# PHYSICAL SCIENCE
## Handbook

# 8th Class
## (SPECIAL EDITION)

A Complete Book

**Main Features**

* Main Points
* Definitions
* Textual Questions
* Extended Learning - Activities and Projects
* Additional Questions
* Bits
* Textual Tables

**Chapter Wise**


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# CHAPTER - 1

# FORCE AND PRESSURE

- **Force – A Push or a Pull**
- **Forces are due to an Interaction**
- **Exploring Forces**
- **A Force can Change the State of Motion**
- **Force can Change the Shape of an Object**
- **Contact Forces Muscular Force**
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## MAIN POINTS

1. Force arises due to the interaction between at least two objects.
2. Force has both magnitude and direction.
3. Force can change
   i) The state of motion ii) Speed of an object iii) Direction of motion iv) Shape of an object
4. Forces are two types. They are i) Contact forces ii) Non-Contact forces
5. Muscular force, frictional force, Normal force and Tension are examples of contact forces.
6. Gravitational force, Electrostatic force and Magnetic force are examples of Non-Contact force.
7. A magnet can exert a force without being in contact with it. The force exerted by a magnet is an example of a non-contact force.
8. Pressure(P) = Force(F)/ Area on which it acts(A). S.I unit is $N/m^2$ or pascal.
9. Liquids exert pressure on the walls of the container in which they are kept.
10. Gases exert pressure in all directions.
11. A force exerted by a charged body on another charged or uncharged body is known as electrostatic force.

## DEFINITIONS

1. **Force:** A push or a pull on an object is called a force
2. **Contact force:** A force that can be applied only when it is in contact with an object is called a contact force.
3. **Non-Contact force:** A force that can be applied without any contact between two objects is called non-contact force.
4. **Muscular force:** The force resulting due to the action of muscles is known as muscular force.
5. **Friction:** The force of friction always acts on all the moving objects and its direction is always opposite to the direction of motion.
6. **Magnetic force:** The force exerted by a magnet to pull/push a metallic object is called magnetic force.
7. **Electrostatic force:** A positive or negative charged body, exerted force on another charged or uncharged body, that force is known as electrostatic force.
8. **Gravitational force:** The force exerted by the earth to pull the objects towards itself is called as Gravitational force.
9. **Gravity:** Objects or things fall towards the earth because it pulls them. This force is called the force of gravity or gravity.
10. **Pressure:** The force acting on a unit area of a surface is called pressure.
11. **Atmospheric Pressure:** The pressure exerted by air around us is known as atmospheric pressure.

## TEXTUAL QUESTIONS

**1. Give two examples each of the situations in which you push or pull to change the state of motion of objects.**

**Ans:** Push: i) We close drawer by pushing.
ii) We move a wooden box by pushing.
Pull: i) We draw water from a well by pulling the rope.
ii) A horse pulls a cart.

**2. Give two examples of situations in which applied force causes a change in the shape of an object.**

**Ans:** When we apply force on a rubber band to stretch it and on clay to change its shape.

**3. Fill in the blanks in the following statements.**

(a) To draw water from a well we have to _____ at the rope.
(b) A charged body _____ an uncharged body towards it.
(c) To move a loaded trolley we have to _____ it.
(d) The north pole of a magnet _____ the north pole of another magnet.

**Ans:** (a) pull (b) attracts (c) push (d) repels

**4. An archer stretches her bow while taking aim at the target. She then releases the arrow, which begins to move towards the target. Based on this information fill up the gaps in the following statements using the following terms:**

**muscular, contact, non-contact, gravity, friction, shape, attraction**

(a) To stretch the bow, the archer applies a force that causes a change in its _____
(b) The force applied by the archer to stretch the bow is an example of _____ force.
(c) The type of force responsible for a change in the state of motion of the arrow is an example of a _____ force.
(d) While the arrow moves towards its target, the forces acting on it are due to _____ and that due to _____ of air.

**Ans:** (a) shape (b) muscular (c) contact (d) gravity, friction

**5. In the following situations identify the agent exerting the force and the object on which it acts. State the effect of the force in each case.**

(a) Squeezing a piece of lemon between the fingers to extract its juice.
(b) Taking out paste from a toothpaste tube.
(c) A load suspended from a spring while its other end is on a hook fixed to a wall.
(d) An athlete making a high jump to clear the bar at a certain height.

**Ans:**

| Agent exerting the force | Object | Effect of force on object |
|---|---|---|
| (a) Fingers | Lemon | Lemon juice comes out. |
| (b) Fingers | Toothpaste tube | Toothpaste comes out. |
| (c) Spring | Load | Load is suspended. |
| (d) Athlete | Height of the Bar | Jumping helps to cross the bar |

**6. A blacksmith hammers a hot piece of iron while making a tool. How does the force due to hammering affect the piece of iron?**

**Ans:** The force due to hammering causes the change in the shape of the iron and iron can be moulded in the shape of the required tool.

**7. An inflated balloon was pressed against a wall after it has been rubbed with a piece of synthetic cloth. It was found that the balloon sticks to the wall. What force might be responsible for the attraction between the balloon and the wall?**

**Ans:** Electrostatic force.

**8. Name the forces acting on a plastic bucket containing water held above ground level in your hand. Discuss why the forces acting on the bucket do not bring a change in its state of motion.**

**Ans:** Forces acting on bucket are as follows:
(i) Muscular force of arms acting upward.

(ii) Force of gravity acting downward.

Both the forces do not bring any change in the state of motion because both of them are acting in equal and opposite directions and thus they cancel each other's effect.

**9. A rocket has been fired upwards to launch a satellite in its orbit. Name the two forces acting on the rocket immediately after leaving the launching pad.**

**Ans:** The forces that act when a rocket leaves launching pad are as follows:

(i) Gravitational force of the earth (downward)

(ii) Frictional force of air (in opposite direction)

**10. When we press the bulb of a dropper with its nozzle kept in water, air in the dropper is seen to escape in the form of bubbles. Once we release the pressure on the bulb, water gets filled in the dropper. The rise of water in the dropper is due to**

(a) pressure of water (b) gravity of the earth (c) shape of rubber bulb (d) atmospheric pressure

**Ans:** (d) atmospheric pressure

## Extended Learning — Activities and Projects

**1.** Make a 50 cm × 50 cm bed of dry sand about 10 cm in thickness. Make sure that its top surface is levelled. Take a wooden or a plastic stool. Cut two strips of graph paper each with a width of 1 cm. Paste them vertically on any leg of the stool - one at the bottom and the other from the top. Now gently put the stool on the sand bed with its legs resting on the sand. Increase the size of sand bed if required. Now put a load, say a school bag full of books, on the seat of the stool. Mark the level of sand on the graph strip. This would give you the depth, if any, to which the legs of stool sink in sand. Next, turn the stool upside down so that now it rests on its seat on the sand bed. Note the depth to which the stool sinks now. Next, put the same load on the stool and note the depth to which it sinks in the sand. Compare the pressure exerted by the stool in the two situations.

**Ans:** Pressure exerted by the stool is greatest in first situation.

**2.** Take a tumbler and fill it with water. Cover the mouth of the tumbler with a thick card similar to that of a postcard. Hold the tumbler with one hand while keeping the card pressed to its mouth with your other hand. Turn the tumbler upside down while keeping the card pressed to its mouth. Make sure that the tumbler is held vertical. Gently remove the hand pressing the card. What do you observe? Does the card get detached allowing the water to spill? With a little practice you will find that the card continues to hold water in the tumbler even after it is not supported by your hand. Also try this activity by using a piece of cloth to hold the tumbler in an upside down position (Fig. 1.21).

*Fig. 1.21*

**Ans:** What to do: Once you have everything in place, fill up the glass with water right upto its brim. Carefully place the glossy side of the postcard down on the rim of the glass. Keep the palm of your hand placed on the card and turn the glass upside down.

What happens: The card remains attached to the rim of the glass and does not allow the water to flow out.

Why this happens: This happens because the air pressure exerted on the card from underneath is greater that the weight of the water inside the glass. This is why the card manages to hold up the water not letting it spill out.

**3.** Take 4-5 plastic bottles of different shapes and sizes. Join them together with small pieces of glass or rubber tube as shown in Fig. 1.22. Keep this arrangement on a level surface. Now pour water in any one of the bottles. Note whether the bottle in which water is poured gets filled first or all the bottles get filled up simultaneously. Note the level of water in all the bottles from time to time. Try to explain your observations.

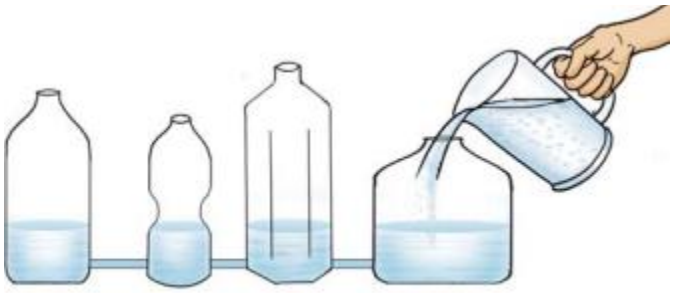


*Fig. 1.22*

**Ans:** Water fills in bottles according to air pressure. The bottle which has less air pressure will fill first. This is because air pressure opposes water flow.
However at the end, water level in all the bottles will be same.

## ADDITIONAL QUESTIONS

**1. During dry weather, clothes made of synthetic fibre often stick to the skin. Which type of force is responsible for this phenomenon?**

**Ans:** Magnetic force

**2. What is the necessary condition for a force to come into play?**

**Ans:** At least two objects must interact for a force to come into play.

**3. Does the force of gravitation exist between two astronauts in space?**

**Ans:** Yes

**4. An inflated balloon was pressed against a wall after it has been rubbed with a piece of synthetic cloth. It was found that the balloon sticks to the wall. What force might be responsible for the attraction between the balloon and the wall ?**

**Ans:** Electrostatic force.

**5. Which force is responsible for the weight of objects ?**

**Ans:** Force of gravity

**6. What happens when the two forces act in the opposite direction on an object?**

**Ans:** If two different forces act in the opposite direction on an object, the net force acting on it is the difference between the two forces.

**7. What will be the net force on an object when two forces act on an object in the same direction?**

**Ans:** Forces applied on an object in the same direction add to one another.

**8. Specify push or pull when dealing with two magnets with similar and opposite poles.**

**Ans:** Similar poles of two magnets repel (push) each other and opposite poles attract (pull) each other.

**9. How can we change the speed and direction of a moving body?**

**Ans:** By applying force on moving body.

**10. What causes a change in the state of motion of an object?**

**Ans:** The force of friction is responsible for change in the state of motion of an object.

**11. Name the force responsible for the wearing out of bicycle tyres.**

**Ans:** Force of friction

**12. What force will you use to sort out pins easily from garbage? Whether it is a contact force or non-contact force?**

**Ans:** Magnetic force acts on to sort out pins from garbage and it is a non-contact force.

**13. Why is it comfortable to lift a school bag with broad straps than thin straps ?**

**Ans:** Pressure is inversely proportional to area. Since broader straps have greater area, therefore, the pressure decreases.

**14. Give two examples of situations in which applied force causes a change in the shape of an object.**

**Ans:** i) Pressing a lump of dough with hand. ii) Pressing an inflated balloon.

**15. What may be the consequences when a force is applied on an object?**

**Ans:** i) change in the shape of the object. ii) change in the state of motion of the object.

**16. How does an applied force change the speed of an object?**

**Ans:** i) If the applied force is in the direction of motion, the speed of the object increases.
ii) If the applied force is in the direction opposite to the motion, the speed of the object decreases.

**17. What can be the result of a force applied on an object?**

**Ans:** i) Change in the shape of the object. ii) Change in direction of motion of an object.
iii) Change in speed of an object. iv) The moving object comes to rest.

**18. Name some non-contact forces with examples.**

**Ans:** i) Gravitational force
Ex: A ball projected upwards, falls back on earth.
ii) Magnetic force
Ex: The force exerted by the magnet on iron.
iii) Electrostatic force
Ex: Sticking an inflated balloon to the wall after rubbing with a dry cloth.

**19. On what factors does the effect of force depends?**

**Ans:** The effect of a force depends on two factors
i) The amount of force applied. ii) The area on which the force is applied.

**20. Why does the pointed end of the nail get into the wooden plank easily?**

**Ans:** The area of the pointed end of the nail is much smaller than that of its head. The same force produces a sufficient pressure to push the pointed end of the nail into the wooden plank.

**21. Why do porters place a round piece of cloth on their heads?**

**Ans:** Porters place a round piece of cloth on their heads to increase the area of contact of the load with their head. So the pressure on their head is reduced and they can carry heavy loads easily.

**22. Explain the principle of watering the gardens through fountains of water.**

**Ans:** Water fountains work due to the pressure exerted by water on the walls of the fountain pipe. It further depends on the force by which water enters the pipe.

**23. Define Pressure. Write the relation between pressure force and area. Name the instrument used to measure atmospheric pressure.**

**Ans:** Pressure is force per unit area.
Pressure = Force/Area
A barometer is used to measure atmospheric pressure.

**24. Why is it difficult to cut vegetables with a blunt knife?**

**Ans:** Pressure is inversely proportional to area. The area of the blunt knife is more and therefore, the effect of the force is less. Therefore, more force has to be applied.

**25. Trucks intended to carry heavy loads have eight tyres instead of four tyres. Why ?**

**Ans:** Trucks intended to carry heavy loads have eight tyres, so as to increase the area of contact with the road. Since pressure is inversely proportional to area, less pressure is applied on the road.

**26. An archer stretches her bow while taking aim at the target. She then releases the arrow, which begins to move towards the target. Based on this information fill up the gaps in the following tatements using the following terms.**

**muscular, contact, non-contact, gravity, friction, shape, attraction.**

(a) To stretch the bow, the archer applies a force that causes a change in its …….
(b) The force applied by the archer to stretch the bow is an example of …….. force.
(c) The type of force responsible for a change in the state of motion of the arrow is an example of a ……. force.
(d) While the arrow moves towards its target, the forces acting on it are due to and …… of air.

**Ans:** (a) shape (b) muscular (c) contact (d) gravity, friction

**27. Answer the following questions?**

**a. While constructing dams, the base is made more wide. Why ?**

**b. Why does blood ooze out when there is a slight cut on your body ?**

**Ans:** a. The pressure of liquids increases as the depth increases. Therefore, the base is made wider to withstand the high pressure of water.

b. Blood pressure is little greater than atmospheric pressure. Due to this, the blood oozes out when we have a slight cut on our body.

**28. Give reasons for the following**

**(a) The skiers use flat and broad skis** **(b) Deep sea divers wear special suits**.

**Ans:** (a) The skiers use flat and broad skis to ski on the snow. The larger surface of skis reduces pressure on snow and helps them to slide instead of sinking.

(b) Deep sea divers wear special suits, because the pressure of water increases with depth. The increased pressure may hurt the body of divers.

**29. What is a force?**

**Ans:** Force is a push or a pull exerted on one object from another.

**30. Write the formula to find out pressure.**

**Ans:** The formula of pressure is Pressure= Force/Area

$$P=F/A$$

**31. State whether the following statement is True or False. Give Reason?**

(a) Gases exert pressure on the walls of their container.

**Ans:** True. Gaseous particles move randomly and due to this motion, they also hit the walls of the container, thus creating pressure on its walls.

**32. Which force acts on every object in the universe?**

**Ans:** Gravitational force acts on every object in the universe

**33. Find out the type of force acting on the below situations.**

(a) A coin or a pen falls to the ground when it slips out of your hand.

(b) A boat comes to rest if we stop rowing it.

(c) When a person lifts a bucket of water.

**Ans:** (a) Gravitational force acts when something falls to the ground after slipping out of our hand.

(b) A boat comes to rest if we stop rowing due to friction.

(c) Muscular force acts when a person lifts a bucket of water.

**34. Describe the state of motion of an object.**

**Ans:** The motion of an object is defined by its speed and direction. The resting state is considered to be the state of zero speed. An object may rest or move; these can be its two states of motion.

**35. Write one point of difference between contact and non-contact force with an example.**

**Ans:**

| Contact force | Non-Contact force |
|---|---|
| Contact force is a force that is applicable when two objects are placed such that they have physical contact with each other. | Non-Contact force is a force that can be applied even when two objects are not in contact physically. |
| For example, Frictional force | For example, Magnetic force |

**36. Why do you think a ball rolling along the ground gradually slows down and comes to rest?**

**Ans:** A ball rolling along the ground gradually slows down and comes to rest due to friction. This force of friction acts between the surface of the ball and the ground and acts opposite to the direction of motion which brings the ball to rest after some time.

**37. Porters place a round piece of cloth on their heads when they have to carry heavy loads. Why?**

**Ans:** Porters place a round piece of cloth on their head when they have to carry heavy loads because this increases the area of contact of the load and their head which decreases the pressure on their head. Since pressure is inversely proportional to the area of contact. This makes it easier for porters to carry heavy loads.

**38. What type of force is friction – contact or non-contact? Why?**

**Ans:** Friction is a contact force because it arises due to contact between two surfaces. The surface of contact witnesses' frictional motion while rubbing against each other. This force acts in the direction opposite to the direction of motion.

**39. Why do you think pressure acts on the area of a surface?**

**Ans:** Pressure is inversely proportional to the area of the surface, that is, a small area will provide greater pressure with the same amount of force applied. This means that a pointed needle will hurt more or exert more pressure than a plank of wood with the same force applied on both.

**40. Do you think sometimes the application of force does not result in a change in the state of motion? Describe with an example.**

**Ans:** Sometimes application of force does not result in a change in the state of motion. This does not mean that force is not applied instead, it means that the force applied is not enough to move the object.
For example, applying pressure on a wall or a heavy stone and may not move.

**41. Why does a rubber sucker stick to the surface of any object?**

**Ans:** The rubber sucker sticks to the surface of any object because of the pressure of the atmosphere that acts on it.

**42. Define muscular force. Give examples.**

**Ans:** The force exerted due to the action of the muscles of someone's body is called muscular force.
For example, running, lifting something, jumping, etc.

**43. Write a short on the electrostatic force.**

**Ans:** Electrostatic force is the force caused due to attraction or repulsion of electric charges between two particles. This is a non-contact force, therefore it acts when two charged bodies are brought closer to each other. It is also known as Coulomb's force.

**44. Describe an activity to show that 'a force can change the state of motion.**

Ans: To show that a force can change the state of motion place a rubber ball on any flat surface. Now, push the ball in any direction along the surface. Pushing it again increases its speed while placing a palm in front of it stops its motion and brings the ball to rest. It will move again if a force is applied to it. This proves that a force can change the state of motion.

**45. What are the effects of the application of force on an object? Explain.**

**Ans:** (a) The shape of an object can be changed.
Ex: A cricket ball changes its shape temporarily when hit by the bat.
(b) The direction of a moving object can be changed.
Ex: The direction of the cricket ball changes when hit by the bat.
(c) A moving object can be brought to rest.
Ex: Putting a hand in front of a rolling ball brings it to rest.
(d) A stationary object can be brought to motion.
Ex: Rolling a stationary ball on a plane surface brings it to motion.
(e) It can change the speed of an object.
Ex: Further pushing a rolling ball on a surface in the same direction as its motion increases its speed.

**46. Demonstrate an experiment to show that liquids exert pressure on the walls of the container.**

**Ans:** To show that liquids exert pressure on the walls of the container, take a plastic bottle and fix a cylindrical glass tube of a few centimetres near its bottom. To do this, you can simply heat an end of the glass tube and insert it immediately near the bottom of the plastic bottle. Seal any leakage, if present, with molten wax. Now, cover the open end of the glass tube with a thin rubber sheet. Fill half of the bottle with water. Note that the rubber sheet bulges out due to the pressure applied by water. This proves that liquids exert pressure on the walls of the container.

**47. State whether the given statements are true or false.**

(a) Pressure does not depend on area of contact.
(b) Atmospheric pressure is less at higher altitudes.
(c) Pascal is the unit of force.
(d) To move an object faster it has to be pushed or pulled repeatedly.
(e) At least two objects must interact for a force to come into play.
(f) Magnetic force is a non-contact force.

(g) An apple from a tree falls on the ground due to the force of gravity.

**Ans:** (a) False (b) True (c) False (d) True (e) True (f) True (g) True

## BITS

1. A batsman hits a cricket ball which then rolls on the level ground. After covering a short distance the ball comes to rest. The ball stops due to
(a) magnetic force (b) frictional force (c) gravitational force (d) muscular force

**Ans: (b)**

2. When two forces applied on an object are equal and opposite, then these forces
(a) may move the object. (b) may stop the object.
(c) may move the object and also cause a change in its shape.
(d) do not move the object but may cause a change in its shape.

**Ans: (d)**

3. When two unbalanced forces act on a body, in opposite directions, the net force is equal to
(a) the sum of the individual unbalanced forces. (b) zero.
(c) difference between the two unbalanced forces and is in the direction of the larger force.
(d) difference between the two unbalanced forces and is in the direction of smaller force.

**Ans: (c)**

4. Nails have pointed ends. This results in
(a) a decrease in the force exerted on them. (b) a decrease in the effect of the force exerted on them.
(c) an increase in the force exerted on them. (d) an increase in the effect of the force exerted on them.

**Ans: (c)**

5. Which of the following is an example of contact force ?
(a) Magnetic force (b) Muscular force (c) Electric force (d) Gravitational force

**Ans: (b)**

6. Fruits falling from trees is an example of
(a) gravitational force (b) muscular force (c) frictional force (d) electric force

**Ans: (a)**

7. The unit of measuring pressure is
(a) newton (b) newton/metre (c) metre$^2$ (d) metre$^2$ /newton

**Ans: (b)**

8. In liquids, the pressure
(a) increases with depth (b) decreases with depth
(c) remains same at all depths (d) sometimes increases sometimes decreases

**Ans: (a)**

9. During dry weather, rubbing a plastic scale with dry hair, attracts small pieces of paper. This is due to
(a) gravitational force (b) electrostatic force (c) frictional force (d) muscular force

**Ans: (b)**

10. Which is not the non-contact force?
(a) Electrostatic force (b) Gravitational force (c) Frictional force (d) Magnetic force

**Ans: (c)**

11. A wooden piece 5N in weight and 5cm x 3cm x 2cm in size lies on 5cm x 2cm face. The pressure exerted by it in N/cm$^2$ is
(a) 150 (b) 50 (c) 0.5 (d) 15

**Ans: (c)**

12. The force is always attractive in nature and extends to infinity
(a) magnetic force (b) gravitational force (c) electrostatic force (d) frictional force

**Ans: (b)**

13. The standard unit of force is
(a) metre/second (b) newton (c) pascal (d) metre/second$^2$

**Ans: (b)**

14. Force can be measured by

(a) magnitude (b) mass (c) weight (d) volume

**Ans: (a)**

15. Fill in the blanks in the following statements.
(a) A _____ or a _____ on an object is called force.
(b) An object in _____ with another object results in a force between the two objects.
(c) A force applied on an object causes either a change in its _____ of _____ or its _____
(d) Force acting on per unit area is called _____
(e) The force resulting due to the action of muscles is known as _____
(f) Magnetic force is a _____ force.

