rodents, birds, mites, bacteria and fungi.

Ncert Textbook Page 210

Question 1. Which method is commonly used for improving cattle breeds and why ?

Answer: Cross breeding is a process in which indigenous varieties of cattle are crossed by exotic breeds to get a breed which is high yielding. During cross breeding, the desired characters are taken into consideration. The offspring should be high yielding, should have early maturity and should be resistant to climatic conditions.

Ncert Textbook Page 211

Question 1. Discuss the implications of the following statement:

“It is interesting to note that poultry is India’s most efficient converter of low fibre food stuff (which is unfit for human consumption) into highly nutritious animal protein food”.

Answer: The basic aim of poultry farming is to raise domestic fowl for egg production and chicken meat. These poultry birds are not only the efficient converters of agricultural by-products, particularly cheaper fibrous wastes (which is unfit for human consumption but can be formulated into cheaper diets for poultry birds) into high quality meat and also help in providing egg, feathers and nutrient rich

manure. For this reasons, it is said that, “poultry is India’s most efficient converter of low fibre food stuff into highly nutritious animal protein food”.

Ncert Textbook Page 211

Question 1. What management practices are common in dairy and poultry farming?

Answer:

1. **Shelter:** Dairy animals and poultry birds require proper shelter, i.e., well designed dairy and hygienic shelter.
2. **Feeding:** To get good yield of food product, proper feed is provided to dairy animals and poultry birds.
3. **Caring for animal health:** Animal and birds must be protected from diseases caused by virus, bacteria or fungi.

Question 2. What are the differences between broilers and layers and in their management?

Answer: The poultry bird groomed for obtaining meat is called broiler. The egg laying poultry bird is called layer.

The housing, nutritional and environmental requirements of broilers are somewhat different from those of egg layers.

The ration (daily food requirement) for broilers is protein rich with adequate fat. The level of vitamins A and K is kept high in the poultry feeds while layers require enough space and proper lightning.

Ncert Textbook Page 213

Question 1. How are fish obtained?

Answer: There are two ways of obtaining fish. One is from natural resources, which is called capture fishing. The other way is by fish farming, which is called culture fishery.

Question 2. What are the advantages of composite fish culture?

Answer: In composite fish culture, a combination of five or six fish species is used in a single fish pond. These species are selected so that they do not compete for food among them and are having different types of food habits. As a result, the food available in all the parts of the pond is used. For example, Catlas are surface feeders, Rohus feed in the middle-zone of the pond, Mrigals and Common Carps are bottom feeders and Grass Carps feed on the weeds, together these species can use all the food in the pond without competing with each other. This increases the fish yield from pond.

Ncert Textbook Page 213

Question 1. What are the desirable characters of bee varieties suitable for honey production?

Answer:

1. The variety of bee should be able to collect a large amount of honey.
2. The bees should stay in a given beehive for a longer period.
3. The bees should have capacity of breeding well.
4. The variety of bee should be disease resistant.

Question 2. What is pasturage and how is it related to honey production?

Answer: The pasturage means the flowers available to the bees for nectar and pollen collection. In addition to adequate quantities of pasturage, the kind of flowers available will determine the taste of the honey.

Questions From NCERT Textbook

Question 1. Explain any one method of crop production which ensures high yield.

Answer: One method used for crop production which ensures high yield is plant breeding. It is the science involved in improving the varieties of crops by breeding plants. The plants from different areas/places is picked up with desired traits and then hybridisation or cross-breeding of these varieties is done to obtain a plant/crop of desired characteristic.

The high yielding crop variety shows the following characteristics:

High yield, early maturation, less water for irrigation, better quality seeds are produced, less fertilizers required, adapts itself to the environmental conditions.

Question 2. Why are manure and fertilizers used in fields?

Answer: They are used to ensure good vegetative growth (leaves, branches and flowers), giving rise to healthy plants, that results in high crop production.

Question 3. What are the advantages of inter-cropping and crop rotation?

Answer: Advantages of using inter-cropping:

1. It helps to maintain soil fertility.
2. It increases productivity per unit area.
3. Save labour and time.
4. Both crops can be easily harvested and processed separately.