**Ans:** (a) push, pull (b) interaction (c) state, motion, shape
(d) pressure (e) muscular force (f) non-contact

16. Which one of the following forces always opposes motion?
(a) gravitational force (b) electrostatic force (c) muscular force (d) friction

**Ans:** (d) friction

17. Pressure is defined as _____.
(a) force per unit area (b) force per square unit area (c) force (d) force per area

**Ans:** A. force per unit area

18. Which one of the following statements is false about force.
(a) Forces applied to an object need not to be in the same direction.
(b) No objects interaction is required for a force to come into play.
(c) Motion imparted to objects will be due to the action of a force.
(d) The strength of a force is usually expressed by its magnitude.

**Ans:** (b) No objects interaction is required for a force to come into play.

19. A batsman hits the ball for a boundary past the bowler i.e. four runs. The batsman, thus
(a) Changes the direction & speed of the ball (b) Does not change the direction but speed only
(c) Does not change the speed but direction only (d) Does not change either direction or speed

**Ans:** (a) Changes the direction & speed of the ball

20. Leaves and fruits fall to the ground when they get detached from a plant. Which one of the following forces is acting on it?
(a) muscular force (b) magnetic force (c) gravitational force (d) electrostatic force

**Ans:** (c) gravitational force

21. Which one of the following is an example of contact force?
(a) magnetic force (b) muscular force (c) electrostatic force (d) gravitational force

**Ans:** (b) muscular force

22. Which is a Contact Force?
(a) Friction (b) Gravity (c) Electrostatic (d) Magnetic

**Ans:** (a) Friction

23. The Force Strength is expressed by which property?
(a) Weight (b) Latitudinal Force (c) Longitudinal Force (d) Magnitude

**Ans:** (d) Magnitude

24. What Does Force Change in an Object?
(a) Speed (b) Shape (c) Motion (d) All of the above

**Ans:** (d) All of the above

25. What Does a Spring Balance Measure?
(a) Force (b) Weight (c) Mass (d) Pressure

**Ans:** (b) Weight

26. Two forces are acting in different or opposite directions. What is the net pressure across them?
(a) Summation of the forces. (b) The difference between the forces.
(c) Both of the above (d) None of the above

**Ans:** (b) The difference between the forces.

27. What is the force exerted by the earth to pull the object towards itself known as?
(a) gravitational force (b) electrostatic force (c) muscular force (d) contact force

**Ans:** (a) gravitational force

28. Two objects repel each other. Which among the following is the cause of this repulsion?
(a) electrostatic force only (b) frictional force only
(c) magnetic force only (d) either a magnetic or an electrostatic force

**Ans:** (d) either a magnetic or an electrostatic force

29. What is a push or pull on an object called?
(a) Pressure (b) Push-pull (c) Force (d) All the above

**Ans:** (c) Force

30. The pressure which is exerted by air around us is known as
(a) force (b) atmospheric pressure (c) muscular force (d) friction

**Ans:** (b) atmospheric pressure

31. A _____ exerted by an object on another is a force.
(a) Push or pull (b) Contact or non-contact force (c) Pressure (d) Magnitude

**Ans:** (a) Push or pull

32. Muscular force is also called _____ force.
(a) non-contact (b) contact (c) gravitational (d) magnetic

**Ans:** (b) contact

33. 1 kilogram weight is equal to
(a) 98 N (b) 9.8 N (c) 0.98 N (d) 0.098 N

**Ans:** (b) 9.8 N

34. A spring balance is used for measuring
(a) mass (b) weight (c) pressure (d) speed

**Ans:** (b) weight

35.Two boys A and B are applying force on a block. If the block moves towards the boy A, which one of the following statements is correct?
(a) Magnitude of force applied by A is greater than that of B.
(b) Magnitude of force applied by A is smaller than that of B.
(c) Net force on the block is towards B. (d) Magnitude of force applied by A is equal to that of B.

**Ans:** (b) Magnitude of force applied by A is smaller than that of B

36. When two forces act in opposite directions, then net force acting is the
(a) sum of two forces (b) difference between two forces (c) both of these (d) none of these

**Ans:** (b) difference between two forces

37. State of motion is described by
(a) Position of rest (b) Position of motion (c) Both by the state of rest or motion (d) None of these

**Ans:** (c) Both by the state of rest or motion

38. When the hammer strikes the gong of an electric bell, which of the following force is responsible for the movement of hammer?
(a) Gravitational force alone (b) Magnetic force alone (c) Electrostatic force alone (d) Frictional force alone

**Ans:** (c) Electrostatic force alone

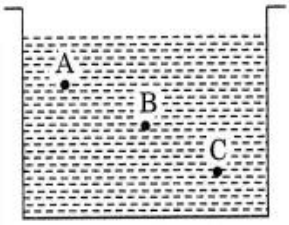
39. During dry weather, while combing hair, sometimes we experience hair flying apart. The force responsible for this is
(a) force of gravity (b) force of friction (c) electrostatic force (d) magnetic force

**Ans:** (c) electrostatic force

40. Two objects repel each other. This repulsion could be due to
(a) frictional force only (b) electrostatic force only
(c) magnetic force only (d) either a magnetic or an electrostatic force

**Ans:** (d) either a magnetic or an electrostatic force

41. A container is filled with water as shown in the given figure. Which of the following statements is correct about pressure of water?



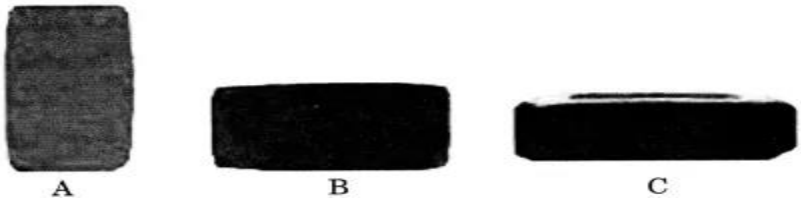

(a) Pressure at A > Pressure at B > Pressure at C (b) Pressure at A = Pressure at B = Pressure at C
(c) Pressure at A < Pressure at B > Pressure at C (d) Pressure at A < Pressure at B < Pressure at C

**Ans:** (d) Pressure at A < Pressure at B < Pressure at C

42. A push or pull on an object is called
(a) Pressure (b) Push-pull (c) Force (d) All of the above

**Ans:** (c) Force

43. A brick is kept in three different ways on a table as shown in given figure. The pressure exerted by the brick on the table will be




(a) maximum in position A (b) maximum in position C
(c) maximum in position B (d) equal in all cases

**Ans:** (a) maximum in position A

44. Which of the following is proper example(s) to explain that force on an object may change its shape
(a) A ball of dough rolled into chapatti (b) Pressing a rubber ball kept on table
(c) Making model using clay (d) All of the above

**Ans:** (d) All of the above

45. A ball rolling on the ground slows down and finally stops. This is because of
(a) Force (b) Less force applied (c) Friction (d) None of the above

**Ans:** (c) Friction

46. If In a tug-o-war, when two teams are pulling a rope, and the rope does not move towards any team, it implies that
(a) Equal force is being applied in the same direction (b) Equal Force is being applied in opposite direction
(c) No force is applied in any direction (d) Cannot be explained

**Ans:** (b) Equal Force is being applied in opposite direction

47. An example of a non- contact force is
(a) Force exerted by us to lift a bucket (b) Push a stationary car
(c) Force exerted by magnet (d) Hit a cricket ball for a 6 run

**Ans:** (c) Force exerted by magnet

48. Pressure =
(a) Area / force on which it acts (b) force / area on which it acts
(c) Volume / force on which it acts (d) Force / volume on which it acts

**Ans:** (b) force / area on which it acts

49. Gravity is
(a) Repulsive (b) Attraction + Repulsive force (c) Attractive force (d) Not a force

**Ans:** (c) Attractive force

50.The envelop of air all around us is called _____.

**Ans:** atmosphere

51. Force has _____ as well as direction.
**Ans:** magnitude
52. _____ and _____ forces are the two kinds of forces.
**Ans:** Contact, non-contact
53. Force is _____ to pressure.
**Ans:** directly proportional
54. The _____ is measured by an instrument called barometer.
**Ans:** atmospheric pressure

## TEXTUAL TABLES

**Table: 1.1**

| S. No. | Description of the situation | Action: (pushing/pulling/picking/hitting/lifting/lowering/flying/kicking/throwing/shutting/flicking) | | | | Action can be grouped as a | |
|---|---|---|---|---|---|---|---|
| | | | | | | Push | Pull |
| 1. | Moving a book placed on a table | Pushing | Pulling | Lifting | – | Yes | Yes |
| 2. | Opening or shutting a door | Pushing | Pulling | Lifting | Lowering | Yes | Yes |
| 3. | Drawing a bucket of water from a well | Lowering | Lifting | Pulling | – | Yes | Yes |
| 4. | A football player taking a penalty kick | Lifting | Kicking | Hitting | – | Yes | No |
| 5. | A cricket ball hit by a batsman | Hitting | Lifting | Flicking | – | Yes | No |
| 6. | Moving a loaded cart | Pulling | Pushing | – | – | Yes | Yes |
| 7. | Opening a drawer | Pulling | – | – | – | No | Yes |

**Table: 1.2**

| Description of situation | How to apply force | Diagram | Action of force | | | |
|---|---|---|---|---|---|---|
| | | | Change in state of motion | | Change in shape | |
| | | | Yes | No | Yes | No |
| A lump of dough on a plate | Pressing it down with your hands |  | | No | Yes | |
| Spring fixed to the seat of a bicycle | By sitting on the seat |  | | No | Yes | |
| A rubber band suspended from a hook/ nail fixed on a wall | By hanging a weight or by pulling its free end |  | | No | Yes | |
| A plastic or metal scale placed between two bricks | By putting a weight at the centre of the scale |  | | No | Yes | |

# CHAPTER-2

# FRICTION

- **Force of Friction**
- **Factors affecting Friction**
- **Friction : A Necessary Evil**
- **Increasing and Reducing Friction**
- **Wheels Reduce Friction**
- **Fluid Friction**

## IMPORTANT POINTS

1. Friction opposes the relative motion between two surfaces in contact. It acts on both the surfaces.
2. Factors affecting friction
   i) Nature of surfaces in contact ii) State of smoothness or roughness of given pair of surfaces
   iii) How hard the two surfaces press together.
3. Friction is independent of the area of contact.
4. Static friction comes into play when we try to move an object at rest.
5. Sliding friction is less than the static friction. Rolling friction is smaller than sliding friction.
6. Effects of friction
   i) Produces heat ii) Wear and tear of various parts of machines iii) Decreases the efficiency of machines.
   iv) It is responsible for writing, walking and transmitting energy, starting or stopping, gripping or holding an object with our hands.
7. Friction can be reduced by using grease, oil, powder, ball bearing and anti-friction alloys etc.
8. Friction can be increased by making a surface rough.
9. The sole of the shoes and the tyres of the vehicle are grooved to increase friction.
10. Fluid friction can be minimized by giving suitable shapes to bodies moving in fluids.
11. To overcome fluid friction bodies of ships and aeroplanes are made streamlined.

## DEFINITIONS

1. Friction: It is form of force, which opposes the relative motion between the two surfaces in contact and it acts on both the surfaces.
2. Static friction: The force required to overcome friction at the instant an object starts moving from rest is a measure of static friction.
3. Sliding friction: When one body slides over the surface of another body, the resistance to its motion is called sliding friction.
4. Rolling friction: When one body rolls over the surface of another body, the resistance to its motion is called rolling friction.
5. Drug: The frictional force exerted by fluids is also called drag or fluid friction.
6. Lubricants: The substances which reduce friction are called lubricants.
7. Streamlined body: A streamlined body is a shape that decreases the friction drag between a fluid, such as air and water, and an object that passes through that fluid.

## TEXTUAL QUESTIONS

**1. Fill in the blanks.**

(a) Friction opposes the _____ between the surfaces in contact with each other.
(b) Friction depends on the _____ of surfaces.
(c) Friction produces _____
(d) The sprinkling of powder on the carrom board _____ friction.
(e) Sliding friction is _____ than the static friction.

**Ans:** (a) relative motion (b) nature (c) heat
(d) reduces (e) less

**2. Four children were asked to arrange forces due to rolling, static and sliding frictions in decreasing order. Their arrangements are given below. Choose the correct arrangement.**

(a) rolling, static, sliding (b) rolling, sliding, static
(c) static, sliding, rolling (d) sliding, static, rolling

**Ans:** (c) static, sliding, rolling.

**3. Alida runs her toy car on a dry marble floor, wet marble floor, newspaper and towel spread on the floor. The force of friction acting on the car on different surfaces in increasing order will be**

(a) wet marble floor, dry marble floor, newspaper and towel.
(b) newspaper, towel, dry marble floor, wet marble floor.
(c) towel, newspaper, dry marble floor, wet marble floor.
(d) wet marble floor, dry marble floor, towel, newspaper.

**Ans:** (a) wet marble floor, dry marble floor, newspaper and towel.

**4. Suppose your writing desk is tilted a little. A book kept on it starts sliding down. Show the direction of frictional force acting on it.**

**Ans:** Frictional force will act upward, i.e., the direction opposite to that of sliding book.

**5. You spill a bucket of soapy water on a marble floor accidentally. Would it make it easier or more difficult for you to walk on the floor? Why?**

**Ans:** The layer of soap makes the floor smooth due to which the friction is reduced. This makes the floor slippery and the foot cannot make a proper grip on the floor. Therefore it is difficult to walk on a soapy floor. We may slip on the floor.

**6. Explain why sportsmen use shoes with spikes.**

**Ans:** Sportsmen use shoes with spikes to increase the friction between shoes and the surface. So the shoes with spikes do not slip while the sportsmen run and play.

**7. Iqbal has to push a lighter box and Seema has to push a similar heavier box on the same floor. Who will have to apply a larger force and why?**

**Ans:** A heavy object produces more friction as it is pressed hard against the opposite surface. So Seema will have to apply a larger force.

**8. Explain why sliding friction is less than static friction.**

**Ans:** The sliding friction is less than static friction because the sliding object get less time to interlock into the contact points on the floor. So it is somewhat easier to move an object already in motion than to get it started.

**9. Give examples to show that friction is both a friend and a foe.**

**Ans:** Friction as a friend:

i) It allows us to grip and catch any object.
ii) It helps us to walk comfortably on the floor.
iii) It helps to minimise the speed or to stop any moving object.
iv)It helps us to write.

Friction as a foe:

i) It causes wear and tears in objects.
ii) It causes damage to the parts of machines and tools which further require money to get them repaired.
iii) It reduces the speed of moving objects, so more force is required.
iv) It produces hurdles in moving any object freely.

**10. Explain why objects moving in fluids must have special shapes.**

**Ans:** The objects moving in fluids must have a special shape to overcome the fluid friction acting on them. Efforts are therefore made to minimise the friction, so objects are given special shape having pointed fronts with little broader middle portion which gets tapered at the back called streamlined

## Extended Learning — Activities and Projects

**1.** What role does friction play in the sport of your choice? Collect some pictures of that sport in action where friction is either supporting it or opposing it. Display these pictures with proper captions on the bulletin board of your classroom.

**Ans:** Activity at home

**2.** Imagine that friction suddenly vanishes. How would life be affected. List ten such situations.

**Ans:** a. Any time you apply brakes of the car, there would be no effect on the car, since brake cannot be applied without friction.

b. We would not be able to walk properly.

c. We would not be able to hold things properly.

d. We will not able to write properly, the pencil will slip off the page.

e. Moving things cannot be stopped without friction (because no resistance).

f. We would not be able to play games.

g. Matchsticks wouldn't work.

h. In a frictionless world Shoes would not wear down.

i. Nails and screws can't be fixed in the wall

j. We would not be able to eat.

**3.** Visit a shop which sells sports shoes. Observe the soles of shoes meant for various sports. Describe your observations.

**Ans:** Different sports shoes have different kinds of shoes

(a) Running shoes are equipped with soles that provide cushion, stability, flexibility and traction.

(b) Sports shoes are spiked or created with varying formations.

(c) Court sports are durable and supportive soles with plenty of traction for gripping on the court.

(d) Cycling shoes have stiffer soles for efficient energy transfer when pedaling.

**4.** A toy to play with: Take an empty match box. Take out its tray. Cut a used refill of a ball pen of the same width as the tray as shown in the figure below. Fix the refill with two pins on the top of the tray as shown in Fig. 2.18. Make two holes on the opposite sides of the tray. Make sure that the holes are large enough to allow a thread to pass through them easily. Take a thread about a metre long and pass it through the holes as shown. Fix beads at the two ends of the thread so that it does not come out. Insert the tray in the outer cover of the matchbox. Suspend the match box by the thread. Leave the thread loose. The match box will start falling down due to gravity. Tighten the thread now and observe what happens. Explain your observation. Can you relate it to friction?

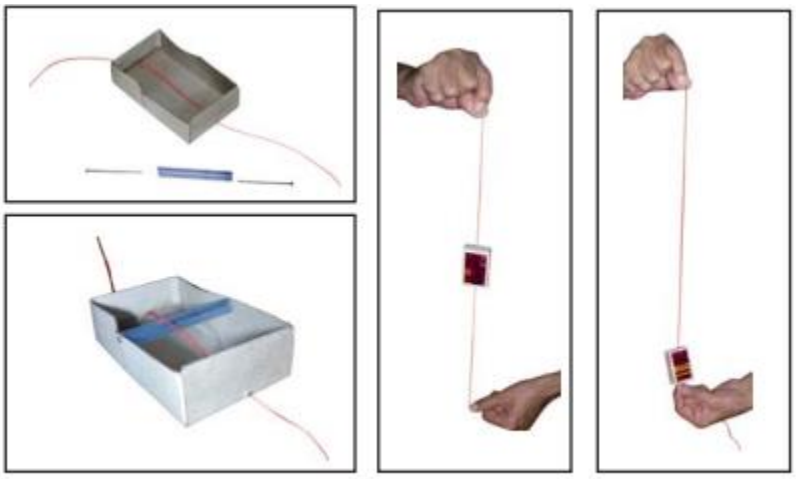


*Fig. 2.18*

**Ans:** The match box will not fall further due to the friction between thread and the match box

## ADDITIONAL QUESTIONS

**1. What is the cause of friction?**

**Ans:** Irregularities on the on the two surfaces in contact.

**2. Why do we sprinkle fine powder on the carom board?**

**Ans:** We want to reduce friction between parts of carom board in order to increase efficiency.

**3. Explain why the surface of mortar and pestile(silbatta) used for grinding is etched again after prolonged use?**

**Ans:** To increase friction to make it more effective for grinding again.

**4. On what factors does the fluid friction depends?**

**Ans:** i) Speed of the object with respect to the fluid. ii) Shape of the object iii) Nature of the fluid

**5. Give reason for the following:**

**(a) Sole of the shoes are grooved. Why? (b) The Tires of any vehicle are threaded. Why?**

**Ans:** (a) The soles of the shoes are grooved in order to increase the friction between the shoes and the surface. It prevents the person from slipping.

(b)Tyre of vehicles is threaded in order to prevent the vehicle from skidding by increasing the friction.

**6. Give some examples that friction is necessary for everyday activities.**

**Ans:** i) When we walk there is fiction between surface and our shoes

ii) While driving there is friction between wheels and the road.

iii) When we write there is friction between the pen/pencil tip and the paper.

**7. Can we eliminate friction completely?**

**Ans:** No, we can never eliminate friction completely. In any situation, we can only increase or decrease the friction between two surfaces. Even when a surface seems smooth from naked eyes it has many irregularities on a microscopic level.

**8. Write a few examples where sliding friction is replaced by rolling friction.**

**Ans:** Sliding friction is generally replaced with rolling friction in circular objects since it helps in body movement. Few such examples are as follows:

In car tyres: Rolling friction helps in movement of the car and static friction is only used when we apply breaks. Use of ball bearings in bicycles.

**9. How can we minimise fluid friction?**

**Ans:** Fluid friction can be reduced by giving bodies moving in fluids appropriate shapes known as streamline.

18. How can you say that rolling reduces friction?

**Ans:** It is always easier to move a heavy object by rolling instead of sliding or lifting. Rolling takes much less force and effort. Thus, we can conclude that rolling reduces friction.

**10. Differentiate between static friction and sliding friction.**

**Ans:**

| Static Friction | Sliding Friction |
|---|---|
| Static friction is defined as the force necessary to overcome friction when an item begins to move from rest. | Sliding friction is defined as the force required to maintain an object moving at the same speed. |
| It is greater than sliding friction. | It is less than static friction. |

**11. It is difficult to move on a wet floor. Why?**

**Ans:** Walking on a wet floor is difficult because the water layer makes the surface smooth. The water coating reduces friction, making it difficult for the foot to maintain a firm grasp on the floor, causing it to slip.

**12. What happens when a book is gently pushed on the table? Why?**

**Ans:** When we push the book gently it moves for a distance and then suddenly stops due to the friction caused by the table surface and the book.

**13. Write a short note on spring balance.**

**Ans:** A spring balance is a device that measures the force exerted on a certain object. It is made up of a coiled spring that expands when a force is applied to it.

A pointer on a graded scale moves to gauge the spring's stretching. The magnitude of the force is determined by the reading on the scale. The scale has a unit newton meter.

**14. Explain increasing and reducing friction with examples.**

**Ans:** Increasing Friction:

a) When we put a brake on the vehicle for it to stop.
b) Gymnasts use a gritty material to increase friction on their hands, which helps them grip better.
c) We increase force to stop a moving ball.

Reducing Friction:

a) We reduce the friction in the cricket ball by rubbing it continuously to increase its spin.
b) Drop of oil/grease is used in machines for its smooth functioning.

c) Powdered is sprinkled on the carrom board for the coins to move better.

**15. Why is 'friction: a necessary evil'? Explain.**

**Ans:** a) It helps us in walking and running comfortably.
b) It makes writing easy on paper.
c) It balances the movement of vehicles on the road.
d) Nail is fixed on the wall due to friction.

Friction at the Same Time Can be Known as Evil Because:

a) It causes wear and tear of the objects.
b) Makes movement of objects difficult.
c) Reduces life of machine and tyres.

**16. How do lubricants help to reduce friction?**

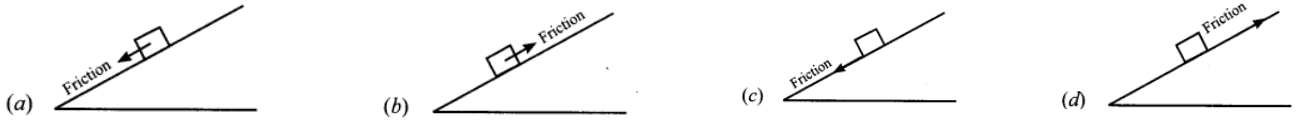
**Ans:** Lubricants such as oil, grease, or graphite establish a thin film between moving parts of a machine, preventing moving surfaces from rubbing against each other. Interlocking of defects is minimised, and movement becomes more smooth and efficient. Lubricants are chemicals that help to reduce friction. It may not be advisable to use oil as a lubricant in particular machinery.

**17. Explain in detail how friction occurs.**

**Ans:** The roughness on the two surfaces in contact generates friction. Even surfaces that appear to be exceedingly smooth contain a vast number of minute defects. Irregularities on both surfaces connect with one other. To overcome interlocking, we must exert force when attempting to move any surface. On rough surfaces, the number of irregularities is higher. As a result, when a rough surface is involved, the friction force is greater. We can see that the friction created by the irregularity on the two surfaces comes in contact with each other. If the two surfaces are forced harder together, it is apparent that the friction force will grow. This friction can be reduced with the use of lubricants like oil or grease.

## BITS

1. Suppose your writing desk is tilted a little. A book kept on it, starts sliding down. The figure, showing the correct direction of frictional-force acting on it, is




**Ans:** (d)

2. Friction,that exists between two surfaces in contact, when there is no relative motion between them, is called
(a) sliding friction (b) static friction (c) viscous drag (d) rolling friction

**Ans:** (b)

3. Four students were asked to arrange forces due to rolling, static and sliding frictions in an increasing order. Their arrangements are listed below. Choose the correct arrangement.
(a) rolling, static, sliding (b) rolling, sliding, static (c) static, sliding, rolling (d) static, rolling, sliding

**Ans:** (b)

4. The energy required to overcome friction is mainly converted into
(a) sound energy (b) heat energy (c) light energy (d) chemical energy

**Ans:** (b)

5. Out of the following, the better lubricant to be used in the moving parts of a machine,
(a) water (b) air (c) chalk powder (d) turpentine oil

**Ans:** (d)

6. Force of friction is more in
(a) marble tiles (b) wooden floor (c) playground (d) glass table

**Ans:** (c)

7. Once a body starts moving on table, the friction which comes into play is
(a) static friction (b) sliding friction (c) limiting friction (d) none of these

**Ans:** (b)

8. The force of friction that comes into play when one body rolls over another surface, is
(a) sliding friction (b) limiting friction (c) rolling friction (d) static friction
**Ans:** (c)

9. These days we use suitcases with wheels because
(a) they look smart (b) they are easy to carry (c) they make less noise (d) none of these
**Ans:** (b)

10. Tyres have cut grooves in them
(a) to increase friction (b) to decrease friction (c) to make them look attractive (d) to save rubber
**Ans** (a)

11. _____ produces the least friction
(a) Rolling friction (b) Sliding friction (c) Composite friction (d) Static friction
**Ans:** (a)

12. _____ is responsible for wearing out of bicycle tyres.
(a) Magnetic force (b) Muscular force (c) Frictional force (d) Electrostatic force
**Ans:** (c)

13. Force of friction is dependent on _____
(a) Roughness of surface (b) Smoothness of surface (c) Inclination of surface (d) All of these
**Ans:** (d)

14. Which one of the following is not a lubricant?
(a) Oil (b) Water (c) Grease (d) Graphite
**Ans:** (b) Water

15. The frictional force on an object in a fluid depends on its _____ with respect to the fluid.
(a) Speed (b) Weight (c) Volume (d) Mass
**Ans:** (a) Speed

16. Which of the following statements is false about friction?
(a) Friction is undesirable. (b) Friction is caused by the irregularities on the two surfaces in contact.
(c) The force of friction is lesser if a rough surface is involved. (d) Friction is a necessary evil.
**Ans:** (c) The force of friction is lesser if a rough surface is involved.

17. Lubricants are the substance which
(a) Increase friction (b) Decrease friction (c) Natural (d) All of the above
**Ans:** (b) Decrease friction.

18. The force of friction on a smooth surface is _____.
(a) Greater (b) Lesser (c) Higher (d) None of the above
**Ans:** (b) Lesser

17. Friction is a type of a _____.
(a) Contact force (b) Magnetic force (c) Non-contact force (d) Gravitational force
**Ans:** (a) contact force

18. The force of friction is always _____ the applied force.
**Ans:** Opposes.

19. What is used in the brake system of a bicycle to increase the friction?
**Ans:** Brake pad

20. In many machines, friction is reduced by using _____.
**Ans:** Ball bearing.

21. Friction always
(a) opposes the motion (b) helps the motion (c) both (a) and (b) (d) none of these
**Ans:** (a) opposes the motion

22. Friction can be reduced by using
(a) oil (b) grease (c) powder (d) all of these
**Ans:** (d) all of these

23. Static friction is less than
(a) sliding friction (b) rolling friction (c) both (a) and (b) (d) none of these

**Ans:** (d) none of these

24. Whenever the surfaces in contact tend to move or move with respect to each other, the force of friction comes into play
(a) only if the objects are solid. (b) only if one of the two objects is liquid.
(c) only if one of the two objects is gaseous.
(d) irrespective of whether the objects are solid, liquid or gaseous.

**Ans:** (d) irrespective of whether the objects are solid, liquid or gaseous.

25. To sharpen the blade of a knife by rubbing it against a surface, which of the following will be most suitable?
(a) Stone (b) Plastic block (c) Wooden block (d) Glass block

**Ans:** (a) Stone

26. Friction is
(a) foe (b) friend (c) both (a) and (b) (d) none of these

**Ans:** (c) both (a) and (b)

27. Friction due to fluids is called
(a) force (b) pressure (c) friction (d) drag

**Ans:** (d) drag

28. Which of the following is not a smooth surface?
(a) Surface of wet soap (b) Surface of tyres (c) Glazed tiles (d) Surface of mirror

**Ans:** (b) Surface of tyres

29. A toy car released with the same initial speed will travel farthest on
(a) muddy surface (b) polished marble surface (c) cemented surface (d) brick surface

**Ans:** (b) polished marble surface

30. If we apply oil on door hinges, the friction will
(a) increase (b) decrease (c) disappear altogether (d) will remain unchanged

**Ans:** (b) decrease

31. Force of friction depends on
(a) roughness of surface (b) smoothness of surface (c) inclination of surface (d) all of these

**Ans:** (d) all of these

32. Force of friction depends on
(a) roughness of surface (b) weight (c) size (d) all of these

**Ans:** (d) all of these

33. Fluids are
(a) liquids (b) gases (c) both (a) and (b) (d) none of these

**Ans:** (c) both (a) and (b)

34. Which is a streamlined object?
(a) Boats (b) Aeroplanes (c) Ships (d) All of these

**Ans:** (d) All of these

35. Which of the following is responsible for wearing out of bicycle tyres?
(a) Muscular force (b) Magnetic force (c) Frictional force (d) Electrostatic force

**Ans:** (c) Frictional force

36. It is difficult to walk on an oily floor because
(a) Floor gets spoiled (b) There is more resistance
(c) Force of friction is high (d) Force of friction is very less

**Ans:** (d) Force of friction is very less

37. Spring balance is a device used for measuring the _____ acting on an object.
(a) mass (b) pressure (c) force (d) None of the above

**Ans:** (c) force

38. A matchstick struck on a matchbox catches fire easily because
(a) Friction may cause fire (b) Of chemical reaction (c) Force heated the match stick (d) None

**Ans:** (a) Friction may cause fire

39. Tyres are treaded to
(a) look good (b) Increase friction (c) increase its longevity (d) increase weight of the tyre

**Ans:** (b) Increase friction

40. A boat or an aeroplane has a pointed or tapering front / head. Why?

(a) To increase the friction of fluid (b) To reduce the friction of fluid (c) To look good (d) For no reason

**Ans:** (b) To reduce the friction of fluid

41. The sole of the shoes becomes plain after wearing it for several months. The reason is

(a) Wearing out due to friction (b) Wearing out due to no friction

(c) Sole is of bad quality (d) None of the above

**Ans:** (a) Wearing out due to friction

42. Match the items given in column I suitably with those given in column II.

| **Column I** | **Column II** |
|---|---|
| 1. Fluid friction | (a) Due to friction |
| 2. Lubricants | (b) Streamlined |
| 3. Wheels | (c) Increases friction |
| 4. Spring balance | (d) Drag |
| 5. Shape of aeroplane | (e) Rolling friction |
| 6. Rough surface | (f) Reduce friction |
| 7. Heat generation | (g) Measures force |

**Ans:** 1-(d) 2-(f) 3-(e) 4-(g) 5-(b) 6-(c) 7-(a)

43. Fill in the blanks

(a) Friction can be reduced by using _____.

(b) Friction can be increased by making surface _____.

(c) Bodies of birds, fishes and ships are _____.

(d) Friction can also produce _____.

(e) All objects moving in fluids have _____ shape to reduce _____.

(f) Rough surfaces produce _____ friction than smooth surfaces.

(g) In many machines, friction is reduced by using _____.

(h) Friction depends on the _____ of substances in contact.

(i) Static friction comes into play when we try to move an object at _____.

(j) . _____ force is responsible for downward movement of a parachutist when he jumps from an aircraft

(k) The sole of shoes and the tyres of vehicles are treaded to _____ friction.

(l) Friction is sometimes _____ .

**Ans:** (a) lubricants (b) rough (c) streamlined (d) heat (e) streamlined, friction (f) more (g) ball bearing (h) nature (i) rest (j) Gravitational (k) increase (l) undesirable

44. State whether the given statements are true or false.

(a) Friction is always useful to us.

(b) A soapy floor is slippery due to increased friction.

(c) Friction always works in opposite direction to the relative motion.

(d) Friction is dependent on area of contact.

(e) Friction decreases with increase in the smoothness of the surface.

(f) It is easier to move a heavy object than a light object.

(g) A spring balance measures force.

(h) Friction can never be eliminated.

**Ans:** (a) False (b) False (c) True (d) False (e) True (f) False (g) True (h) True

# CHAPTER-3

## COAL AND PETROLEUM

- Coal
- Petroleum
- Natural Gas
- Some Natural Resources are Limited

## IMPORTANT POINTS

1. Natural resources can be broadly classified into two kinds
   (i) Inexhaustible Natural Resources (ii) Exhaustible Natural Resources
2. Sunlight, air etc.are the examples of Exhaustible Natural Resources.
3. Wildlife, minerals, coal, petroleum, natural gas etc. are the examples of Inexhaustible Resources
4. Coal, petroleum and natural gas are fossil fuels
5. Fossil fuels are exhaustible resources.
6. Coal is a fossil fuel, formed by the decay of vegetation which existed millions of years ago.
7. Coal gas is obtained as a by-product during the processing of coal to form coke and is used as a fuel.
8. Coal tar is a black thick liquid with an unpleasant smell obtained by the processing of coal.
9. Coke is a tough, porous and black substance. It is an almost pure form of carbon.
10. Coke, coal tar and coal gas are the products of coal.
11. Coke is used in the manufacture of steel and in the extraction of many metals.
12. Coal tar are used as starting materials for manufacturing various substances used in everyday life and in industry, like synthetic dyes, drugs, explosives, perfumes, plastics, paints, photographic materials, roofing materials, etc.
13. Coal gas is used as a fuel in many industries situated near the coal processing plants and street lighting.
14. The word petroleum is derived from petra (rock) and oleum (oil)
15. Petroleum gas, petrol, diesel, kerosene, paraffin wax, lubricating oil are obtained by refining petroleum.

## DEFINITIONS

1. **Natural Resources:** The resources that are obtained from nature are called natural resources.
2. **Inexhaustible Natural Resources:** These resources are present in unlimited quantity in nature and are not likely to be exhausted by human activities.
3. **Exhaustible Natural Resources:** The amount of these resources in nature is limited. They can be exhausted by human activities.
4. **Fossil fuels:** Some exhaustible natural resources from the dead remains of living organisms are known as fossil fuels.
5. **Carbonization:** The slow process of conversion of dead vegetation into coal is called carbonisation.
6. **Destructive distillation:** The process of heating coal in the absence of air is called destructive distillation.
7. **Petroleum refining:** The process of separating the different constituents/ fractions of petroleum is known as petroleum refining.
8. **LPG:** Liquefied Petroleum Gas
9. **CNG:** Compressed Natural Gas

## TEXTUAL QUESTIONS

**1. What are the advantages of using CNG and LPG as fuels?**

**Ans:** 1. They burn with a smokeless flame and so does not cause any pollution.
2. They leave no ash on burning.
3. They are easy to handle and convenient to store.
4. They have high calorific values.

**2. Name the petroleum product used for surfacing of roads.**

**Ans:** Bitumen

**3. Describe how coal is formed from dead vegetation. What is this process called?**

**Ans:** Millions of years ago, trees, plants, ferns and forests got buried below the rocks, soil and sand due to natural processes like flooding, earthquake, etc. Slowly, as more soil deposited over them, they were compressed. This led to the conditions of high pressure and heat. These conditions along with the anaerobic conditions turned the carbon-enriched organic matter of wood into coal.

This slow process of conversion of dead vegetation into coal is called carbonisation.

**4. Fill in the blanks.**

(a) Fossils fuels are ____ , ____ and ____

(b) Process of separation of different constituents from petroleum is called _____

(c) Least polluting fuel for vehicle is _____

**Ans:** (a) coal, petroleum, natural gas (b) refining (c) CNG

**5. Tick True/False against the following statements.**

(a) Fossil fuels can be made in the laboratory.

(b) CNG is more polluting fuel than petrol.

(c) Coke is an almost pure form of carbon.

(d) Coal tar is a mixture of various substances.

(e) Kerosene is not a fossil fuel.

**Ans:** (a) False (b) False (c) True (d) True (e) False

**6. Explain why fossil fuels are exhaustible natural resources.**

**Ans:** Fossil fuels take millions of years to be formed. They are limited in nature and cannot be replenished easily, once consumed. Hence, they are considered as exhaustible natural resources.

**7. Describe the characteristics and uses of coke.**

**Ans:** Characteristics of coke: Coke is 98% pure carbon. It is a tough, porous and black substance. It pro-duces a very little smoke. Uses of coke: Coke is very useful as fuel. It is a good reducing agent. It is widely used in metallurgical processes to reduce metals from their oxides. It is used for producing water gas.

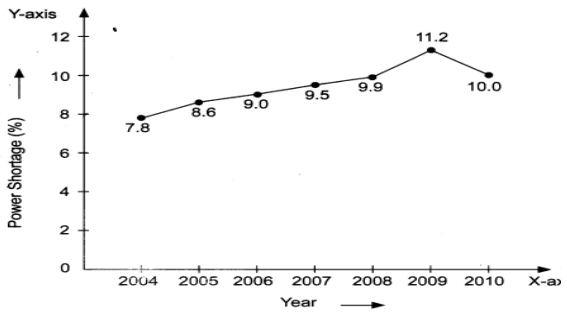
**8. Explain the process of the formation of petroleum.**

**Ans:** Petroleum is formed by the burial of aquatic plants and animals below the sea bed. The marine animals and plants died thousands of years ago and settled down in the bottom of sea. In anaerobic conditions, microorganisms decompose this organic matter. Due to high pressure and heat, the dead remains of tiny plants and animals were slowly converted into petroleum..

**9. The following table shows the total power shortage in India from 2004-2010. Show the data in the form of a graph. Piet shortage percentage for the years on the y-axis and the year on the x-axis.**

| S. No. | Year | Shortage (%) |
|---|---|---|
| 1 | 2004 | 7.8 |
| 2 | 2005 | 8.6 |
| 3 | 2006 | 9.0 |
| 4 | 2007 | 9.5 |
| 5 | 2008 | 9.9 |
| 6 | 2009 | 11.2 |
| 7 | 2010 | 10.0 |

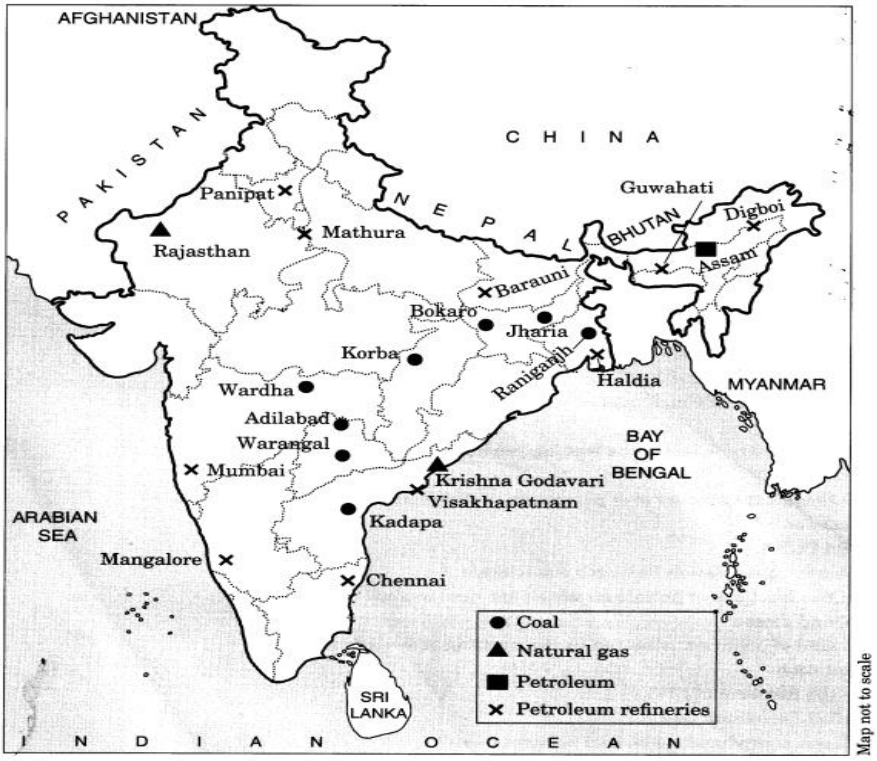
**Ans:**



## Extended Learning — Activities and Projects

**1**. Get an outline map of India. Mark the places in the map where coal, petroleum and natural gas are found. Show the places where petroleum refineries are situated.

**Ans:**




**2.** Choose any five families of your neighbourhood. Enquire whether their energy consumption (coal, gas, electricity, petrol, kerosene) has increased or decreased in the last five years. Enquire also about the measures they adopt to conserve energy.

**Ans:** Energy consumption of all the families have increased in the last five years, this is due to the changes in life style. This is in spite of the fact that they are adopting many energy conservation methods

(a) Use of CFL in place of electric bulb (b) Appliances with more efficiency

(c) Proper electric circuit in houses

**3.** Find out the location of major thermal power plants in India. What could be the reasons for their being located at those places?

**Ans:** Major thermal power plants in India are located in Jharkhand, West Bengal, Odisha and Madhya Pradesh. The reason for their being located at those places is that the majority of coal mines are located there.

## ADDITIONAL QUESTIONS

**1. What is the purest form of coal?**

**Ans:** Anthracite

**2. What is use of LPG?**

**Ans:** LPG is used as fuel gas for home, vehicles and industry.

**3. What is meant by destructive distillation?**

**Ans:** The process of heating coal in the absence of air, to get coke is called destructive distillation.

**4. Name the petroleum product used as fuel for stoves, lamps and jet aircrafts.**

**Ans:** Kerosene.

**5. Give examples of any two exhaustible resources.**

**Ans:** Coal, petroleum, etc.

**6. Give examples of any two inexhaustible resources.**

**Ans:** Sunlight, air, etc

**7. Give any two uses of coal.**

**Ans:** Cooking, running rail engines, etc.

**8. Name the products of coal.**

**Ans:** Coke, coal tar, coal gas

**9. Give any two uses of petroleum.**

**Ans:** i) It is used to run vehicles.
ii) It is used in petroleum products like Vaseline.

**10. Name any two natural gas reserves in India.**

**Ans:** Tripura, Rajasthan, Maharashtra

**11. What are natural resources? Differentiate between exhaustible and inexhaustible natural resources.**

**Ans:** Resources which we find in our natural environment are called natural resources. Natural resources can be classified into two categories:

| Exhaustible Resources | Inexhaustible Resources |
|---|---|
| These resources are present in limited amounts in nature. | These resources are present in unlimited amounts in nature. |
| It cannot be replenished after getting exhausted. | It gets replenished after use. |
| Example: Coal, Petroleum etc. | Example: Water, Sunlight etc. |

**12. Define fossil fuels**

**Ans:** Fossil fuels are formed by the constant decomposition of dead and decaying animals and plants under pressure and heat in the earth's crust. Fossil fuel takes thousands of years to form. Example: Coal, Petroleum etc.

**13. What is petroleum? How is it formed?**

**Ans:** Petroleum is a type of exhaustible natural resource. Diesel and petrol are obtained from petroleum. Petroleum is found deep inside water in the sea or oceans.
Petroleum is formed from dead organisms which are found in water. The bodies of dead organisms settle at the bottom of the ocean and get covered with soil/sand or other aquatic plants and start decaying slowly. Over millions of years, these dead organisms turn into petroleum or natural gas due to the non-availability of proper oxygen, heat and constant high pressure.

**14. What is refining? Why does petroleum require refining?**

**Ans:** The process of separating the various constituents of petroleum at different boiling points is known as refining. Natural petroleum is a crude dark coloured liquid with a very unpleasant smell. It cannot be used in its crude form. Hence, we find petroleum in several different products such as diesel, petrol, wax and use it for various purposes.

**15. Why is natural gas a very important fossil fuel?**

**Ans:** Natural gas is important fossil fuel because it mainly constitutes methane and doesn't produce much pollution. It is a clean gas. Natural gas compressed under high pressure forms CNG which we use in our cars as fuel.