Advantages of using crop rotation:

1. It improves the soil fertility.
2. It avoids depletion of a particular nutrient from soil.
3. It minimise pest infestation and diseases.
4. It helps in weed control.
5. It prevents change in the chemical nature of the soil.

Question 4. What is genetic manipulation? How is it useful in agricultural practices?

Answer: Genetic manipulation is a process of incorporating desirable (genes) characters into crop varieties by hybridisation. Hybridisation involves crossing between genetically dissimilar plants. This is done for production of varieties with desirable characteristics like profuse branching in fodder crops, high yielding varieties in maize, wheat, etc.

Genetic manipulation is useful in developing varieties which shows:

- Increased yield
- Better quality
- Shorter and early maturity period
- Better adaptability to adverse environmental conditions
- Desirable characteristics

Question 5. How do storage grain losses occur?

Answer: The factors responsible for loss of grains during storage are:

1. Abiotic factors like moisture (present in foodgrains), humidity (of air) and temperature.
2. Biotic factors like insects, rodents, birds, mites and bacteria.

Question 6. How do good animal husbandry practices benefit farmers?

Answer: Good animal husbandry practices are beneficial to the farmers in the following ways:

1. Improvement of breeds of the domesticated animals.
2. Increasing the yield of foodstuffs such as milk, eggs and meat.
3. Proper management of domestic animals in terms of shelter, feeding, care and protection against diseases.

Which ultimately helps the farmers to improve their economic condition.

Question 7. What are the benefits of cattle farming?

Answer: Cattle farming is beneficial in the following ways:

1. Milk production is increased by high yielding animals.
2. Good quality of meat, fibre and skin can be obtained.
3. Good breed of draught animals can be obtained.

Question 8. For increasing production, what is common in poultry, fisheries and bee-keeping?

Answer: Through cross breeding, the production of poultry, fisheries and bee-keeping can be increased.

Question 9. How do you differentiate between capture fishing, mariculture, and aquaculture?

Answer:

Capture fishing: It is the fishing in which fishes are captured from natural resources like pond, sea water and estuaries.

Mariculture: It is the culture of fish in marine water. Varieties like prawns, oysters, bhetki and mullets are cultured for fishing.

Aquaculture: It is done both in fresh water and in marine water.

More Questions Solved

I. Multiple Choice Questions

Choose the correct option:

1. The use of fertilizers in farming is an example of
(a) No cost production (b) Low cost production
(c) High cost production (d) None of these
2. Nitrogen, phosphorus, potassium are examples of
(a) micro-nutrients (b) macro-nutrients
(c) fertilizer (d) both (c) and (b)
3. Xanthium, Parthenium, Cyperinus are the examples of
(a) diseases (b) pesticides
(c) weeds (d) pathogens
4. Mulletts, bhetki, pearl spots, prawns, mussels are the example of
(a) marine fishes (b) fresh-water fishes
(c) finned fishes (d) shell fish
5. *Apis cerana indica* is commonly known as
(a) Indian cow (b) Indian buffalo
(c) Indian bee (d) None of these
6. The production and management of fish is called
(a) pisciculture (b) apiculture
(c) sericulture (d) aquaculture
7. Catla and Rohu are examples of
(a) freshwater fish (b) marine water fish
(c) both (a) and (b) (d) none of these
8. Pasturage is related to

(a) cattle (b) fishery

(c) apiculture (d) poultry

9. Growing two or more crops in definite patterns is known as

(a) crop rotation (b) inter-cropping

(d) organic cropping (c) mixed cropping

10. Leghorn and Aseel are related to

(a) apiculture (b) dairy farming

(c) pisciculture (d) poultry

Answer: 1—(c), 2—(b), 3—(c), 4—(a), 5—(c), 6—(a), 7—(a), 8—(c), 9—(b), 10—(d).

II. Very Short Answer Type Questions

Question 1. Name any two fodder crops.

Answer: Berseem, oats or sudan grass are raised as food for the livestock, called fodder crops.