**16. Name the different constituents of petroleum and write their uses.**

**Ans:**

| Constituents | Uses |
|---|---|
| LPG | Fuel for home and industries. |
| Petrol | Motor fuel, Aviation fuel, Solvent for dry cleaning. |
| Diesel | Fuel for vehicles and generators. |
| Paraffin Wax | Ointment, Candle, Wax etc. |
| Lubricating Oil | Lubrication in machines |
| Bitumen | Paints |
| Kerosene | Fuel for stove, lamps, jet etc. |

**17. State the uses of natural gas.**

**Ans:** (a)Power generation.
(b) Fuel for transport vehicles.
(c) As a fuel in homes for cooking.

(d) Manufacturing of fertilizers and chemicals.

**18. Why is natural gas preferred over petrol as a transport fuel?**

**Ans:** Natural gas is preferred over petrol because it is a clean-burning fuel and produces less harmful substances into the air.

**19. Explain in detail the products of coal.**

**Ans:** Coal is processed in the industry to get some useful products such as coke, coal tar and coal gas.

(a) **Coke:** Coke is almost a pure form of carbon. It is dark in colour. It is used for the extraction of metals.

(b) **Coal Tar:** It is a black liquid with a very unpleasant smell. It is a by-product obtained during the formation of coke. Coal tar is a major constituent during the manufacturing of paints or anti-dandruff shampoos.

(c) **Coal Gas:** Coal gas is also obtained during the formation of coke.

**20. Why should we use some resources like coal and petroleum in limit?**

**Ans:** Resources like coal and petroleum are from exhausting natural resources. They are formed by the decomposition of dead organisms over millions of years. Their replenishment rate is very slow. Also, this fossil fuel produces carbon dioxide on burning which is very harmful to our environment causing air pollution as well as global warming. Hence, we should use coal and petroleum in limited amounts.

**21. Suggest ways in which consumption of fuels can be reduced.**

**Ans:** Petroleum Conservation Research Association (PCRA) advises people on how to save petrol/diesel while driving. This will also help in the reduction of air pollution.

(a) Use more renewable sources of energy such as CNG.

(b) Switch off the engine of the vehicle at traffic lights or in long jams.

(c) Ensure regular maintenance of the vehicle.

(d) We can use bicycles for a small distance.

## BITS

1. Wind, sun and hydropower are

(a) renewable (b) non-renewable (c) synthetic sources (d) none of these .

**Ans:** (a)

2. The unit of calorific value of combustion of fuels is

(a) kilojoule (b) joule (c) kilojoule/kilogram (d) kilogram

**Ans:** (c)

3. A brownish-black sedimentary rock is known as

(a) charcoal (b) coke (c) coal (d) coal tar

**Ans:** (c)

4. Peat is a type of

(a) charcoal (b) coke (c) coal (d) none of these

**Ans:** (c)

5. The most pure form of carbon fuel is

(a) coal (b) coke (c) charcoal (d) coal gas

**Ans:** (b)

6. The fossil fuel found below the sea is

(a) petrol (b) petroleum (c) kerosene (d) diesel

**Ans:** (b)

7. 'Black gold' is another name for

(a) coal (b) coke (c) charcoal (d) petroleum

**Ans:** (d)

8. The white semi-solid fraction of petroleum used for making vaseline is

(a) asphalt (b) lubricating oil (c) paraffin wax (d) fuel oil

**Ans:** (c)

9. Out of the following, which fuel is best used in the homes ?

(a) Wood (b) CNG (c) LPG (d) Kerosene oil

**Ans:** (c)

10. From the given statements, choose the incorrect one.
(a) Petroleum gas in liquid from (LPG) is used as fuel in homes and industries.
(b) Kerosene is used as fuel for stoves, lamps and jet aircraft
(c) Diesel is used as fuel for heavy motor vehicles, electric generators
(d) Paraffin is used in paints and road surfacing

**Ans:** (b)

11. Naphthalene obtained from coal tar are used as _____
(a) Honey bee repellant (b) Mosquito repellant (c) Snake repellant (d) Moth repellant

**Ans:** (d)

12. Name a pair of exhaustible natural resources from the following:
(a) Air and Sunlight (b) Coal and Soil (c) Water and Petroleum (d) Minerals and wildlife

**Ans:** (d)

13. When coal burns in air _____ is formed.
(a) Carbon Dioxide (b) Sulphur Dioxide (c) Carbon Monoxide (d) Hydrogen Gas

**Ans:** (a) Carbon Dioxide.

14. Which one of the following is obtained from coal tar?
(a) Petrol (b) Coke (c) Air (d) Naphthalene Balls

**Ans:** (d) Naphthalene Balls

15. Which one of the following is NOT a fossil fuel?
(a) Petrol (b) Coal (c) Wood (d) Diesel

**Ans:** (c) Wood

16. Which one of the following is NOT a non-renewable energy resource?
(a) Coal (b) Petroleum (c) Solar energy (d) Electricity

**Ans:** (c) Solar Energy

17. _____ is a natural resource.
(a) Car (b) Bus (c) Water (d) Parks

**Ans:** (c) Water

17. Which one is least polluting Fuel?
(a) Petrol (b) Diesel (c) CNG (d) Kerosene

**Ans:** (c) CNG

18. Coal tar contains about _____.
(a) 300 Substance (b) 400 Substance (c) 200 Substance (d) 100 Substance

**Ans:** (c) 200 Substances

19. Minerals are
(a) natural resources. (b) inexhaustible natural resources (c) exhaustible natural resources (d) all of these

**Ans:** (c) exhaustible natural resources

20. Petroleum is mainly a mixture of which one of the following class?
(a) Carbohydrates (b) Carbogens (c) Hydrocarbons (d) Alcohols

**Ans:** (c) Hydrocarbons

21. Which one is not a coal product?
(a) Coal tar (b) Coal gas (c) Lime (d) All of these

**Ans:** (c) Lime

22. Which one of the following is a petrochemical?
(a) Ammonia (b) Coke (c) Acetone (d) Paraffin wax

**Ans:** (d) Paraffin wax

23. Conversion of dead vegetation into coal is called
(a) carbonization (b) distillation (c) coal gas (d) natural gas

**Ans:** (a) carbonization

24. Full form of LPG
(a) Light Petroleum Gas (b) Liquefied Petroleum Gas (c) Long Pipe of Gas (d) Long Petroleum Gas

**Ans:** (b) Liquefied Petroleum Gas

25. A natural gas stored under high pressure is called
(a) CNG (b) LPG (c) KLG (d) PNP

**Ans:** (a) CNG

26. Name the petroleum product used for surfacing of road
(a) Peat (b) Lignite (c) Anthracite (d) Bituminous

**Ans:** (d) Bituminous

27. Products obtained by the process of destructive distillation are
(a) coke, coal-tar, coal gas (b) petrol, diesel, kerosene (c) paraffin wax, bitumen (d) compressed natural gas

**Ans:** (a) coke, coal-tar, coal gas

28. The mining of oil under sea is termed as
(a) distillation (b) carbonization (c) shore mining (d) destructive distillation

**Ans:** (c) shore mining

29. Main constituent of LPG is
(a) methane (b) butane (c) ethane (d) propane

**Ans:** (b) butane

30. Name the petroleum product used for surfacing of roads.
(a) Butane (b) Anthracite (c) Bitumen (d) Hydrocarbon

**Ans:** (c) Bitumen

31. Least polluting fuel for vehicles is
(a) coke (b) kerosene (c) diesel (d) CNG

**Ans:** (d) CNG

32. Petroleum is found under the
(a) sedimentary rocks (b) water (c) sand (d) coke

**Ans:** (a) sedimentary rocks

33. In which of the following places natural gas has not been formed in India?
(a) Tripura (b) Jaiselmer (c) Mumbai (d) Delhi

**Ans:** (d) Delhi

34. Match the following items given in column 'A with that in column 'B'

| **Column A** | **Column B** |
|---|---|
| i) Petroleum | a) Provide more heat on burning |
| ii) Coal | b) Carbon |
| iii) Oil refinery | c) Insoluble in water |
| iv) Good fuels | d) Wood |
| v) Coke | e) Barauni |
| vi) Fuels | f) Produce more energy |
| vii) CNG | g) Petroleum product |
| viii) Bitumen | h) Non-polluting fuel |

**Ans:** i-c, ii-d, iii-e, iv-f, v-b, vi-a, vii-h, viii-g

35. Coke is formed when coal is heated in …….. of air.

**Ans:** absence

36. Pencil lead is made from ……..

**Ans:** graohite

37. Coal and petroleum sources are ……..

**Ans:** limited

38. Natural gas, petroleum and coal are ……..

**Ans:** fossil fuels

39. Kerosene is not a ……..

**Ans:** fossil fuel

40. …….. and …….. are the crystalline form of carbon.

**Ans:** diamond, graphite

41. State whether the statements given below are True or False:
(a) Coke is harder and denser than charcoal.
(b) Exhaustible sources can't be exhausted by the human activities.
(c) Fossil fuels are inexhaustible natural resources.
(d) CNG stands for combined natural gas.
(e) We get Naphthalene ball from coal tar.
(f) A good fuel must leave very little ash after burning.
(g) Petroleum is found in pure form under the sedimentary rocks.

**Ans:** (a) True (b) False (c) False (d) False (e) True (f) True (g) False

## Textual Table

Activity 3.1

| Natural | Man-made |
|---|---|
| Air | Clothes |
| Sunlight | Plastics |
| Water | Fan |
| ,Minerals | Cement |
| Forests | Cosmetics |

# CHAPTER - 4

# SYNTHETIC FIBRES AND PLASTICS

- What are Synthetic Fibers?
- Types of Synthetic Fibers Rayon
- Characteristics of Synthetic Fibers
- Plastics
- Plastics as Materials of Choice
- Plastics and the Environment

## IMPORTANT POINTS

1. Natural fibres like cotton, wool, silk, etc., are obtained from plants or animals.
2. Synthetic fibres are obtained by chemical processing of petrochemicals.
3. Some synthetic fibres are rayon, nylon, polyester and acrylic.
4. The word 'polymer' comes from two Greek words; poly meaning many and mer meaning part/unit.
5. Rayon is also known as artificial silk. It is obtained from wood pulp.
6. Rayon is mixed with cotton to make bed sheets or mixed with wool to make carpets.
7. Nylon was the first fully synthetic fibres, Nylon fibres are strong, elastic, light, lustrous and easy to wash.
8. We use many articles made from nylon, such as socks, ropes, tents, toothbrushes, car seat belts, sleeping bags, curtains, etc.
9. Synthetic fibres find uses ranging from many household articles like ropes, buckets, furniture, containers, etc., to highly specialised uses in aircrafts, ships, space crafts, healthcare, etc.
10. Polythene and PVC are some of the examples of thermoplastics.
11. Bakelite and melamine are the examples of thermosetting plastics.
12. Acrylic is an artificial wool.
13. The different types of fibres differ from one another in their strength, water absorbing capacity, nature of burning, cost, durability etc.
14. PET(Poly Ethylene Terephthalate) is used for making bottles, utensils, films, wires etc.
15. Plastics are not corroded easily and poor conductors of heat and electricity.
16. Terylene is a popular polyester. It can be drawn into very fine fibres that can be woven like any other yarn.
17. The waste created by plastics is not environment friendly. On burning, plastics release poisonous gases. On dumping in the ground they may take years to degenerate. This is because of their non-biodegradable nature.
18. As a responsible citizen remember the 5 R principle. Reduce, Reuse, Recycle, Recover and Refuse.

## DEFINITIONS

1. **Polymer:** Many such small units combine to form a large single unit called a polymer.
2. **Synthetic fibres:** The fibres made by human beings are called synthetic fibres.
3. **Petrochemicals:** All the synthetic fibres are prepared by a number of processes using raw materials of petroleum origin, called petrochemicals.
4. **Thermoplastics:** Plastic which gets deformed easily on heating and can be bent easily are known as thermoplastics.
5. **Thermosetting plastics:** Plastics which when moulded once, can not be softened by heating. These are called thermosetting plastics.
6. **Biodegradable:** A material which gets decomposed through natural processes, such as action by bacteria, is called biodegradable.
7. **Non-biodegradable:** A material which is not easily decomposed by natural processes is termed non-biodegradable.

## TEXTUAL QUESTIONS

**1. Explain why some fibres are called synthetic.**

**Ans:** Some fibers are called synthetic because-

i) They are man-made, meaning they are made from chemicals like petrochemicals.

ii) They are artificial fibers made with or without using any natural raw material from plants or animals.

iii) Examples of synthetic fibers are nylon, rayon, acrylic, and polyester.

**2. Mark (✓) the correct answer.**

Rayon is different from synthetic fibres because

(a) it has a silk-like appearance.

(b) it is obtained from wood pulp.

(c) its fibres can also be woven like those of natural fibres.

**Ans:** (b) it is obtained from wood pulp.

**3. Fill in the blanks with appropriate words.**

(a) Synthetic fibres are also called ____ or ____ fibres.

(b) Synthetic fibres are synthesised from a raw material called _____

(c) Like synthetic fibres, plastic is also a _____

**Ans:** (a) man-made, artificial fibres (b) petrochemicals (c) polymer

**4. Give examples which indicate that nylon fibres are very strong.**

**Ans:** (i) They are used for making parachutes and ropes for rock climbing.

(ii) They are used in making seat-belts, fishing nets, tyre cord, a string for sports rackets and musical instruments.

**5. Explain why plastic containers are favoured for storing food.**

**Ans:** (i) The plastics do not react with the food stored in them.

(ii) The plastics are lightweight and are strong.

(iii) They are easy to handle and safe.

**6. Explain the difference between thermoplastic and thermosetting plastics.**

**Ans:**

| Thermoplastics | Thermosetting plastics |
|---|---|
| (i) These plastics softened on heating and can be bent easily. | (i) These plastics when moulded once, can't be softened again. |
| (ii)They soften upon heating. Hence they can be remolded and reshaped. | (ii)They do not soften upon heating. Hence they cannot be remolded and reshaped. |
| (iii) They do not lose their plasticity. | (iii) They lose their plasticity. |
| (iv) Examples are polyethene, PVC, etc. | (iv) Examples are bakelite and melamine. |

**7. Explain why the following are made of thermosetting plastics.**

(a) Saucepan handles

(b) Electric plugs/switches/plugboards

**Ans:** (a) Since, thermosetting plastics are a bad conductor of heat and do not get heated up while cooking, they are used for making saucepan handles.

(b) Since thermosetting plastics are a bad conductor of electricity and the electric current does not pass through such plastics, they are used for making electric plugs/switches/plugboards.

**8. Categorise the materials of the following products into 'can be recycled' and 'can not be recycled'.**
**Telephone instruments, plastic toys, cooker handles, carry bags, ballpoint pens, plastic bowls, plastic covering on electrical wires, plastic chairs, electrical switches.**

**Ans:**

| Can be recycled | Cannot be recycled |
|---|---|
| Plastic toys carry bags, plastic bowls, plastic covering on electrical wires, plastic chairs. | Telephone instruments, cooker handles, ballpoint pens, electrical switches. |

**9. Rana wants to buy shirts for summer. Should he buy cotton shirts or shirts made from synthetic material? Advise Rana, giving your reason.**

**Ans:** He should buy cotton shirts. This is because cotton has more capacity to hold moisture than synthetic

clothes. In summers we have extensive sweating which is easily soaked by cotton shirts and hence, cotton clothes are much better than the clothes made from synthetic material.

**10. Give examples to show that plastics are non-corrosive in nature.**

**Ans:** i) Plastic containers do not react with items stored in it.
ii) They do not get rusted when exposed to moisture and air.
iii) They do not decompose when left in open for a long period.

**11. Should the handle and bristles of a toothbrush be made of the same material? Explain your answer.**

**Ans:** No, the handle and bristles of a toothbrush should not be made of the same material. This is because our gums are soft and the bristles should be made of soft material so that it does not harm the gums. On the other hand, the handles should be made up of hard material so that it can give a firm grip.

**12. 'Avoid plastics as far as possible'. Comment on this advice.**

**Ans:** Plastics must be avoided as far as possible. The materials made of plastics are non-biodegradable. The use of plastics has a bad effect on the environment. When the plastics are burnt, it releases a lot of poisonous fumes into the atmosphere causing air pollution. These plastic materials when eat up by the animals (like cows), choke their respiratory system. This can cause death of these animals. The waste plastic articles thrown here and there carelessly get into dirty water drains and sewers, and block them. In a nutshell, plastics can be considered a threat to our environment.

**13. Match, the terms of column A correctly with the phrases given in column B.**

| A | B |
|---|---|
| (i) Polyester | Prepared by using wood pulp |
| (ii) Teflon | Used for making parachutes and stockings |
| (iii) Rayon | Used to make non-stick cookware |
| (iv) Nylon | Fabrics do not wrinkle easily |

Ans: (i) (d) (ii) (c) (iii) (a) (iv) (b)

**14. 'Manufacturing synthetic fibres is actually helping the conservation of forests'. Comment.**

**Ans:** In the manufacturing of synthetic fibres, we use only chemical substances and no natural materials, thus, in turn, we conserve forests.

**15. Describe an activity to show that thermoplastic is a poor conductor of electricity.**

**Ans:** Arrange a circuit as shown in the given figure. Leave a gap between two ends of the wire. Place a thermoplastic in the gap. Observe the bulb.

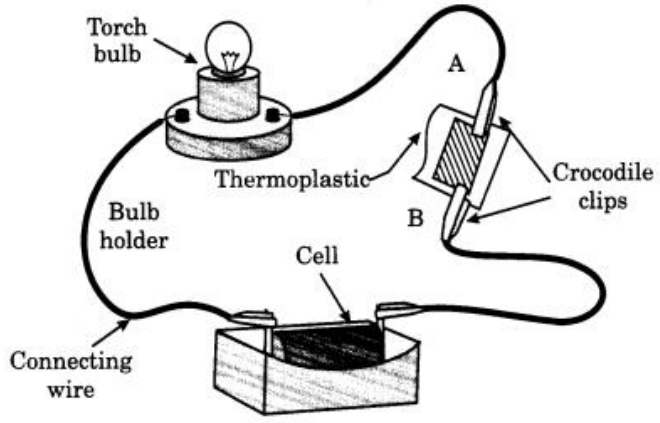



Fig. 3.4 *An electric circuit to test materials for their electric conductance*

It is observed that the bulb does not glow. This shows that thermoplastic is a poor conductor of electricity.

## Extended Learning — Activities and Projects

**1.** Have you heard of the campaign : ''Say No To Plastics". Coin a few more slogans of this kind. There are certain governmental and nongovernmental organisations who educate the general public on how to make wise

use of plastics and develop environment friendly habits. Find out organisations in your area which are carrying out awareness programmes. If there is none, form one.

**Ans:** i) Plastic will make our end drastic!
ii) Go green, plastic is obscene!
iii) Less plastic. More life.
iv) Make the world a beautiful place, start reducing our plastic waste.
v) Stop using plastic. Save the planet.
vi) Cut down on plastic. Recycling is fantastic!

**2.** Organise a debate in the school. Children may be given an option to role play as manufacturers of synthetic fabrics or those of fabrics from natural sources. They can then debate on the topic 'My Fabric is Superior'.

**Ans:**My Fabric is Superior: A fibre is a kind of thread which is strong and flexible. All fabrics are made from either natural fibres or artificial fibres. Those fibres which are obtained from natural sources are called natural fibres. While a synthetic fibre is made up of a long chain of small units joined together to form a polymer. We already have natural fibres to make clothes, bags, curtains. No doubt, natural fibres are beautiful and comfortable but they are not very much durable. The clothes made of synthetic fibres are attractive as well as durable. Synthetic fibres are cheaper than the clothes made of natural fibres. A lot of dresses made up of synthetic fibres have become very popular because of the following reasons:

i) Chemical resistance ii) Resistance to weather iii) Light weight
iv) Strong and durable v) Toughness vi) Insulation

Another advantage of synthetic fibres is that we can make fabrics having desired properties. Synthetic fibres are used in making parachutes, mattresses, umbrella etc. So we can say that synthetic fibres are superior to natural fibres for us.

**3.** Visit five families in your neighbourhood and enquire about the kind of clothes they use, the reason for their choice and advantages of using them in terms of cost, durability and maintenance. Make a short report and submit it to your teacher.

**Ans:** I visit my five neighborhoods

i) Mr.Praveen ii) Mr.Narayana iii) Mr.Ashok Sharma iv) Mr.Ajay Babu v) Mr.Kaleel Ahmed

When I meet them and ask which cloths they refers to wear,most of them says that in summer cotton is better choice because it is easily available, comfortable to wear, cheaper cost, last long and most important it absorb sweat of our body in summer. And in winter the wool is best choice and knit and arcylic. But wool is cheap, easily available and comfortable in winter.

**4.** Devise an activity to show that organic waste is biodegradable while plastic is not.

**Ans:** Aim: To prove that organic waste is biodegradable while plastic is not.
Material required: Two beakers, Moist soil, Plastic and Organic waste like vegetable peel etc.
Procedure: (i) Take two beakers and label them as beaker "A" and Beaker "B".
(ii) Put organic waste in Beaker A and plastic in Beaker B.
(iii) Now, add some moist soil in both the beakers and leave them in open for couple of weeks or days.
(iv) Now after 25-30 days observe them carefully.
Observation: (i) in beaker A the organic waste has change its color and become smellier and darker.
(ii) Whereas in Beaker B the plastic was same as it was before.
Conclusion: It can be concluded from the observation that organic waste is biodegradable while plastic is not.

## ADDITIONAL QUESTIONS

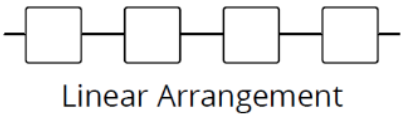
**1. Explain why the following are made of thermosetting plastics.**

(a) Saucepan handles (b) Electric plugs/switches/plug boards

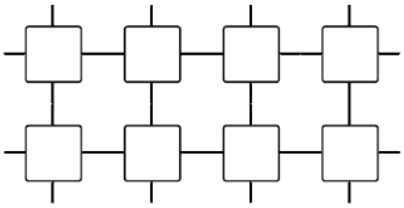
**Ans:** (a) Saucepan handles – Thermosetting plastics, such as melamine, are used because they resist fire and can withstand heat better than other polymers. They also don't easily bend or melt when heated.
(b) Electric plugs/switches/plug boards – They are made from thermosetting plastics like bakelite because it is a poor conductor of heat and electricity. Thus in case of any short or current leakage, it will not allow the electricity to pass and harm the user.

**2. Draw a simple diagram of the linear and cross-linked arrangement of units in plastic.**

**Ans:** Diagrams of linear and cross-linked arrangement of units in plastic are given below:



Linear Arrangement



Cross-Linked Arrangement

**3. List any three characteristic properties of plastic.**

**Ans:** i) Non-reactive in nature. ii)They are light in weight but are strong and durable.
iii) Poor conductor of heat and electricity.

**4. Why is nylon suitable for making clothes?**

**Ans:** Nylon is suitable for making clothes because it is strong, elastic, light, lustrous, and easy to wash.

**5. 'Plastic is a poor conductor of heat and electricity. With an example to justify the statement.**

**Ans:** Plastic is a poor conductor of heat and electricity. This statement can be justified because the electric wire has a plastic covering. Also, the handles of screwdrivers and testers are made of plastic. The plastic covering is used because it prevents the chances of electric shock.

**6. Sort the following materials into - biodegradable and non-biodegradable plastic bottle, flower, wooden bowl, banana peel, cotton cloth, soda can**

**Ans:** Biodegradable products are flowers, wooden bowls, banana peels, and cotton cloth.
Non-biodegradable products are plastic bottles and soda cans.

**7. Write two differences between natural and synthetic fibre.**

**Ans:**

| Natural Fibre | Synthetic Fibre |
|---|---|
| As the name suggests, they are obtained from natural sources such as plants and animals. | As the name suggests, they are man-made fibres. |
| They are less durable and expensive. | They are more durable and cheaper. |

**8. What is the disadvantage of synthetic fibre?**

**Ans:** The main disadvantage of synthetic fibres is that they are inflammable i.e., they melt on heating and if clothes catch fire, the fabric melts and sticks to the body of the person wearing it.

**9. Being responsible citizens, how can we avoid plastics?**

**Ans:** Being a responsible citizens, we can avoid plastics by the following practices:
i) Using steel or copper water bottles instead of plastic.
ii) Using cotton or jute carry bags instead of plastic.
iii) Using a steel lunch box instead of a plastic one.

**10. Describe the following with examples:**

i) Thermoplastic ii) Thermosetting plastics

**Ans:** i) Thermoplastics are materials that get deformed easily on heating. They are malleable and can be easily bent. Some examples of thermoplastics are polythene and PVC. Thermoplastics are mainly used in the manufacturing and production of toys and combs.

ii) Thermosetting plastics are materials that can be moulded only once and cannot be softened by heating. Some examples of thermosetting plastics are bakelite and melamine. Melamine resists fire and can tolerate heat, it is used for making floor tiles, kitchenware, and fabrics. Bakelite is a poor conductor of heat and electricity and is used for making electrical switches, handles of various utensils, etc.

**11. Write the applications of plastics in different industries.**

**Ans:** i) Healthcare industry – packaging of tablets, threads used for stitching wounds, syringes, and doctors gloves.

ii) Cooking – some microwave plastic cookware.
iii) Cooking – Teflon coating is used for non-stick coating on cookware.
iv) Uniforms of firemen – they have a coating of melamine plastic.

**12. Cotton is a natural polymer. What is its chemical name?**
**Ans:** Cellulose
**13. Terrycot is made by mixing two types of fibres. Write the names of the fibres?**
**Ans:** Terylene and cotton.
**14. List some characteristic properties of plastics.**
**Ans:** i) Plastics are not corroded easily.
ii) Plastic is light, strong and durable.
iii) Plastics are poor conductors of heat and electricity.
**15. Plastic articles are available in all possible shapes and sizes. Can you tell why?**
**Ans:** Plastics is easily moldable so the articles are available in all shapes and sizes.
**16. Plastics is used for making a large variety of articles of daily use and these articles are very attractive. But it is advised to avoid the use of plastic as far as possible. Why?**
**Ans:** Due to its non-biodegradable nature, it causes environmental pollution.
**17. A bucket made of plastic does not rust like a bucket made of iron. Why?**
**Ans;** Plastic is a non-reactive material. It does not react with air and water, so does not rust.

## BITS

1. Electrical switches are made of
(a) nylon (b) bakelite (c) polythene (d) melamine
**Ans:** (b)
2. Out of the following, which is not biodegradable ?
(a) Vegetable peels (b) Plastic bags (c) Cotton (d) Jute
**Ans:** (b)
3. Clothes made of which fabric are best suited for hot climate ?
(a) Cotton (b) Nylon (c) Acrylic (d) Polycot
**Ans:** (a)
4. Out of the following, which is not a natural fibre ?
(a) Cotton (b) Silk (c) Jute (d) Rayon
**Ans:** (d)
5. Naturally occurring polymer is
(a) cellulose (b) polyester (c) nylon (d) PVC
**Ans:** (a)
6. Plastic used for coating non-stick pans is
(a) PVC (b) ester (c) bakelite (d) melamine
**Ans:** (d)
7. Pickles are kept in plastic containers because plastic containers are
(a) non-corrosive (b) light (c) colourful (d) cheap
**Ans:** (a)
8. Which of the following is a thermoplastic
(a) Bakelite (b) Melamine (c) Polythene (d) Jute
**Ans:** (c)
9. Which of the following can be recycled?
(a) Plastic bowls (b) Ballpoint pens (c) Telephone instruments (d) Electrical switches
**Ans:** (a)
10. Which material is best suited for covering electric wires?
(a) Plastic bowls (b) PVC (c) Polystyrene (d) Nylon
**Ans:** (b)
11. Name a natural fibre from the following:
(a) Nylon (b) Polyester (c) Rayon (d) Cotton

**Ans:** (d) Cotton

12. Which of these items given below cannot be recycled?
(a) Cooker handles (b) Carry bags (c) Toys (d) Plastic chair

**Ans:** (a) Cooker handles

13. What is PET?
(a) Polyester (b) Polyamide (c) Nylon (d) Thermosetting polymer

14. Mark the correct answer.
Rayon is different from synthetic fibers because
(a) It has a silk-like appearance. (b) It is obtained from wood pulp.
(c) Its fibers can also be woven like those of natural fibers.

**Ans:** (b) it is obtained from wood pulp

15. What is the other name for artificial silk?
(a) Nylon (b) Rayon (c) Acrylic (d) Polyester

**Ans:** (b) Rayon

16. Which fibre is used as artificial wool?
(a) Acrylic (b) Rayon (c) Nylon (d) Cotton

**Ans:** (a) Acrylic

17. Polymers are made up of small units called
(a) layers (b) molecules (c) cells (d) monomers

**Ans:** (d) monomers

18. The strongest synthetic fibre is
(a) nylon (b) rayon (c) polyester (d) acrylic

**Ans:** (a) nylon

19. Wood pulp is used to make
(a) plastic (b) wool (c) jute (d) rayon

**Ans:** (d) rayon

20. Which of the following is a natural fibre?
(a) Wool (b) Nylon (c) PVC (d) Polythene

**Ans:** (a) Wool

21. Melamine is
(a) thermoplastic polymer (b) thermosetting polymer (c) fibre (d) elastomer

**Ans:** (b) thermosetting polymer

22. Fibre produced in factories is called
(a) man-made fibre (b) natural fibre (c) synthetic fibre (d) both (a) and (c)

**Ans:** (d) both (a) and (c)

23. PET is a
(a) polyester (b) polyamide (c) nylon (d) thermosetting polymer

**Ans:** (a) polyester

24. Which of the following cannot be recycled?
(a) Toys (b) Cooker handles (c) Carry bags (d) Plastic chair

**Ans:** (b) Cooker handles

25. The plastic which cannot be recycled is
(a) jute (b) rayon (c) petrochemicals (d) bakelite

**Ans:** (d) bakelite

26. Bakelite is an example of
(a) fibre (b) elastomer (c) nylon (d) thermosetting polymer

**Ans:** (d) thermosetting polymer

27. Which term is used for polymers made up of a large number of glucose units?
(a) Protein (b) Fructose (c) Cellulose (d) Polyester

**Ans:** (c) Cellulose

28. Which of the following is non-biodegradable?
(a) Paper (b) Cotton cloth (c) Wood (d) Plastic

**Ans:** (d) Plastic

29. Which of the following is natural fibre obtained from plants?

(a) Cotton (b) Wool (c) Rayon (d) Ketone

**Ans:** (a) Cotton

30. Match the following items given in Column 'A with that in Column 'B'.

| **Column 'A'** | **Column 'B'** |
|---|---|
| i) Cotton | a) Thermoplastic |
| ii) Nylon | b) Polyester |
| iii) PVC | c) Biodegradable |
| iv) Bakelite | d) Artificial fibres |
| v) PET | e) Artificial wool |
| vi) Acrylic | f) Chain of glucose units |
| vii) Cellouse | g) Non-biodegradable |
| viii) Paper | h) Natural fibre |
| ix) Plastic Bags | i) Cook wares |
| x) Teflon | j) Thermosetting |

**Ans:** i-h, ii-d, iii-a, iv-j, v-b, vi-e, vii-f, viii-c, ix-g, x-i

31. Synthetic fibres are made by …….

**Ans:** human beings

32. Many small units combine to form a large single unit called a …….

**Ans:** polymer

33. A nylon wire is ……. than steel wire.

**Ans:** stronger

34. All the synthetic fibres are prepared using raw materials of petroleum origin called …….

**Ans:** petrochemicals

35. Plastics are ……. conductors of electricity.

**Ans:** poor

36. Nylon was prepared from ……. , ……. and …….

**Ans:** coal, water, air

37. State whether the statements given below are True or False'.

(a) All fibres are made up of very large units which in turn are made up of many small units.
(b) Nylon was also known as artificial silk in China.
(c) Acrylic is an artificial wool.
(d) Plastics are light, strong and durable.
(e) It is not advised to store food items in plastic containers as it may react with the w ills of container.
(f) Bake lite is poor conductor of electricity.

**Ans:** (a) True (b) False (c) True (d) True (e) False (f) True

## Textual Table

Table 4.1 : Natural and Artificial Fibres

| S. No. | Name of Article | Type of Fibre (Natural/ artificial) |
|---|---|---|
| 1 | Jute bag | Natural fibre |
| 2 | Belt | Artificial fibre |
| 3 | Silk saree | Natural fibre |
| 4 | Plastics clips | Artificial fibre |
| 5 | Electric switches | Artificial fibre |
| 6 | Cotton shirt | Natural fibre |

# CHAPTER - 5

# SOUND

- **Sound is Produced by a Vibrating Body**
- **Sound Produced by Humans**
- **Sound Needs a Medium for Propagation**
- **We Hear Sound through Our Ears**
- **Amplitude, Time Period and Frequency of a Vibration**
- **Audible and Inaudible Sounds**
- **Noise and Music**
- **Noise Pollution**

## IMPORTANT POINTS

1. Sound plays an important role in our daily life. It helps us to communication.
2. Sound is produced by vibrating the body.
3. Sound needs a medium to travel. It cannot travel in vacuum.
4. In humans, the sound is produced by the voice box or the larynx.
5. The eardrums of our ears sense the vibrations produced by a vibrating object.
6. Frequency is expressed in hertz. Its symbol is Hz.
7. Amplitude and frequency are two important properties of any sound.
8. The frequency determines the shrillness or pitch of a sound.
9. If the frequency of vibration is higher we say that the sound is shrill and has a higher pitch. If the frequency of vibration is lower, we say that the sound has a lower pitch.
10. The loudness of sound depends on its amplitude. When the amplitude of vibration is large, the sound produced is loud. When the amplitude is small, the sound produced is feeble.
11. The loudness is expressed in a unit called decibel (dB).
12. Excessive or unwanted sounds lead to noise pollution. Noise pollution may pose health problems for human beings.
13. Attempts should be made to minimise noise pollution.
14. Plantation on the roadside and elsewhere can reduce noise pollution.

## DEFINITIONS

1. **Vibration:** The to and fro or back and forth motion of an object is called vibration.
2. **Frequency:** The number of oscillations per second is called the frequency of oscillation.
3. **Amplitude:** The maximum distance to which a vibrating body moves on either side of its mean position is called the amplitude
4. **Noise:** Unpleasant sounds are called noise.
5. **Time period:** The time taken by a pendulum to complete one oscillation is called the time period.
6. **Voice box:** Upper end of the wind pipe, below the hard part on the throat is called the voice box.
7. **Eardrum:** When sound enters outer part of the ear, it travels down a canal at the end of which there is a thin stretched membrane. It is called the eardrum.
8. **Inaudible / Infrasonic sounds:** Sound frequencies less then 20Hz are called Inaudible sounds
9. **Audible/ Sonic sounds:** Sounds frequencies between 20Hz – 20KHz are called Audible sounds
10. **Ultrasonic sounds:** Sound frequencies more than 20KHz are called ultrasonic sounds.

## TEXTUAL QUESTIONS

**1. Choose the correct answer.**

**Sound can travel through**

**(a) gases only (b) solids only (c) liquids only (d) solids, liquids, and gases**

**Ans:** (d) solids, liquids, and gases.

**2. Voice of which of the following is likely to have a minimum frequency?**

**(a) Baby girl (b) Baby boy (c) A man (d) A woman**

**Ans:** (c) A man

**3. In the following statements, tick 'T' against those which are true and 'F' against those which are false.**

(a) Sound cannot travel in a vacuum.
(b) The number of oscillations per second of a vibrating object is called its time period.
(c) If the amplitude of vibration is large, the sound is feeble.
(d) For human ears, the audible range is 20 Hz to 20,000 Hz.
(e) The lower the frequency of vibration, the higher is the pitch.
(f) Unwanted or unpleasant sound is termed as music.
(g) Noise pollution may cause partial hearing impairment.

**Ans:** (a) True (b) False (c) False (d) True (e) False (f) False (g) True

**4. Fill in the blanks with suitable words.**

(a) Time taken by an object to complete one oscillation is called _____
(b) Loudness is determined by the _____ of vibration.
(c) The unit of frequency is _____
(d) Unwanted sound is called _____
(e) The shrillness of a sound is determined by the _____ of vibration.

**Ans:** (a) Time period (b) Amplitude (c) Hertz (Hz) (d) Noise (e) Frequency

**5. A pendulum oscillates 40 times in 4 seconds. Find its time period and frequency.**

**Ans:** No. of oscillation = 40

Total time is taken = 4 seconds

$$\text{Time period} = \frac{\text{time}}{\text{number of oscillations}}$$

$$= \frac{4 \text{ seconds}}{40} = \frac{1}{10} \text{ second} = 0.1 \text{ second.}$$

$$\text{Frequency} = \text{number of oscillations per second}$$

$$= \frac{\text{number of oscillations}}{\text{time}}$$

$$= \frac{40}{4} \text{ second} = 10 \text{ per second or } 10 \text{ Hz}$$

**6. The sound from a mosquito is produced when it vibrates its wings at an average rate of 500 vibrations per second. What is the time period of the vibration?**

**Ans:** Number of vibrations per second = 500

$$\text{Time period} = \frac{\text{time}}{\text{number of vibration}}$$

$$= \frac{1}{500} = 0.002 \text{ second}$$

**7. Identify the part which vibrates to produce sound in the following instruments.**

**(a) Dholak (b) Sitar (c) Flute**

**Ans:** (a) Stretched membrane (b) String of sitar (c) Air column

**8. What is the difference between noise and music? Can music become noise sometimes?**

**Ans:** The type of sound which are unpleasant to listen is known as noise whereas music is a pleasant sound, which produces a sensation.

Yes, music can become noise when it's too loud.

**9. List the sources of noise pollution in your surroundings.**

**Ans:** The major sources of noise pollution are

i) Sound of vehicles
ii) Sound of kitchen appliances
iii) Sound of bursting crackers
iv) Sound of loudspeakers, TV, transistors

**10. Explain in what way noise pollution is harmful to humans.**

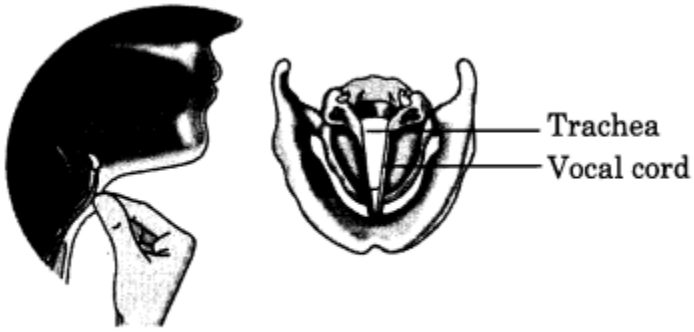
**Ans:** (a) Lack of sleep (b) Anxiety (c) Hypertension and these are harmful to health.

**11. Your parents are going to buy a house. They have been offered one on the roadside and another three lanes away from the roadside. Which house would you suggest your parents should buy? Explain your answer.**

**Ans:** I would suggest my parents buy a house three lanes away from the roadside because house on the roadside would be much noisy in both days and night due to running vehicles. Whereas, a house three lanes away would be comparatively quieter as the intensity of noise decreases with the distance between the source and the listener.

**12. Sketch larynx and explain its function in your own words.**

**Ans:** Larynx is also known as voice box. It is at the upper end of the windpipe. Two vocal cords are stretched across the voice box or larynx in such a way that it leaves a narrow slit between them for passage of air. When lung force air through the slit, the vocal cords vibrate, producing sound. Muscles attached to the vocal cords can make the cords tight or loose.




*Larynx in human*

When the vocal cords are tight and thin, the type or quality of voice is different from that when they are loose and thick.

**13. Lightning and thunder take place in the sky at the same time and at the same distance from us. Lightning is seen earlier and thunder is heard later. Can you explain why?**

**Ans:** The speed of light is more than that of the speed of sound. Thus, due to more speed of light it reaches us before sound. So, lightning is seen earlier and thunder is heard later.

## Extended Learning — Activities and Projects

**1.** Visit the music room of your school. You may also visit musicians in your locality. Make a list of musical instruments. Note down the parts of these instruments that vibrate to produce sound.

**Ans:** Stringed musical instruments: Music produced by stretched string

Ex: Guitar, Sitar, Piano
Wind musical instruments: Music produced by vibrating of air columns
Ex: Flute, Shehnai
Membrane musical instruments: Music produced by vibration of stretched membrane
Ex: Tabla, Drums
Plate Type musical instruments: Music produced by vibration of thick plates
Ex: Manjira, Jal-tarag

**2.** If you play a musical instrument, bring it to the class and demonstrate how you play it.

**Ans:** Activity for home

**3.** Prepare a list of famous Indian musicians and the instruments they play.

**Ans:** 1. Ustad Bismillah Khan – **Shehnai** 2. Hariprasad Chaurasia - **Flute**
3. Pandit Ravi Shankar – **Sitar** 4. Pandit Shivkumar Sharma - **Santoor**
5. Ustad Zakir Hussain – **Tabla** 6. Ustad Asad Ali Khan - **Veena**
7. Amjad Ali Khan - **Sarod** 8. Thetakudi Hrihara Vinayakram - **Ghatan**
9. Ramnad V. Raghavan - **Mridangam)** 10. Pt. Ram Narayan - **Sarangi**

**4.** Take a long thread. Place your hands over your ears and get some one to place this thread round your head and hands. Ask her to make the thread taut and hold its ends in one hand. Now ask her to draw her finger and thumb tightly along the thread (Fig. 5.19). Can you hear a rolling sound like that of a thunder? Now repeat the activity while another friend stands near both of you. Can he hear any sound?

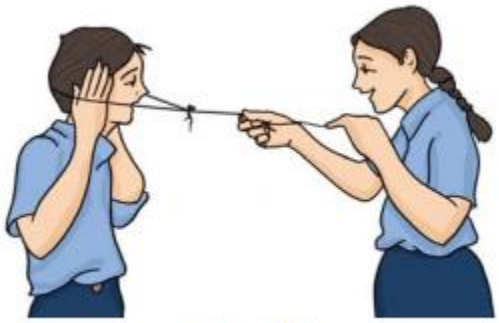


*Fig. 5.19*

**Ans:** Yes

**5.** Make two toy telephones. Use them as shown in Fig. 5.20. Make sure that the two strings are taut and touch each other. Let one of you speak. Can the remaining three persons hear? See how many more friends you can engage in this way. Explain your observations.

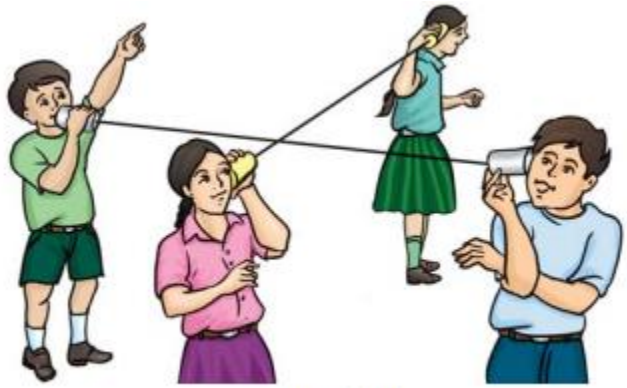


*Fig. 5.20*

**Ans:** Yes, the remaining three persons can also hear. As sound can travel through a medium, in this case sound is travelling through the string and thus everyone on the toy telephone can hear the voice.

**6.** Identify the sources of noise pollution in your locality. Discuss with your parents, friends and neighbours. Suggest how to control noise pollution. Prepare a brief report and present it in the class.

**Ans:** Sources of Noise pollution in our locality are

a) Vehicles b) Industries machine c) Crackers d) Airport (Aeroplane)

To control noise pollution we should do the following reason.

i) Using vehicles (petrol) ii) Silence in public places. iii) Minimizing the use of industries n factories.
iv) Avoiding bursting crackers when no events. v) Use of battery vehicles.
vi) Lower sound equipments should be used. vii) No loud music .

## ADDITIONAL QUESTIONS

**1. Does any part of our body vibrate when we speak? Name the part.**

**Ans:** Yes, larynx (vocal cords)

**2. What is the unit of frequency?**

**Ans:** Hertz is a unit of measurement for frequency. The sign for it is Hz.

**3. Name two musical instruments which produce sound by vibrating strings.**

**Ans: Sitar and Gitur**

**4. Give two examples of noise pollution.**

**Ans:** During an event, the use of crackers and loudspeakers.

**5. What would be the sound produced in a bus station or railway station called as?**

**Ans:** Unpleasant noise will be produced in both locations, which is known as noise.

**6.We have learnt that vibration is necessary for producing sound. Explain why the sound produced by every vibrating body cannot be heard by us?**

**Ans:** If the sound produced by a vibrating body is in the audible range, the sound produced will be heard bu us, otherwise we will not be able to hear the sound even though the body is vibrating.

**7. Suppose a stick is struck against a frying pan in vacuum. Will the frying pan vibrate? Will we be able to hear the sound? Explain.**

**Ans:** The frying pan will vibrate. We will not be able to hear the sound of vibration because sound cannot travel in vacuum.