Question 2. What do you understand b.y photoperiod of sunlight?

Answer: Photoperiod are related to the duration of sunlight required for plant growth.

Question 3. Name two kharif crops.

Answer: Paddy and soyabean.

Question 4. Name two rabi crops.

Answer: Wheat and gram.

Question 5. Define hybridisation.

Answer: Hybridisation refers to crossing between genetically dissimilar plants, to obtain, better variety of crops.

Question 6. What are genetically modified crops?

Answer: By introducing a gene with required characters into a crop for its improvement is called genetically modified crop.

Question 7. “Shorter the duration of the crop from sowing to harvesting, the more economical is the variety”. Give reason for this.

Answer: Due to short duration of crop growth, farmers can grow more crops in a year, and reduce the cost of crop production.

Question 8. Name different types of crop production practices involved in India.

Answer: They are (a) no cost production, (b) low cost production and (c) high cost production.

Question 9. Who provides nutrients to plants?

Answer: Nutrients to plants are provided by air, water and soil.

Question 10. What are macro-nutrients?

Answer: The nutrients required by plants in larger quantity is called macro-nutrients. They are nitrogen, phosphorus, potassium, calcium, magnesium and sulphur.

Question 11. Name the nutrients that plants obtain from air and water.

Answer: Air – Carbon and oxygen Water- Hydrogen and oxygen

Question 12. State the difference between compost and vermi-compost.

Answer: The compost is obtained by decomposition of organic waste like animal excreta, plant waste etc. naturally due to decomposition by bacteria.

Vermi-compost: To hasten the process of decomposition redworms are added to this organic matter to obtain compost.

Question 13. Name any two weeds.

Answer: Parthenium and Xanthium.

Question 14. What causes disease in plants?

Answer: It is caused by pathogens such as bacteria, fungi and viruses.

Question 15. Name two Indian cattle.

Answer: Bos indicus – cows 4 Bos bubalis – buffaloes

Question 16. Name two exotic breeds of cattle.

Answer: Jersey and Brown Swiss

Question 17. Name two variety of food required for milch animals.

Answer:

- Maintenance requirement – food required to keep animal healthy
- Milk producing requirement – food required for increased lactation Animal food includes roughage and concentrate also.

Question 18. State the meaning of capture fishing and culture fishing.

Answer: Capture fishing: It is done from natural resources.

Culture fishing: It is done by fish farming.

Question 19. Name four marine fish varieties.

Answer: Pomphret, mackerel, tuna and sardines.

Question 20. What is apiculture?

Answer: Keeping bee for obtaining honey commercially is called apiculture.

Question 21. Name the products obtained from apiculture.

Answer: Honey and wax both are obtained from apiculture.

III. Short Answer Type Questions

Question 1. What are the major group of activities involved for improving of crop yields?

Answer:

- Crop variety improvement
- Crop production improvement
- Crop protection improvement

Question 2. What are the different ways/ methods of hybridisation?

Answer: Hybridisation can be

- Intervarietal – between different varieties of crops
- Interspecific – between two species of same genus
- Intergeneric – between two different genera

Question 3. What are the main characters required in a crop during its improvement practices?

Answer: The useful characters that are required in a crop during its improvement:

- (a) Disease resistance (b) Response to fertilizer
(c) Product quality and (d) High yield.

Question 4. State the difference between macro-nutrients and micro-nutrients.

Answer:

Macro-nutrients	Micro-nutrients
1. These are required by crops in larger quantity. 2. Six macro-nutrients are: Nitrogen, phosphorus, potassium, calcium, magnesium and sulphur.	1. These are required by crops in very small quantity. 2. Seven micro-nutrients are : Iron, manganese, boron, zinc, copper, molybdenum and chlorine.

Question 5. How do deficiency of nutrients affect the crop?

Answer: Deficiency of any nutrient affects physiological processes in plants including reproduction, growth and susceptibility to diseases.

Question 6. State the difference between manure and fertilizer.

Answer:

Manure	Fertilizer
1. It consists of organic matter. 2. Prepared from animal excreta and plant waste. 3. Its use causes no pollution.	1. It consists of inorganic matter. 2. It is prepared commercially from chemicals. 3. It causes pollution in soil and water.