**8. Briefly describe the loudness of sound.**

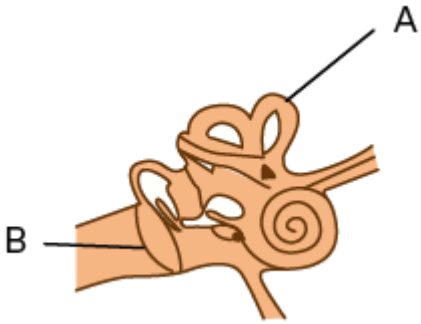
**Ans:** The Square of the amplitude of the vibration producing the sound determines the loudness of the sound. For example, doubling the amplitude increases the loudness by a factor of four. The decibel is a measurement of how loud something is (dB).

**9. Classify the following into music and noise. Desert coolers, sound produced by harmonium, string of sitar, television and transistor radio at high volumes**

**Ans:**

| Music | Noise |
|---|---|
| Sound produced by harmonium, String of sitar | Desert coolers, Television and transistor radio at high volumes |

**10. Label the parts of the human ear in the below given picture.**




**Ans:** A. Inner ear, B. Eardrum

**11. Correct the following statements.**

Noise is one which is pleasing to the ear.

**Ans:** Musical sound is one which is pleasing to the ear

**12. Sounds of frequencies more than 20 Hz but less than 20,000 Hz cannot be detected by the human ear.**

**Ans:** Sounds of frequencies more than 20 Hz but less than 20,000 Hz can be detected by the human ear.

**13. Explain with an activity that sound travels in liquids.**

**Ans:** Fill a bucket with water and, using one hand, shake a bell under the water, making sure the bell does not touch the bucket's body. Now carefully place your ear on the water's surface; you will hear the ringing bell, proving that sound can travel through water.

**14. Give an example to show that the frequency determines the shrillness or pitch of a sound.**

**Ans:** A low-frequency vibration is produced by a drum. As a result, it makes a low-pitched sound. A whistle, on the other hand, has a high frequency and hence generates a higher pitch sound.

**15. It is said that "The loudness of sound depends on its amplitude". What happens to the sound when the amplitude of vibration is large and vice versa?**

**Ans:** Because the loudness of sound is determined by its amplitude, so the sound produced is loud when the

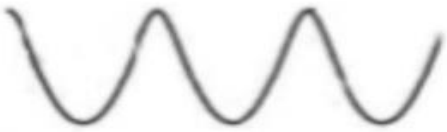
amplitude of vibration is significant. The sound generated is weak when the amplitude is tiny.

**16. Sound plays an important role in our life. Why?**

**Ans:** Sound is crucial because it enables us to communicate with one another.

**17. Identify the type of frequency in the below given pictures.**

a. 

b. 

**Ans:** a. High frequency b. low Frequency

**18. Explain how sound is produced in human beings.**

**Ans:** The voice box or the larynx in humans produces the sound. The larynx is located near the top of the windpipe. Two vocal cords are stretched across the voice box or larynx in such a way that a thin slit for air passage is left between them. The vocal cords vibrate when the lungs force air through the slit, producing sound. The muscles that link to the voice cords can tighten or loosen them. The sort or quality of voice produced when the vocal cords are tight and thin differs from that produced when they are loose and thick.

**19. Demonstrate an activity to show that sound needs a medium for propagation**

**Ans:** Take a tumbler, either metal or glass. Make sure it's completely dry. Put a cell phone in there. Request that a friend call this cell phone from another cell phone. Pay close attention to the ring. Now, wrap your hands over the tumbler's rim. Place your mouth in the space created by your hands. Tell your friend to ring the phone once more. While sucking air from the tumbler, listen to the ring. Keep an eye on the tumbler and take it out of your mouth. It's probable that the decreased volume of air in the tumbler contributed to the ring's decreased volume. There would be no sound if the tumbler is completely devoid of air. This demonstrates that sound requires a medium in order to travel.

**20. List the harmful effect of Noise pollution**

**Ans:** Excessive noise in the environment can lead to a variety of health issues.

a. Lack of sleep b. Hypertension (high blood pressure) c. Anxiety,

d. A person who is continuously exposed to a loud sound may suffer from temporary or permanent hearing loss.

**21. How can we control Noise pollution?**

**Ans:** a) Aircraft engines, transport vehicles, industrial machines, and household appliances must all have noise-cancelling devices fitted.

b) All loud operations must take place outside of any residential areas. Industries that produce noise should be located distant from such regions.

c) Automobile horns should be used sparingly. Low-volume television and music systems are recommended.

d) Trees should be planted along highways and around buildings to reduce the amount of noise that reaches households, hence lowering the negative impacts of noise pollution.

## BITS

1. The maximum displacement of a vibrating body on either side of its mean position, is known as its

(a) Frequency (b) Loudness (c) Amplitude (d) Pitch

**Ans:** (c)

2. The frequency of a given sound is 1.5 kHz. The vibrating body is

(a) completing 1,500 vibrations in one second. (b) taking 1,500 seconds to complete one vibration.

(c) taking 1.5 seconds to complete one vibration. (d) completing 1.5 vibrations in one second

**Ans:** (a)

3. A given sound is inaudible to the human ear, if

(a) its amplitude is too small. (b) its frequency is below 20 Hz.

(c) its frequency is above 20 kHz. (d) it has any of the three characteristics listed above.

**Ans:** (d)

4. Sound can propagate
(a) through vacuum as well as gases (b) only through gases and liquids
(c) only through gases and solids (d) any of the three states of the matter.
**Ans:** (d)

5. When lightning and thunder take place, they
(a) occur together and are also observed together. (b) occur one after the other but are observed together.
(c) occur together but the thunder is observed a little after the lightning.
(d) occur together but the thunder is observed a little before the lightning
**Ans:** (c)

6. Sounds having frequency more than 20 Hz are called
(a) Infrasonic (b) Supersonic (c) Ultrasonic (d) None of these
**Ans:** (c)

7. Loudness of sound is expressed in
(a) Hertz (b) Decibel (c) Seconds (d) None of these
**Ans:** (b)

8. A list of mediums is given below.
(i) wood (ii) water (iii) air (iv) vacuum
In which of these mediums can sound travel?
(a) i & ii only (b) i, ii & iii only (c) iii & iv only (d) ii, iii & iv only
**Ans:** (b) i, ii & iii only

9. The loudness of a sound depends on:
(a) its amplitude (b) its frequency (c) its time period (d) its speed
**Ans:** (a) its amplitude

10. Which of the following statements are correct?
(i) Sound is produced by vibrations. (ii) Sound requires a medium for propagation.
(iii) Light and sound both require a medium for propagation. (iv) Sound travels slower than light.
(a) i & ii only (b) i, ii & iii only (c) ii, iii & iv only (d) i, ii & iv only
**Ans:** (d) i, ii & iv only

11. An object is vibrating at 50 hertz. What is its time period?
(a) 0.02 s (b) 2 s (c) 0.2 s (d) 20.0 s
**Ans:** (a) 0.02 s

12. In order to reduce the loudness of a sound, we have to
(a) decrease its frequency of vibration of the sound. (b) increase its frequency of vibration of the sound.
(c) decrease its amplitude of vibration of the sound. (d) increase its amplitude of vibration of the sound.
**Ans:** (c) decrease its amplitude of vibration of the sound.

13. 1 hertz is equal to
(a) 1 vibration per minute (b) 10 vibrations per minute
(c) 60 vibrations per minute (d) 600 vibrations per minute
**Ans:** (c) 60 vibrations per minute

14. Pitch of sound is determined by its
(a) frequency (b) amplitude (c) speed (d) loudness
**Ans:** (a) frequency

15. The range of audible sound for a human being is _____.
(a) 20 Hz to 20,000 Hz (b) 20 Hz to 10,000 Hz (c) 10 Hz to 10,000 Hz (d) 20 Hz to 40,000 Hz
**Ans:** (a) 20 Hz to 20,000 Hz

17. Which one of the following will have long vocal cords?
(a) Women (b) Men (c) Children (d) None of the above
**Ans:** (b) Men

18. Which one of the following instruments produces sound through vibrations?
(a) Ghatam (b) Tabla (c) Flute (d) Sitar
**Ans:** (d) Sitar

19. To and fro motion of an object is called _____.

**Ans:** Vibration

20. _____ and _____ are two important properties of any sound.

**Ans:** Amplitude and frequency

21. Sound is a kind of

(a) work (b) energy (c) force (d) pressure

**Ans:** (b) energy

22. The frequency of subsonic sound is

(a) more than 20 Hz (b) 100 Hz (c) less than 20 Hz (d) more than 20,000 Hz

**Ans:** (c) less than 20 Hz

23. Cochlea is a part of

(a) hearing organ (b) sound producing organ (c) muscular organ (d) air pollution

**Ans:** (a) hearing organ

24. 1 hertz is equal to

(a) 1 vibration per minute (b) 10 vibrations per minute

(c) 60 vibrations per minute (d) 600 vibrations per minute

**Ans:** (c) 60 vibrations per minute

25. Sound cannot travel through

(a) air (b) water (c) air (d) vacuum

**Ans:** (d) vacuum

26. The sound in the audible range is called

(a) ultrasonic sound (b) sonic sound (c) subonic sound (d) light sound

**Ans:** (b) sonic sound

27. Speed is

(a) Distance travelled / Time (b) Time / Distance travelled

(c) Distance travelled × Time (d) Time + Distance travelled

**Ans:** (a) Distance travelled / Time

28. A pendulum oscillates 20 times in 4 seconds. Find its time period.

(a) 0.05 sec. (b) 0.001 sec. (c) 0.2 sec. (d) 0.1 sec

**Ans:** (c) 0.2 sec

29. The number of vibrations made by a vibrating body in one second is

(a) frequency (b) noise (c) loudness (d) pitch

**Ans:** (a) frequency

30. The velocity of sound at 20°C is approximately

(a) 3400 m/sec. (b) 340 m/sec. (c) 430 m/sec (d) 304 m/sec.

**Ans:** (b) 340 m/sec.

31. Sound is produced by

(a) Non-Vibrating objects only (b) Vibrating and non- vibrating objects

(c) Vibration has no relation to sound (d) Vibrating objects only

**Ans:** (d) Vibrating objects only

32. Vibration is also known as

(a) Vibratory motion (b) Translatory motion (c) Oscillatory motion (d) None of these

**Ans:** (c) Oscillatory motion

33. Above _____ dB the sound becomes physically painful

(a) 60 (b) 40 (c) 120 (d) 80

**Ans:** (d) 80

34. When the amplitude of vibration is large, sound produced is

(a) No sound (b) feeble (c) loud (d) No relation between amplitude and sound

**Ans:** (c) loud

35. An ultrasound equipment works at frequency

(a) Higher than 20,000Hz (b) Higher than 10,000Hz (c) Lower than 20,000Hz (d) Lower than 10,000Hz

**Ans:** (a) Higher than 20,000Hz

36. Match the items given in column I suitably with those given in column II.

| Column I | Column II |
|---|---|
| 1. Audible frequencies | (a) 10 dB |
| 2. Length of vocal cords in man | (b) 30 dB |
| 3. Ultrasound | (c) 20 mm long |
| 4. Normal breathing | (d) 20 to 20,000 Hz |
| 5. Soft whisper (At 5 m) | (e) Hertz |
| 6. Frequency | (f) Percussion instrument |
| 7. Unpleasant sound | (g) Music |
| 8. Pitch | (h) Produced by bats |
| 9. Tabla | (i) Noise |
| 10. Pleasant sound | (j) Higher frequency |

**Ans:** 1 – d, 2 – c, 3 – h, 4 – a, 5 – b, 6 – e, 7 – i, 8 – j, 9 – f, 10 – g

**37. Fill in the blanks with suitable word/s.**

(a) The _____ nerve is also present in the inner ear.
(b) Too much noise in our surroundings that causes discomfort is called _____.
(c) The speed of sound is maximum in _____.
(d) _____ is the time taken by a vibrating body for one complete vibration.
(e) Plantation on the roadside can reduce _____.
(f) The loudness of normal breathing of human is _____.

**Ans:** (a) auditory (b) noise pollution (c) solids (d) Time period (e) noise pollution (f) 10dB

**38. State whether the given statements are true or false.**

i) All human beings can hear sounds of frequencies upto 60,000 Hz.
ii) Sound does not need a medium for its propagation.
iii) Loud sounds have high frequencies.
iv) Sound travel faster in air, slower in iron.
v) Light travels much faster than sound.
vi) Man cannot hear sound of bats.
vii) Shriller sound has more frequency.
viii) The pitch of a sound depends in the frequency of the waves.

**Ans:** i) False ii) False iii) False iv) False v) True vi) True vii) True viii) True

## Textual Table

Table 5.1 : Musical Instruments and their Vibrating Parts

| S.No | Musical instrument | Vibrating part producing sound |
|---|---|---|
| 1 | Veena | Stretched string |
| 2 | Tabla | Stretched membrane |
| 3 | Flute | Air columns |
| 4 | Guitar | Stretched string |
| 5 | Mridangam | Stretched membrane |
| 6 | Clarinet | Air columns |
| 7 | Drum | Stretched membrane |

# CHAPTER - 6

## MATERIALS METALS AND NON-METALS

- **Physical Properties of Metals and Non-metals**
- **Chemical Properties of Metals and Non-metals**
- **Uses of Metals and Non-metals**

## IMPORTANT POINTS

1. The examples of metals are Iron, Copper, Aluminium, Calcium, Magnesium, etc
2. The examples of non-metals are Sulphur, Carbon, Oxygen, Phosphorus, etc.
3. Physical properties of metals are i) Hard to touch ii) Lustrous iii) Malleable iv) Ductile v) Sonorous vi) Good conductor of heat and electricity.
4. Metals like Sodium and Potassium are soft and can be cut with a knife.
5. Mercury is the only metal which is found in the liquid state at room temperature.
6. Physical properties of non-metals are i) Soft and Dull ii) Brittle nature iii) Not sonorous iv) Poor conductors of heat and electricity
7. Metals and Non-metals are react with oxygen to form their oxides.
8. Metal oxides are basic in nature and Non-metals are acidic in nature.
9. Some metals react with water to produce metal hydroxide and hydrogen gas.
10. Generally, Non-metals do not react with water.
11. Metals react with acids and produce metal salt and hydrogen gas.
12. Generally, Non-metals do not react with acids.
13. Metals react with bases to produce hydrogen gas.
14. More reactive metals displace less reactive metals from their metal compounds in aqueous solutions.
15. Metals are used in making machinery, automobiles, aeroplanes, trains, satellites, industrial gadgets, cooking utensils, water boilers etc.
16. Non-metals are used in day to day life, fertilizers, water purifier etc.

## DEFINITIONS

1. **Malleability:** The property of metals by which they can be beaten into thin sheets is called malleability.
2. **Ductility:** The property of metal by which it can be drawn into wires is called ductility.
3. **Sonorous:** Metals produce ringing sounds, they are said to be sonorous.
4. **Conductors:** Substance which allow heat/ electricity to pass through them are called conductors of heat/ electricity
5. **Metalloids:** Elements which possess characters of both metals and no-metals are called metalloids.
6. **Metals:** The materials which are generally hard, lustrous, malleable, ductile, sonorous and good conductors of heat and electricity are called metals.
7. **Non-metals:** The materials which are generally soft, dull in appearance, brittle, not sonorous and poor conductors of heat and electricity are called metals

## TEXTUAL QUESTIONS

**1. Which of the following can be beaten into thin sheets?**

**(a) Zinc** **(b) Phosphorus** **(c) Sulphur** **(d) Oxygen**

**Ans:** (a) Zinc

**2. Which of the following statements is correct?**

**(a) All metals are ductile.** **(b) All non-metals are ductile.**

**(c) Generally, metals are ductile.** **(d) Some non-metals are ductile.**

**Ans:** (c) Generally, metals are ductile

**3. Fill in the blanks.**

**(a) Phosphorus is a very ____ non-metal.**

**(b) Metals are _____ conductors of heat and _____**

**(c) Iron is _____ reactive than copper.**

**(d) Metals react with acids to produce _____ gas.**

**Ans:** (a) reactive (b) good, electricity (c) more (d) hydrogen

**4. Mark 'T' if the statement is true and 'F' if it is false.**

**(a) Generally, non-metals react with acids.**

**(b) Sodium is a very reactive metal.**

**(c) Copper displaces zinc from zinc sulphate solution.**

**(d) Coal can be drawn into wires.**

**Ans:** (a) False (b) True (c) False (d) False

**5. Some properties are listed in the following Table. Distinguish between metals and non-metals on the basis of these properties.**

| Properties | Metals | Non-metals |
|---|---|---|
| 1. Appearance | | |
| 2. Hardness | | |
| 3. Malleability | | |
| 4. Ductility | | |
| 5. Heat Conduction | | |
| 6. Conduction of Electricity | | |

**Ans:**

| Properties | Metals | Non-metals |
|---|---|---|
| 1. Appearance | have metallic lustre | dull |
| 2. Hardness | hard | soft |
| 3. Malleability | malleable | non-malleable |
| 4. Ductility | ductile | non-ductile |
| 5. Heat Conduction | good conductors | bad conductors |
| 6. Conduction of Electricity | good conductors | bad conductors/insulators |

**6. Give reasons for the following.**

**(a) Aluminium foils are used to wrap food items.**

**(b) Immersion rods for heating liquids are made up of metallic substances.**

**(c) Copper cannot displace zinc from its salt solution.**

**(d) Sodium and potassium are stored in kerosene.**

**Ans:** (a) Aluminium is highly malleable and it can be easily beaten in sheets to make its foil for wrapping purposes. It is also soft and does not react with food items. That is why aluminium foils are used to wrap food items.

(b) Immersion rods made up of metallic substances because metals are good conductors of heat and electricity. They get hot very soon on the passage of electric current and warm the water.

(c) Copper is less reactive than zinc. So it cannot displace zinc from its solution.

(d) Sodium and potassium are highly reactive, so they are stored in kerosene.

**7. Can you store the lemon pickle in an aluminium utensil? Explain.**

**Ans:** No, we cannot store lemon pickle in an aluminium utensil because aluminium is a metal and metals readily react with acids to produce hydrogen. When aluminium comes in contact with lemon, which is acidic, would react to give hydrogen and the pickles will be spoiled.

**8. Match the substances given in column A with their uses given in column B.**

| A | B |
|---|---|
| Gold | Thermometers |
| Iron | Electric wire |
| Aluminium | Wrapping food |

| | |
|---|---|
| Carbon | Jewellery |
| Copper | Machinery |
| Mercury | Fuel |

**Ans:** (i) (d) (ii) (e) (iii) (c) (iv) (f) (v) (b) (vi) (a).

**9. What happens when**

**(a) Dilute sulphuric acid is poured on a copper plate?**

**(b) Iron nails are placed in a copper sulphate solution?**

**Write word equations of the reactions involved.**

**Ans:** (a) No reaction will take place because copper is very less reactive.

(b) Iron being more reactive than copper will replace copper from its solution and brown coating of copper is deposited on the iron nails. Also, the blue colour turns green.

Iron + Copper sulphate (solution) → Iron sulphate (solution) + Copper

**10. Saloni took a piece of burning charcoal and collected the gas evolved in a test tube.**

**(a) How will she find the nature of the gas?**

**(b) Write down the word equations of all the reactions taking place in this process.**

**Ans:** (a) She can find the nature of the gas by using a wet litmus paper. After bringing the litmus paper in contact with the gas, if it turns the blue litmus paper into red, it is acidic. Similarly, if it turn the red litmus into blue, it is basic.

(b) (i) Carbon + Oxygen → Carbon dioxide

(ii) Carbon dioxide + Lime water → Milky

**11. One day Reeta went to a jeweller's shop with her mother. Her mother gave an old gold jewellery to the goldsmith to polish. Next day when they brought the jewellery back, they found that there was a slight loss in its weight. Can you suggest a reason for the loss in weight?**

**Ans:** The gold jewellery is dipped into an acidic solution called aqua regia (a mixture of hydrochloric acid and nitric acid) for polishing. On dipping the gold jewellery in the acid solution, the outer layer of gold dissolves and the inner shiny layer appears. This causes a slight loss in its weight.

## Extended Learning — Activities and Projects

**1**. Prepare Index Cards for any four metals and four non-metals. The card should have information like name of metal/non-metal; its physical properties, chemical properties and its uses.

**Ans:**

| Metals | Non-metals |
|---|---|
| Name: **Copper**<br>Physical properties: 1) Good conductor of electricity<br>2) Good conductor of heat. 3) Very ductile<br>Chemical properties<br>1) It produces green coloured rust on reaction with water, oxygen and carbon dioxide present in the air. The rust contains copper hydroxide and copper carbonate.<br>2) It can be replaced from its salt solution by reactive metal.<br>Fe + CuSO4 --> FeSO4 + Cu<br>Use: It is used in electrical wires as it is a good conductor of electricity and very ductile.<br>Name: **Aluminium**<br>Physical properties:<br>1) Good conductor of electricity.<br>2) High tensile strength. 3) Very malleable.<br>Chemical properties- 1) It reacts with the base.<br>Aluminium + potassium hydroxide --> potassium | Name: **Carbon**<br>Physical properties:<br>1) Exists in solid state<br>2) bad conductor of heat.<br>Chemical properties:<br>1) Reacts with oxygen:<br>C + O2 --> CO2<br>2) Reacts with water<br>C + H2O --> CO + H2<br>Uses:Diamond is used as a gemstone. Graphite is used as a lubricant.<br>Name: **Sulphur**<br>Physical properties:<br>1) It exists as solid.<br>2) Non sonorous<br>Chemical properties<br>1) It react with oxygen<br>S + O2 --> SO2<br>2) Its oxides are acidic in nature. When sulphur |

aluminate + hydrogen
2) It reacts with acid.
2Al + 6HCl --> 2AlCl3 + 3H2
Uses: Aluminium foil, which is very light, is used to pack food, medicines etc. Aluminium is also used for making wires and utensils.
Name: **Magnesium**
Physical properties:
1) It is very light, its density is two third of aluminium.
2) Very malleable.
Chemical properties:
1) React with oxygen: 2Mg + O2 --> 2MgO
2) React with acid.
Mg + H2SO4 --> MgSO4 + H2
Use: Magnesium burns in air with a dazzling white light when ignited. Therefore it is used in fireworks.
Name: **Gold**
Physical properties- 1) They are very lustrous.
2) Very malleable. 3) Very ductile.
Chemical properties:
It is non-reactive metal. Do not react with acid, base or air. Thus it is called noble metal.
Use: It is used for making jewellery.

dioxide reacts with water forms a sulphurous acid.
SO2 + H2O --> H2SO3
Uses: It is used in the manufacture of dyes, matches, fireworks and gunpowder.
Name: **Chlorine**
Physical properties
1) It exists as a gas under ordinary conditions.
Chemical properties
1) Displacement reaction:
Cl2 + 2NaBr --> 2NaCl + Br2
2) It reacts with water in presence of sunlight or heat.
2Cl2 + 2H2O --> 4HCl + O2
Uses:
It is used for the manufacture of many plastics, polyvinyl chloride. It is used to disinfect water as it kills germs.
Name: **Oxygen**
Physical properties: 1) It exists as a gas.
Chemical properties:
Above reactions involving oxygen as reactants can be used to write chemical properties on an index card.
Uses: It is most important non-metal as it is required for respiration. All combustion processes need oxygen.

**2.** Visit a blacksmith and observe how metals are moulded.
**Ans:** A blacksmith is a person who molds and reshapes different metals to form various things. The process is completed by various different means.
Forging, drawing, upsetting, bending, punching are the names of various different processes that I saw when I visited the blacksmith.
Among all this the process that interested me the most was that of melting.
I saw the blacksmith melting the raw iron in the smelter.
The blacksmith could determine the temperature of the iron by just looking at its color and shape them as wanted.
**3.** Suggest an experiment to compare the conductivity of electricity by iron, copper, aluminium and zinc. Perform the experiment and prepare a short report on the results.
**Ans:** Aim:To compare the electrical conductivity of different metals.
Apparatus: cell, torch bulb fitted in a holder,connecting wires, different metal strips
Procedure: i) Let us make a simple circuit by connecting one end of the torch to cell and other end end of torch to metal strip and to cell back. ii) Let us insert a piece of Aluminium foil between the wires .And we will observe. iii) Repeat the same activity with different metal strips like Iron, copper and zinc.
Observation: i) In case of aluminium,iron,copper and zinc we observe that , bulb glows in the circuit.
ii) This experiment proves that all metals are good conductors of electricity
iii) Copper wire is the best conductor among all the metals.
Conclusion: This experiment proves that all metals are good conductors of electricity and Copper wire is the best conductor among all the metals.
**4**. Find out the locations of the deposits of iron, aluminium and zinc in India. Mark these in an outline map of India. In which form are the deposits found? Discuss in the class.
**Ans:** Iron is found in Jharkhand, Odisha, Chhattisgarh, Madhya Pradesh, Goa, Maharashtra and Karnataka. Aluminium is found in Jharkhand, Madhya Pradesh, Chhattisgarh, Maharashtra and Gujrat. Zinc is found in Rajasthan and Kerala.

**Deposits of aluminium:** By States, Odisha alone accounts for 51% of country's resources of bauxite followed by Andhra Pradesh (16%), Gujarat (9%), Jharkhand (6%), Maharashtra (5%) and Madhya Pradesh & Chhattisgarh (4% each). Major bauxite resources are concentrated in the East Coast bauxite deposits in Odisha and Andhra Pradesh.

**Deposits of zinc:** Zinc ore occurs in two types of deposit: as primary zinc ore in thin veins known as rakes, or a secondary deposit formed by weathering of the primary mineral veins. Zinc ore is most commonly found as zinc carbonate ($ZnCO_3$), known as calamine or smithsonite.

**Deposits of iron:** Major economic deposits of iron ore are found associated with volcano- sedimentary Banded Iron Formation (BIF) of Pre-Cambrian Age. The major "hematite" type iron deposits are located in well defined belts in the States of Orissa, Jharkhand, Chhattisgarh, Maharashtra, Goa and Karnataka

**5.** Discuss with your parents/neighbours/goldsmiths why gold is preferred for making jewellery.

**Ans:** Gold is preferred for making jewellery because unlike other metals, it does not react with air or moisture. It can retain its texture for a very long period of time if it is not treated with any kind of chemicals. Moreover, gold is malleable and ductile, that is, it can be easily converted into thin sheets and wires.

## ADDITIONAL QUESTIONS

**1. Fill in the blanks in the following statements.**

(a) Phosphorus is a very ____ non-metal.
(b) Metals are ____ conductors of heat and _____.
(c) Iron is _____ reactive than copper.
(d) Metals react with acids to produce _____ gas.

**Ans: (a)** reactive **(b)** good **(c)** more **(d)** hydrogen

**2. Mark 'T' if the statement is true and 'F' if it is false.**

(i) Generally, non-metals react with acids. ( )
(ii) Sodium is a very reactive metal. ( )
(iii) Copper displaces zinc from zinc sulphate solution. ( )
(iv) Coal can be drawn into wires. ( )

**Ans:** (i) F (ii) T (iii) F (iv) F

**3. Some properties are listed in the following table. Distinguish between metals and nonmetals on the basis of these properties.**

| Properties | Metals | Non-metals |
|---|---|---|
| 1. Appearance<br>2. Hardness<br>3. Malleability<br>4. Ductility<br>5. Heat Conduction<br>6. Conduction of Electricity | | |

**Ans:**

| Properties | Metals | Non-metals |
|---|---|---|
| Malleability | Can be beaten into thin sheets | Cannot be beaten into thin sheets |
| Ductility | Can be drawn into thin wires | Cannot be drawn into thin wires |
| Appearance | Lustrous | Dull |
| Hardness | Hard | Soft |
| Conduction of Electricity | Good conductors of electricity | Poor conductors of electricity |
| Heat Conduction | Good conductors of heat | Poor conductors of heat |

**4. Give reasons for the following.**

(a) Aluminium foils are used to wrap food items.

**Ans:** Food is wrapped in aluminium foil because the metal can be drawn into thin sheets (malleable).

(b) Immersion rods for heating liquids are made up of metallic substances.

**Ans:** Metal immersion rods are used to heat liquids because metals are excellent heat and electrical conductors.

(c) Copper cannot displace zinc from its salt solution.

**Ans:** Because Copper is less reactive than Zinc, it cannot displace Zinc from its salt solution. Metal reactivity series can help you understand this better.

$Cu(s) + ZnSO_4(aq) \rightarrow$ No reaction

(d) Sodium and potassium are stored in kerosene.

**Ans:** Because sodium and potassium are very reactive with oxygen in the atmosphere, they are kept in kerosene.

**5. Can you store the lemon pickle in an aluminium utensil? Explain.**

**Ans:** Lemon pickle includes acids, thus it cannot be preserved in aluminium utensils. Acids react with aluminium, releasing hydrogen, causing the pickle to spoil.

**6. Match the substances given in Column A with their uses given in Column B.**

| A | | B | |
|---|---|---|---|
| (i) | Gold | (a) | Thermometers |
| (ii) | Iron | (b) | Electric wire |
| (iii) | Aluminium | (c) | Wrapping food |
| (iv) | Carbon | (d) | Jewellery |
| (v) | Copper | (e) | Machinery |
| (vi) | Mercury | (f) | Fuel |

**Ans:** i-d, ii-e, iii-c, iv-f, v-b, vi-a

**7. What happens when**

**(a) Dilute sulphuric acid is poured on a copper plate?**

**(b) Iron nails are placed in copper sulphate solution?**

**(c) Write word equations of the reactions involved.**

**Ans:** (a) When dilute sulphuric acid is poured on a copper plate, the copper metal reacts with the sulphuric acid, releasing hydrogen gas.

Copper(Cu) + Sulphuric acid($H_2SO_4$) → Copper sulphate($CuSO_4$) + Hydrogen gas($H_2$)

(b) When a copper sulphate solution is used to soak an iron nail. Copper is displaced by iron in a copper sulphate solution, resulting in copper and iron sulphate. Copper is less reactive than iron.

(c) Iron (Fe) + Copper sulphate ($CuSO_4$) → Iron sulphate ($FeSO_4$) + Copper (Cu)

**8. Saloni took a piece of burning charcoal and collected the gas evolved in a test tube. How will she find the nature of the gas? Write down word equations of all the reactions taking place in this process.**

**Ans:** When a few drops of water are added to a gas-filled test tube. In water, gas is dissolved. Use blue litmus to test the gas and water solution. The blue litmus changes colour to red, indicating that the gas is acidic. Write down word equations of all the reactions taking place in this process.

Charcoal releases $CO_2$ when it is burnt. $CO_2$ is a greenhouse gas.

C + $O_2$ -------> $CO_2$

(Carbon from charcoal) (Oxygen) (Carbon Dioxide)

Carbonic acid is formed when carbon dioxide gas combines with water, turning blue litmus red.

$CO_2$ + $H_2O$ -------> $H_2CO_3$

(Carbon Dioxide) (Water) (Carbonic acid)

(Turns blue litmus red)

**9. One day Reeta went to a jeweller's shop with her mother. Her mother gave old gold jewellery to the goldsmith to polish. The next day when they brought the jewelry back, they found that there was a slight loss in its weight. Can you suggest a reason for the loss of weight?**

**Ans:** The ancient gold jewellery is soaked in a solution called Aqua Regia to polish it (1:3 molar ratio of $HNO_3$ and HCl). Aqua Regia dissolves the outer layer of the golden jewellery. The removal of the outer layer reduces the weight of gold jewellery.

## BITS

1. Which of the following properties is generally not shown by metals?

(a) Ductility (b) Sonorous (c) Dullness (d) Electrical conduction

**Ans:** (c)

2. The most abundant element in the universe is
(a) hydrogen (b) oxygen (c) helium (d) carbon
**Ans:** (a)

3. The ability of metals to be drawn into wires is known as
(a) ductility (b) conductivity (c) malleability (d) sonorousity
**Ans:** (a)

4. The most abundant element in the earth crust is
(a) iron (b) oxygen (c) silicon (d) aluminium
**Ans:** (b)

5. Galvanisation is a method qf protecting iron from rusting by coating with a thin layer of
(a) silver (b) gallium (c) zinc (d) aluminium
**Ans:** (c)

6. The most abundant metal in earth crust is
(a) Cu (b) Al (c) Fe (d) Zn
**Ans:** (b)

7. An alloy is
(a) a compound (b) a heterogeneous mixture (c) a homogeneous mixture (d) an element
**Ans:** (c)

8. In extraction of copper, the flux used is
(a) FeO (b) $Si0_2$ (c) CaO (d) $FeSi0_3$
**Ans:** (b)

9. Alloys are homogeneous mixtures of a metal with a metal or non-metal. Which among the following aljoys contain non-metal as one of its constituents?
(a) Amalgam (b) Brass (c) Bronze (d) Steel
**Ans:** (d)

10. Which of the following is purest form of carbon?
(a) Diamond (b) Graphite (c) Fullerenes (d) Charcoal
**Ans:** (c)

11. Which among the following alloys contain mercury as one of its constituents?
(a) Alnico (b) Solder (c) Stainless steel (d) Zinc Amalgam
**Ans:** (d)

12. Which of the following methods is suitable for preventing an iron frying pan from rusting?
(a) Applying paint (b) Applying grease (c) Applying a coating of zinc (d) all of these
**Ans:** (c)

13. Generally, non-metals are not conductors of electricity, which of the following is a good conductor of electricity?
(a) Fullerenes (b) Graphite (c) Diamond (d) Sulphur
**Ans:** (b)

14. Food cans are coated with tin and not with zinc because
(a) zinc is costlier than tin (b) zinc is less reactive than tin
(c) zinc is more reactive than tin (d) zinc has a higher melting point than tin
**Ans:** (a)

15. Electrical wires have a coating of an insulating materials. The material, generally used is
(a) sulphur (b) graphite (c) PVC (d) none of these
**Ans:** (c)

16. Which of the following non-metals is a liquid?
(a) Sulphur (b) Phosphorus (c) Carbon (d) Bromine
**Ans:** (d)

17. Which from the following is the most reactive metal?
(a) Calcium (b) Potassium (c) Silver (d) Copper
**Ans:** (b)

18. Which metal is liquid at room temperature?

(a) Bromine (b) Calcium (c) Mercury (d) Sodium

**Ans:** (c)

19. Name a metal from the following that is not corroded by air,water or acid

(a) Zinc (b) Aluminium (c) Copper (d) Gold

**Ans:** (d)

20. Which of the following can be beaten into thin sheets?

(a) Zinc (b) Phosphorus (c) Sulphur (d) Oxygen.

**Ans:** (a) Zinc

21. Which of the following statements is correct?

(a) All metals are ductile. (b) All non-metals are ductile.

(c) Generally, metals are ductile. (d) Some non-metals are ductile.

**Ans:** (c) Generally, metals are ductile.

22. Which of the following is a liquid at room temperature?

(a) Iron (b) Bromine (c) Iodine (d) Phosphorus

**Ans:** (b) Bromine

23. The most reactive metal is

(a) copper (b) silver (c) potassium (d) calcium

**Ans:** (c) potassium

24. The metal which is liquid at room temperature is

(a) sodium (b) bromine (c) calcium (d) mercury

**Ans:** (d) mercury

25. Which one of the following metals is the most ductile?

(a) Aluminium (b) Copper (c) Silver (d) Gold

**Ans:** (d) Gold

26. Which one of the following metals is the most reactive and stored in kerosene?

(a) Iron (b) Gold (c) Copper (d) Potassium

**Ans:** (d) Potassium

27. Name the gas evolved when magnesium reacts with dilute hydrochloric acid

(a) Chlorine (b) Oxygen (c) hydrogen (d) Nitrogen

**Ans:** (c) hydrogen

28. The metal which is not corroded by air, water and acid is

(a) copper (b) zinc (c) aluminium (d) gold

**Ans:** (d) gold

29. Metals are

(a) soft and brittle (b) hard and solid (c) liquid (d) generally liquid

**Ans:** (b) hard and solid

30. Materials having qualities of both metals and non-metals are

(a) alloys (b) metalloids (c) noble metals (d) none of these

**Ans:** (b) metalloids

31. Which metal reacts readily with cold water?

(a) Gold (b) Silver (c) Magnesium (d) Calcium

**Ans:** (d) Calcium

32. The best electrical conductor is

(a) gold (b) copper (c) silver (d) aluminium

**Ans:** (c) silver

33. Iron is galvanised by coating it with

(a) chromium (b) sodium (c) magnesium (d) zinc

**Ans:** (d) zinc

34. Out of these, which one is more reactive with water?

(a) Sodium (b) Magnesium (c) Iron (d) Copper

**Ans:** (a) Sodium

35. Boron is

(a) metal (b) metalloid (c) non-metal (d) alkali

**Ans:** (b) metalloid

36. A mineral from which. a metal can be extracted on the commercial scale, economically is called

(a) ore (b) metalloid (e) corrosion (d) metal

**Ans:** (b) metalloid

37. A mineral from which, a metal can be extracted on the commercial scale, economically is called

(a) ore (b) metalloid (c) corrosion (d) metal

**Ans:** (a) ore

38. Match the following items given in Column 'A' with that in Column 'B'

| **Column 'A'** | **Column 'B'** |
|---|---|
| i) Zinc | a) Non-metal |
| ii) iodine | b) Mercury |
| iii) Liquid | c) Carbon |
| iv) Graphite | d) Silver |
| v) Silicon | e) Water purification |
| vi) Malleability | f) Metalloid |
| vii) Chlorine | g) Bad conductor of heat |
| viii) Non-metal | h) Metal |

**Ans:** i-h, ii-a, iii-b, iv-c, v-f, vi-d, vii-e, viii-g

**39. Fill in the blanks with appropriate words:**

(a). ……. is used in making mirrors.

(b). ……. foils are used as packing material.

(c). ……. is used to prepare sulphuric acid.

(d) A solution of ……. in alcohol has antiseptic properties.

(e) Both ……. and ……. find extensive use in the native form as well as compounds.

(f) Nitrates of ……. find use in photography.

**Ans:** (a) Silver (b) Aluminium (c) Sulphur trioxide (d) Iodine (e) metal, non-metal (f) silver

**40. State whether the statements given below are True or False:**

(a) Sodium is more reactive than magnesium.

(b) Magnesium reacts with cold water.

(c) All înetal exist in solid form at room temperature.

(d) Gallium has a low melting point.

(e) Gold is allayed with copper to make it hard.

**Ans:** (a) True (b) False (c) False (d) True (e) True

## Textual Tables

Table 6.1 : Appearance and Hardness of Materials

| **Object/Material** | **Appearance(Shiny/Dull)** | **Hardness (Very hard/ Not very hard)** |
|---|---|---|
| Iron | Shiny | Very hard |
| Coal | Dull | Not very hard |
| Sulphur | Dull | Not very hard |
| Aluminium | Shiny | Very hard |
| Copper | Shiny | Very hard |
| Sodium | Shiny | Not very hard |

Table 6.2 : Malleability of Materials

| Object/ Material | Change in Shape (Flattens/Breaks into pieces) |
|---|---|
| Iron nail | Flattens |
| Coal piece | Breaks into pieces |
| Aluminium wire | Flattens |
| Pencil lead | Breaks into pieces |

Table 6.3 : Electrical Conductivity of Materials

| S.No | Materials | Good Conductor / Poor Conductor |
|---|---|---|
| 1 | Iron rod/nail | Good conductor |
| 2 | Sulphur | Poor conductor |
| 3 | Coal piece | Poor conductor |
| 4 | Copper wire | Good conductor |

Table 6.4 : Metals and Non-metals in Acids and Bases

| S.No | Name of the Base | Metal | Name of the Acid | Non-metal |
|---|---|---|---|---|
| 1 | Calcium hydroxide | Calcium | Sulphuric acid | Sulphur |
| 2 | Sodium hydroxide | Sodium | Hydrochloric acid | Chlorine |
| 3 | Magnesium hydroxide | Magnesium | Nitric acid | Nitrogen |
| 4 | Potassium hydroxide | Potassium | Carbonic acid | Carbon |
| 5 | Zinc hydroxide | Zinc | Phosphoric acid | Phosphorus |

Table 6.5 : Reaction of Metals and Non-metals with Acids

| Test Tube Label | Metal/ Non-metal | Reaction with Dilute Hydrochloric Acid | | Reaction with Dilute Sulphuric Acid | |
|---|---|---|---|---|---|
| | | Room Temperature | Warm | Room Temperature | Warm |
| A. | Magnesium (ribbon) | Reacts to give hydrogen | Rapid reaction | Reacts to give hydrogen | Rapid reaction |
| B. | Aluminium (foil) | Reacts to give hydrogen | Rapid reaction | Reacts to give hydrogen | Rapid |
| C. | Iron (filings) | Reacts to give hydrogen | Rapid reaction | Reacts to give hydrogen | Rapid |
| D. | Copper (Peeled flexible wire) | No reaction | No reaction | No reaction | No reaction |
| E. | Charcoal (powder) | No reaction | No reaction | No reaction | No reaction |
| F. | Sulphur (powder) | No reaction | No reaction | No reaction | No reaction |

# CHAPTER - 7

# LIGHT

- What makes Things Visible
- Laws of Reflection
- Regular and Diffused Reflection
- Reflected Light Can be Reflected Again
- Multiple Images
- Sunlight — White or Coloured
- What is inside Our Eyes?
- Care of the Eyes

## IMPORTANT POINTS

1. When light from an object enters our eyes that we see the object.
2. Light is reflected from all surfaces
3. Regular reflection takes place when light is incident on smooth, polished and regular surfaces.
4. Diffused/Irregular reflection takes place from rough surfaces.
5. Image formed in a plane mirror undergoes lateral inversion.
6. Two mirrors inclined to each other give multiple images.
7. Beautiful patterns are formed in a kaleido scope because of multiple reflections.
8. Parts of the eye are cornea, iris, pupil, lens, retina and optic nerve.
9. Cornea is the transparent front part of the eye.
10. Iris is the coloured part of the eye. It controls the size of pupil.
11. Pupil is a small opening in the cornea.
12. Retina is the site of the formation of image.
13. Cones are nerve cells on retina, which are sensitive to bright light and sense colour.
14. Rods are the nerve cells on the retina, which are sensitive to dim light.
15. Rainbow is a natural phenomenon showing dispersion.
16. A normal eye can see nearby and distant objects clearly.
17. Most comfortable distance at which one can read with a normal eye is 25 cm.
18. Impression of an image persists on retina for about $1/16^{th}$ of the second.
19. Night blindness is the most common eye problem and it happens due to vitamin A deficiency.
20. Braille system is most popular resource for reading and writing for visually challenged persons developed by Louis Braille.

## DEFINITIONS

1. **Incident ray:** The light ray, which strikes any surface, is called the incident ray.
2. **Reflected ray:** The ray that comes back from the surface after reflection is known as the reflected ray.
3. **Normal:** A perpendicular line at the point of incidence is called normal.
4. **Angle of Incidence:** The angle between the normal and the incident ray is called the angle of incidence.
5. **Angle of Reflection:** The angle between the normal and the reflected ray is called the angle of reflection.
6. **Reflection of Light**: Bouncing back of light rays after hitting any surface is called reflection of light.
6. **Laws of Reflection:** (i) The angle of incidence is equal to the angle of reflection. (ii) Incident ray, reflected ray and the normal drawn at the point of incidence to the reflecting surface, lie in the same plane.
7. **Lateral inversion:** Phenomenon of changing side left to right and right to left by the mirror while forming images is called lateral inversion.
8. **Regular reflection:** Reflection from a smooth surface like that of a mirror is called regular reflection
6. **Diffused or Irregular Reflection:** When all the parallel rays reflected from a rough or irregular surface are not parallel, the reflection is known as diffused or irregular reflection.
7. **Dispersion of light:** Splitting of light into its constituent colours is known as dispersion of light.
8. **Blind Spot:** At the junction of optic nerve and the retina, there are no sensory cells, so no vision is possible

on that spot. This is called the blind spot.

## TEXTUAL QUESTIONS

**1. Suppose you are in a dark room. Can you see objects in the room? Can you see objects out¬side the room? Explain.**

**Ans:** When we are in a dark room then we cannot see objects in the room. We can see the objects outside the room, because out of the room the light is available and the rays of light can enter our eyes after reflection from the objects.

**2. Differentiate between regular and diffused reflection. Does diffused reflection mean the failure of the laws of reflection?**

**Ans:**

| Regular Reflection | Diffused Reflection |
|---|---|
| (i) All the reflected rays are parallel. | (i) The reflected rays are not parallel. |
| (ii) It occurs on a smooth and polished surface. | (ii) It occurs on the rough surface. |
| (iii) Reflected rays are in one direction. | (iii) Reflected rays are scattered in different directions. |

No, diffuse reflection doesn't mean the failure of laws of reflection.