Question 7. What are the harmful effects of fertilizer? .

Answer. It causes soil and water pollution. Continuous use can also destroy soil fertility.

Question 8. What is organic farming?

Answer: It is the farming in which no chemical fertilizers, pesticides or herbicides are used. But uses all organic matter for its growth like manure, neem leaves as pesticides and for grain storage.

Question 9. State the preventive and control measures used before grains are stored.

Answer:

- Cleaning of the grains
- Proper drying of the produce in sunlight, there should be no moisture.
- Fumigation of produce using chemicals that kills pest.

Question 10. Name few varieties of bees used for commercial honey production.

Answer:

Apis cerana indica – Indian bee
A. dorsata – rock bee (local varieties)
A. florea – the little bee
A. mellifera – Italian bee variety

Question 11. What decide the quantity and quality of honey production in apiary?

Answer: For quality of honey: The pasturage, f.e., the kind of flowers available to the bees for nectar and pollen collection will determine the taste of the honey. For quantity of honey: Variety of bee used for the collection of honey. For example, A. mellifera is used to increase yield of honey.

Question 12. How are crops useful to us? What do they provide?

Answer: Crops provide us food for our daily body nutrient. Carbohydrate for energy requirement – Cereals such as wheat, rice, maize.
Protein for body building — Pulses like gram, lentil
Fats for energy — Oil seed like mustard, sunflower
Vitamins and minerals — From vegetables, spices and fruits
Fodder crops — For livestock

Question 13. What are the factors for which variety improvement of crop is done?

Answer:

(a) Higher yield: It increases production of crop.

(b) Biotic and abiotic resistance: Crop should be resistant to biotic factors like diseases, insects, pests and abiotic factor like drought, salinity, heat, cold, frost and water logging.

(c) Change in maturity duration: Short-duration maturity allows farmer to grow more crops in a year and reduces the cost of crop production.

(d) Wider adaptability: Crop should be able to adapt to changing environmental conditions.

(e) Desirable agronomic characteristics: The tallness and dwarfness of crop. Dwarfness is required for cereals, so that less nutrients are consumed.

Question 14. Name the sources and the nutrients supplied by them to the plants.

Answer:

Source	Nutrients
Air	Carbon, oxygen
Water	Hydrogen, oxygen
Soil	Macro-nutrients (six) Nitrogen, phosphorus, potassium, calcium, magnesium, sulphur Micro-nutrients (seven) Iron, manganese, boron, zinc, copper, molybdenum, chlorine

Question 15. What are manures? Give its classification.

Answer: Manures contain large quantities of organic matter and supplies small quantities of nutrients to the soil. It is prepared naturally by the decomposition of animal waste, excreta and plant waste.

- It helps in the soil enrichment with nutrients.
 - It helps in improving the soil structure.
 - It helps in increasing the water holding capacity in sandy soils.
 - In clayey soils it helps in the water drainage and prevent water logging. Manure is classified based on the kind of biological material used to make it as : (i) Compost (ii) Vermi-compost (iii) Green manure
- (i) Compost:** The farm waste and livestock excreta, along with vegetable waste, sewage waste, weeds, straws etc. are allowed to decompose in a pit is called compost. The compost is rich in nutrients.
- (ii) Vermi-compost:** When the above given matter is allowed to decompose in the pit along with some earthworms, the decomposition speeds up and is called vermi-composting.
- (iii) Green manure:** Some plants like sun-hemp or guar are grown and then mulched by ploughing them into the soil. This is done before the sowing of crop seeds into the field. These green plants present in the soil acts as green manure which enriches the soil in nitrogen and phosphorus.

Question 16. What are fertilizers? Excess use of fertilizers is not advisable, explain?

Answer: Fertilizers are obtained artificially on commercial basis. It is a chemical which contains the nutrients required for the crop to grow. Fertilizers supply various nutrients as they are nutrient specific e.g.-urea provides nitrogen. Mixed fertilizer provides any two mixture of nutrients. They are expensive but their use yield large production hence are a factor of high cost farming.

Excessive use of fertilizers are not advisable as:

- (a) It leads to soil and water pollution.
- (b) It can destroy the fertility of soil. As the soil is not replenished, micro-organisms in the soil are harmed by fertilizers.

Question 17. What are the different patterns of cropping?

Or

What are the different cropping systems?

Answer: Different ways/patterns / systems of growing crop's are:

- (a) Mixed cropping
- (b) Inter-cropping
- (c) Crop rotation.

Mixed cropping: It is a method in which two or more crops grow simultaneously on the same piece of land.

Example, Wheat + grain, wheat + mustard or groundnut + sunflower.

This helps in the reduction of risk factor and provides insurance against failure of one of the crops.

Inter-cropping: It is a method of growing two or more crops simultaneously on the same field in a definite patterns. A few row of one crop alternate with a few rows of second crop.

Example, soyabean + maize or bajra + lobia

Crop rotation: The growing of different crops on a piece of land in a pre-planned succession is known as crop rotation.

The availability of moisture and irrigation facility decides the choice of crop to be cultivated after one harvest.

Question 18. How does insect pests attack the plant and affect it?

Answer: Insect pests attack the plants in three ways:

1. They cut the root, stem and leaf.
2. They suck the cell sap from various parts of the plant.
3. They bore into stem and fruits.

This way they affect the health of the crop and reduces yield.

Question 19. Give different methods of weed control.

Answer: Weeds can be controlled by different methods:

(a) Weedicides: These are the chemicals sprayed on the weeds to kill them. Excessive use is poisonous and causes environmental pollution.

(b) Mechanical removal: In this method weeds are uprooted by removing manually or by machines.

(c) Preventive methods: Proper seed bed preparation, timely sowing of crops, intercropping and crop rotation helps in weed control.

Question 20. What are the new variety/traits obtained by cross breeding of Indian and exotic breeds of poultry?

Answer: The new variety/traits obtained by cross breeding of Indian and exotic breeds of poultry are:

1. Number and quality of chicks
2. Dwarf broiler parent for commercial chick production
3. Summer adaptation capacity/tolerance to high temperature
4. Low maintenance requirements
5. Reduction in the size of the egg-laying bird with ability to utilise more fibrous and cheaper diet, formulated using agricultural by-products

Question 21. State the difference between egg-layers and broiler.

Answer:

Egg-layers	Broiler
1. They are fed on protein-rich feed.	1. They are fed on vitamin-rich supplementary feed for good growth rate.
2. Used for laying eggs.	2. Used for meat purposes. Lot of protein included in the diet.

IV. Long Answers Type Questions

Question 1. What are the various methods of irrigation in India?

Answer: Most of agriculture in India is rain-fed, several different kinds of irrigation system are adopted to supply water to agricultural lands. The resources are- wells, canals, rivers and tanks.

- **Wells:** Dug wells and tube wells. In dug wells water is collected from water— bearing strata.
- **Tubewells:** Can tap water from deeper strata.
- **Canals:** Most extensive irrigation system. Canals receive water from reservoirs or rivers. The main canal is divided into branch canals having further distributaries to irrigate fields.
- **River lift system:** Water is directly drawn from the river for supplementing irrigation in areas close to rivers.
- **Tanks:** These are small storage reservoirs, which intercept and store the run-off of smaller catchment areas.

Question 2. Large amount of food grains get spoiled every year in India due to improper storage of food grains. How can this be avoided?

Answer: Food grains get spoiled by insects, fungi, rodents, bacteria, moisture, temperature in the place of storage.

Storage losses can be minimised by following preventive and control measures.

1. The seeds/grains that are to be stored should be dry, with no moisture in it.
2. The grains should be cleaned.
3. The grains should be fumigated using chemicals that kills pest.
4. The storage houses should be water proof.
5. The grains should be stored in sealed gunny bags or metal containers,
6. The bags should be stacked in order i.e. in pile for proper fumigation, and should be kept few centimetres away from the wall.
7. The ventilators if any should be closed tightly, to avoid birds visiting the storage house and destroying the grains.
8. The walls and the floor should be water-proof with no holes in it, to avoid rodents, pests.

Question 3. Explain different types of fisheries.

Answer: The different types of fisheries are marine fisheries, inland fisheries, capture fishing, mariculture and aquaculture.

- **Marine fisheries:** Marine fishes are caught using fishing nets. Large schools of fishes is located by satellites. Some are farmed in sea water.
- **Mariculture:** Marine fishes are cultured in seawater this culture of fisheries is called mariculture.

- **Inland fisheries:** The fisheries done in fresh water resources like canals, ponds, reservoirs and rivers is called inland fisheries.
- **Capture fishing:** It is done in sea-water, estuaries and lagoons.
- **Aquaculture:** Culture of fish done in different water bodies is called aquaculture.

Question 4. What are the practices used for dairy industry?

Answer: The practices required for raising dairy animals to get the optimum yield are:

(i) Shelter, (ii) feeding, (iii) rearing of animals, (iv) breeding.

(i) Shelter: The shelter should be clean, spacious and airy.

(ii) Feeding: Proper food is essential for dairy animals, two types of food are roughage and concentrates. Proper feed at proper time is required for dairy animals.

(iii) Rearing of animals: Providing them proper health care and protection from pathogens, diseases and proper vaccination.

(iv) Breeding: The crossing of different variety of milch animals to obtain a breed that can produce more yield of milk.

V. Value-based Questions

Question 1. A group of Eco Club students made a compost pit in the school, they collected all bio-degradable waste from the school canteen and used it to prepare the compost.

(a) Name two waste that can be used for the compost and two wastes obtained from canteen which cannot be used for the compost making?

(b) What is the other important component required for making the compost?

(c) What values of Eco Club students are reflected in this act?

Answer:

(a) Two waste used for compost are vegetable peels and fruit peels. Two waste material that cannot be used as compost are polythene bags and plastic items.

(b) Bacteria and fungi present in soil are the other important component for making compost.

(c) Eco Club students reflect the value of group work, responsible citizens.

Question 2. Surjeet read an article in the newspaper that prolonged and excess use of pesticides and fertilizers leads to cancer in human beings. He also saw the increased number of cancer patients in his town. He started educating the farmers in his town to minimize or stop the use of chemicals in farming and adopt the organic farming.

(a) What is the most common pesticide used in our country?

(b) Give one difference in organic farming and chemical farming.

(c) What value of Surjeet is seen in the above act?

Answer:

(a) The common pesticide is DDT.

(b) **Organic farming:** It is a farming system with minimal or no use of chemicals as fertilizers, herbicides, pesticides etc.

Chemical farming: Generally, chemicals are used as fertilizers, herbicides, pesticides etc. to increase crop yield.

(c) Surjeet showed the value of responsible person, leadership quality, initiative taker and a concerned citizen

Question 3. Large number of Bhetki fish died and got crushed in the turbines of hydroelectric power stations while they migrated from river to sea. The environmentalist gave power plant the solution to this problem. Now all Bhetki fish is removed with the help of special technique and hence do not enter the turbines to crush and die.

(a) What is pisciculture?

(b) Suggest two different varieties of fish.

(c) What value of environmentalist is reflected in the above case?

Answer:

(a) The rearing of fish on large scale is called pisciculture.

(b) Two varieties of fish are bony and cartilaginous.

(c) Environmentalist showed the value of concerned and caring individuals.

Question 4. A group of gardening club students prepared a kitchen garden in the school campus and did organic farming to grow the vegetables. Then the students presented their group work in the assembly to spread the awareness and make students understand the importance of organic products.

(a) What is horticulture?

(b) What is green manure?

(c) State the values of gardening club students.

Answer:

(a) Production of vegetables and fruits commercially is called horticulture.

(b) The green plants like guar or sun hemp are turned into the soil which enriches the soil with nitrogen and phosphorus and is called green manure.

(c) Values of gardening club students are aware individuals and responsible behaviour.

WE ARE WITH YOU.....