**3. Mention against each of the following whether regular or diffused reflection will take place when a beam of light strikes. Justify your answer in each case.**

**(a) Polished wooden table** **(b) Chalk powder** **(c) Cardboard surface**
**(d) Marble floor with water spread over it** **(e) Mirror** **(f) Piece of paper**

**Ans:** (a) Regular reflection will take place because the surface is plane and polished.
(b) Diffused reflection will take place because the surface is rough.
(c) Diffused reflection will take place because the surface is rough.
(d) Regular reflection will take place because the surface is smooth and plane.
(e) Regular reflection will take place because the surface is plane and polished.
(f) Diffused reflection will take place because the surface is rough.

**4. State the laws of reflection.**

**Ans:** (i) The incident ray, the normal and the reflected ray, all lie in the same plane.
(ii) The angle of incidence is equal to the angle of reflection.

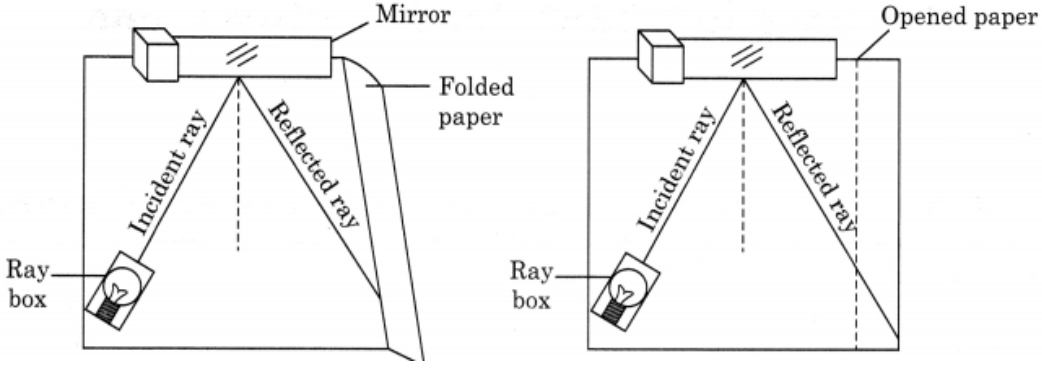
**5. Describe an activity to show that the incident ray, the reflected ray and the normal at the point of incidence lie in the same plane.**

**Ans: Activity:** To show that the incident ray, reflected ray and the normal at the point of incidence lie in the same plane.

**Materials Required:** Plane mirror, holder, ray box, etc.

**Procedure:** Fix sheet of white paper, a little beyond the edge of the board. Place a plane mirror strip vertically to the paper using a stand. Throw light from a ray box on the mirror. Look at the reflected ray. Mark the incident ray, normal ray and reflected ray. Fold the paper which is beyond the edge of the board. You will observe that the reflected ray is not seen in the folded portion of the chart paper. Now bring the folded portion back to its original position. The reflected ray of light is again seen on the page.

**Conclusion:** The sheet on the board can be considered as a plane. The incident ray, the reflected ray, the normal at the point of incidence lie in the same plane.



Incident ray, reflected ray and normal at the point of incidence lie in the same plane

**6. Fill in the blanks in the following.**

**(a) A person 1 m in front of a plane mirror seems to be _____ m away from his image.**

**(b) If you touch your _____ ear with a right hand in front of a plane mirror it will be seen in the mirror that your right ear is touched with _____**

**(c) The size of the pupil becomes _____ when you see in dim light.**

**(d) Night birds have _____ cones than rods in their eyes.**

**Ans:** (a) 2 (b) left, left hand (c) larger (d) lesser

**Choose the correct option in Questions 7-8.**

**7. The angle of incidence is equal to the angle of reflection**

**(a) Always (b) Sometimes (c) Under special conditions (d) Never**

**Ans:** (a) Always

**8. Image formed by a plane mirror is:**

**(a) virtual, behind the mirror and enlarged.**

**(b) virtual, behind the mirror and of the same size as the object.**

**(c) real at the surface of the mirror and enlarged.**

**(d) real, behind the mirror and of the same size as the object.**

**Ans:** (b) virtual, behind the mirror and of the same size as the object.

**9. Describe the construction of a kaleidoscope.**

**Ans:** Kaleidoscope is a device based on the principle of multiple reflections. It consists of three long and narrow strips of plane mirrors inclined at an angle of 60° to one another forming prism. This is fitted in a tube. One end of this tube is closed by a cardboard disc having a hole at its centre. To the other end touching the mirrors plane glass plate is fixed on which broken pieces of coloured bangles are placed. This end of the tube is closed by a ground glass plate.

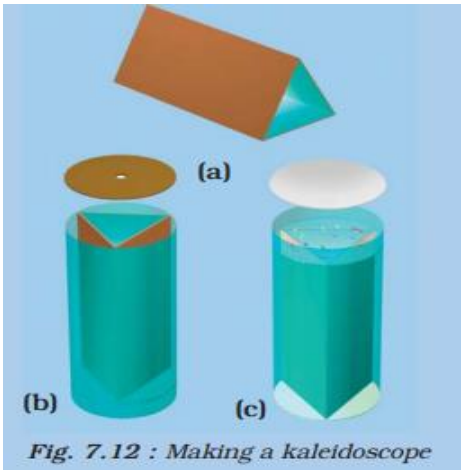
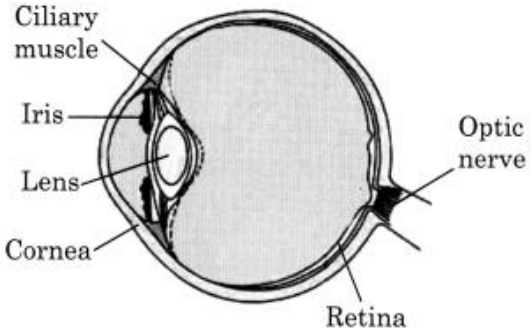
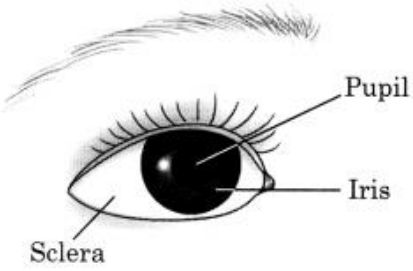


*Fig. 7.12 : Making a kaleidoscope*

**10. Draw a labelled sketch of the human eye.**

**Ans:**




*Human eye*

**11. Gurmit wanted to perform Activity 16.8 using a laser torch. Her teacher advised her not to do so. Can you explain the basis of the teacher's advise?**

**Ans:** Teacher has advised Gurmit not to do so because laser light is very harmful for her eyes and can cause a permanent defect in the eye. Person can even lose his or her eyesight if laser torch is directed over the eyes.

**12. Explain how you can take care of your eyes.**

**Ans:** Eyes are very precious. We must take proper care of them. We must

(i) Always sit straight while reading or writing.

(ii) If advised, use suitable spectacles.

(iii) Wash our eyes with clean water frequently.

(iv) Not look at the sun directly.

(v) Always read or write in a proper light.

**13. What is the angle of incidence of a ray if the reflected ray is at an angle of 90° to the incident ray?**

**Ans:**

Here, the angle of reflection is 90°.

As we know, according to the laws of reflection that angle of incidence is equal to angle of reflection.

Here, the angle between the incident ray and reflected ray is 90°.

i.e., $\angle i + \angle r = 90°$

Since, $\angle i = \angle r$

We can write, $\angle i + \angle i = 90°$

$\Rightarrow 2\angle i = 90°$

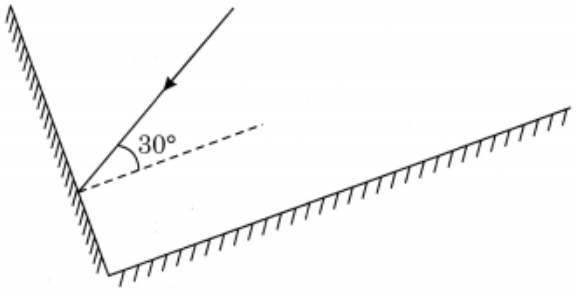
$\Rightarrow \angle i = 45°$

Angle of incidence = 45°.

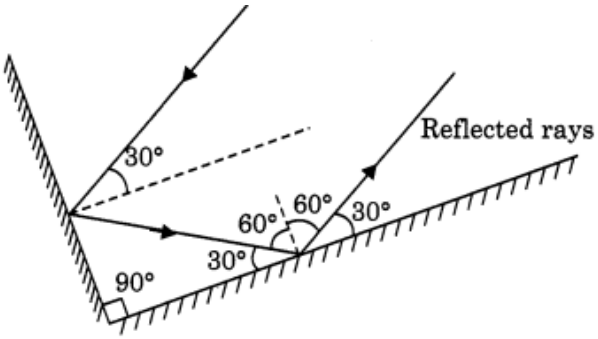
**14. How many images of a candle will be formed if it is placed between two parallel plane mirrors separated by 40 cm?**

**Ans:** Here, mirrors are placed parallel to each other 40 cm apart. Therefore, the infinite number of images will be formed.

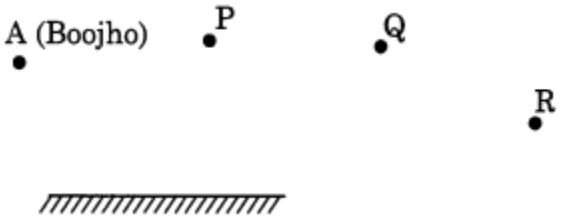
**15. Two mirrors meet at right angles. A ray of light is incident on one at an angle of 30° as shown in Fig. 7.19. Draw the reflected ray from the second mirror.**



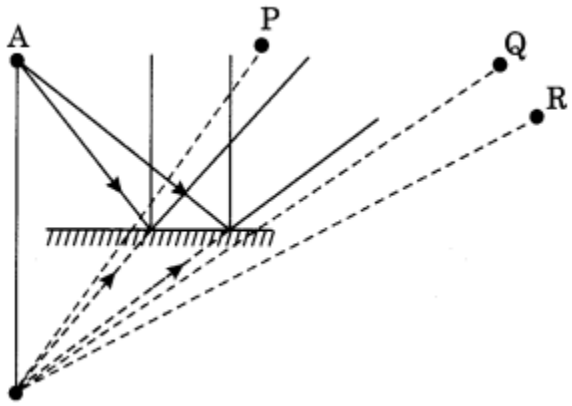

**Ans:**



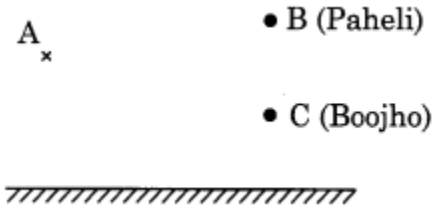

**16. Boojho stands at A just on the side of a plane mirror as shown in Fig. 7.21. Can he see himself in the mirror? Also, can he see the image of objects situated at P, Q, and R?**



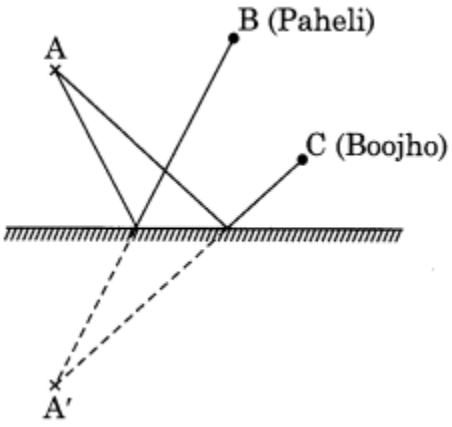

**Ans:** No, Boojho can't see himself in the mirror. He can see the image of the object at P and Q but not of R.




**17. (a) Find out the position of the image of an object situated at A in the plane mirror (Fig. 7.23).**
**(b) Can Paheli at B see this image?**
**(c) Can Boojho at C see this image?**
**(d) When Paheli moves from B to C, where does the image of A move?**




**Ans:** (a) It is shown in the following figure.




(b) Yes, Paheli can see the image of A.
(c) Yes, Boojho can see the image of A.
(d) Image of the object at A will not move as an object is not moving.

## Extended Learning — Activities and Projects

**1.** Make your own mirror. Take a glass strip or glass slab. Clean it and put it on a white sheet of paper. See yourself in the glass. Next put the glass slab on a black sheet of paper. Again look into the glass. In which case do you see yourself better and why?
**Ans:** We can see ourselves better in the case we put the glass slab on white paper because white sheet reflects more light as compared to black sheet.

**2.** Make friends with some visually impaired students. Enquire from them how they read and write. Also find out how they are able to recognise objects, hurdles and currency notes.

**Ans:** They use non-optical and optical aids to develop their capabilities, for example, Braille writer slate and stylus help them in taking notes, reading and writing. Such people try to identify things by touching and listening the voices more carefully.

**3.** Meet an eye specialist. Get your eye sight checked and discuss how to take care of your eyes.

**Ans:** We can take care of our eyes by:

i) Washing our eyes daily with fresh water. ii) Eating green vegetables
iii) Regular check up iv) Proper sitting and reading posture
v) Avoiding very intense or very dim light vi) Do not stare directly at the sun or a bright light.

**4.** Survey your neighbourhood. Find out how many children below the age of 12 years use spectacles. Find out from their parents what, in their view, could be the reason for the weak eyesight of their children.

**Ans:** There are many children in the neighbourhood below the age of 12 years who use spectacles. According to parents, the possible reasons for the weak eyesight of children could be,

i) Watching TV for longer period of time. ii) Too much exposure to computer and mobiles.
iii) Not reading and writing using adequate light. iv) Sleep disorder.
v) Improper diet. vi) In some case, babies are born with vision loss.

## ADDITIONAL QUESTIONS

**1. What are the characteristics of image formed by plane mirror?**

**Ans:** i) Virtual image ii) Erect image iii) Laterally inverted
iv) Size of the image is equal to the size of the object.
v) Distance of the image from the mirror is equal to the distance of the object.

**2. How many times is a ray of light reflected by two plane mirrors placed parallel and facing each other?**

**Ans:** Infinite number of times

**3. How is the phenomenon of reflection used in making a kaleidoscope? What are the applications of a kaleidoscope?**

**Ans:** The kaleidoscope gives a number of images formed by reflection from the mirrors inclined to one another. Designers and artists use kaleidoscope to get ideas for new patterns to design wallpapers, jewellery and fabrics.

**4. What kind of lens is there in our eyes? Where does it form the image of an object?**

**Ans:** The type of lens in our eyes is convex. It forms the images on the retina.

**5. Which part of the eye gets affected if someone is suffering from cataract? How is it treated?**

**Ans:** In people suffering from cataract, the eye lens becomes clouded. Cataract is treated by replacing the opaque lens with a new artificial lens.

**6. Write the name of some non-optical aids.**

**Ans:** i) Tactual aids ii) Auditory aids iii) Electronic aids

**7. Name the part of the eye which gives distinctive color.**

**Ans:** Iris is the part of the eye that gives distinctive color. The iris is a colored ring that surrounds our pupils and gives our eyes their distinct color.

**8. Lack of which nutrient is responsible for eye troubles?**

**Ans:** Deficiency of Vitamin A causes eye troubles. Xerophthalmia is a progressive eye disease caused by a lack of vitamin A. Xerophthalmia can progress to night blindness or more serious damage to the cornea, the outer layer of the eye.

**9. Who developed a system for visually challenged persons and published it in 1821?**

**Ans:** Braille was developed in the 1820s by Louis Braille and is the most widely used resource for visually impaired people. Louis Braille. Blind individuals read and write using the Braille system. A set of raised bumps or dots can be sensed with a finger in the Braille system.

**10. Do you think a ray of light is an idealization? Why?**

**Ans:** Yes a ray of light is an idealization. In reality, there is a narrow beam of light that is made up of several rays. For simplicity, the term ray is used for a narrow beam of light.

**11. Give any two uses of periscope.**

**Ans:** Submarines, tanks, and soldiers in bunkers use periscopes to see things outside.

**12. List the food items which contain vitamin A.**

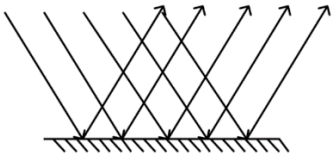
**Ans:** Vitamin A is abundant in raw carrots, broccoli, and green vegetables (such as spinach) as well as cod liver oil. Vitamin A is found in foods including eggs, milk, curd, cheese, butter, and fruits like papaya and mango.

**13. Give any four examples of luminous objects.**

Ans: The Sun, fire, the flame of a candle, and an electric lamp are examples of luminous objects.

**14. Describe regular reflection with the help of a diagram.**

**Ans:** Regular reflection is a reflection from a smooth surface such as a mirror. Regular reflection creates images.



**15. What is the function of the retina?**

**Ans:** The lens directs light to the retina, which includes a number of nerve cells. The nerve cells' sensations are subsequently transferred to the brain via the optic nerve.

**16. Given an example to show that reflected light can be reflected again.**

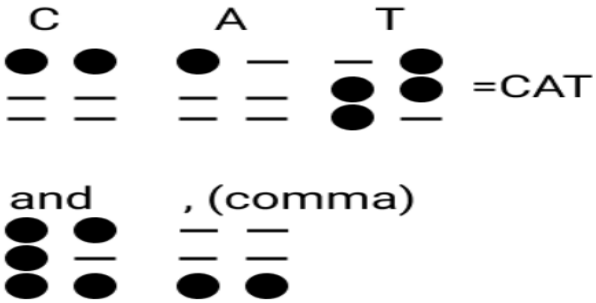
**Ans:** Stand in front of a mirror and tell a friend to hold a mirror behind you so you can see your haircut; your hair picture will appear in the mirror in front of you; this is the best example of reflected light returning to the source.

**17. Can we see objects in dark? Why?**

**Ans:** When light reflected by an object reaches our eyes, we can see it. However, when there is no light reflected by the object, we cannot see it.

**18. How does the braille system work?**

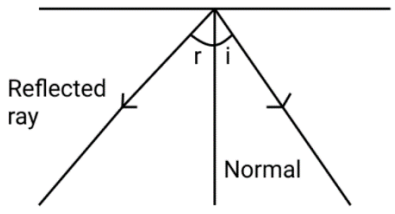
**Ans:** There are 63 dot patterns or characters in the Braille system. A letter, a combination of letters, a common word, or a grammatical sign is represented by each character. Dots are arranged in cells of two vertical rows of three dots each. Below are various dot patterns that symbolize English letters and common words.




When embossed on Braille sheets, these patterns assist visually impaired people in recognizing words by touch. The dots have been slightly right to make them easier to touch.

**19. Demonstrate an activity to show that the angle of incidence is always equal to the angle of reflection.**

**Ans:** On the paper, draw lines to illustrate the position of the plane mirror, incident ray, and reflected ray. At the place where the incident ray reaches the mirror, draw a line at a 90o angle to the line representing the mirror. The normal to the reflecting surface at that location is this line. The angle of incidence and the angle of reflection should be measured. Change the angle of incidence and repeat the activity multiple times. The angle of incidence is always equal to the angle of reflection when the experiment is accurately carried out.



**20. Write any five ways to take care of your eyes.**

**Ans:** i) Use appropriate eyewear if advised.

ii) It is harmful to the eyes to have too little or too much light. Eye strain and headaches are caused by insufficient light. The retina can be damaged by too much light, such as that of the Sun, a strong lamp, or a laser torch.

iii) Do not look directly at the Sun or bright light.

iv) Do not rub your eyes. If dust particles get into your eyes, rinse them out with clean water. If your condition does not improve, see a doctor.

v) Always read at a comfortable distance for your eyes. Avoid bringing the book too close to your eyes or keeping it too far away when reading.

## BITS

1. Which of the following material cannot be used to make a lens ?
(a) Plastics (b) Water (c) Clay (d) Glass

**Ans:** (c)

2. Which of the following would you prefer, to read very small letters printed on the pages of a dictionary ?
(a) A convex lens of focal length 100 cm (b) A concave lens of focal length 10 cm
(c) A concave lens of focal length 5 cm (d) A convex lens of focal length 5 cm

**Ans:** (d)

3. A pond of water appears shallow because of
(a) reflection (b) refraction (c) dispersion (d) none of these

**Ans:** (b)

4. The phenomenon of the splitting of white light into seven colours is called as
(a) dispersion (b) refraction (c) reflection (d) deviation

**Ans:** (a)

5. In air all colours propagate
(a) with different speed (b) nearly same speed
(c) with minimum speed of red colour (d) with maximum speed of violet colour

**Ans:** (b)

6. The phenomenon of dispersion is not visible in a
(a) prism (b) glass slab (c) mirror (d) none of these

**Ans:** (b)

7. If the refractive index is more then optical density is
(a) more (b) less (c) equal (d) independent of refractive index

**Ans:** (a)

8. On refraction through a parallel faced glass slab the emergent ray is
(a) parallel to incident ray (b) displaced w.r.t. incident ray
(c) is not displaced w.r.t. incident ray (d) both (a) and (b)

**Ans:** (d)

9. When a ray of light propagating (in a straight line) in one transparent medium to enter another transparent medium
(a) it gains speed (b) it losses speed (c) it neither gains nor losses speed
(d) its speed in second medium depends upon relative refractive index for a given pair

**Ans:** (d)

10. If lower half of a convex lens is painted black then
(a) no image is formed (b) only erect image is formed
(c) only diminished image is formed (d) image is formed but is of reduced intensity.

**Ans:** (d)

11. The change in focal length of an eye lens, to focus the image of objects at varying distances, is done by the action of
(a) pupil (b) iris (c) retina (d) ciliary muscles

**Ans:** (d)

12. The human eye can focus objects at different distances by adjusting the focal length of the eye lens. This ability of the eye is known as
(a) persistence of vision (b) far-sightedness (c) near-sightedness (d) power of accomodation
**Ans:** (d)

13. The least distance of distinct vision 'for a young adult with normal vision is (nearly)
(a) 25 m (b) 25 cm (c) 2.5 cm (d) 2.5 m
**Ans:** (b)

14. The Braille system, for visually challenged persons,, is a
(a) visual aid (b) auditory aid (c) tactual aid The eye lens is (d) electronic aid
**Ans:** (c).

15. The eye lens is
(a) concave (b) convex (c) plano concave (d) plano convex
**Ans:** (b)

16. Eye problems happen due to lack of
(a) Vitamin C (b) Vitamin D (c) Vitamin A (d) Vitamin B complex
**Ans:** (c)

17. The blind spot of the eye is
(a) at the junction of optic nerve and retina (b) on one side of optic nerve
(c) on one side of retina (d) in the centre of retina
**Ans:** (a)

18.The light sensitive cells having shape of cones
(a) respond mainly to colours of incident light (b) respond mainly to amount of incident light
(c) respond to both colour and amount of light (d) enables us to see in dark
**Ans:** (a)

19. A smooth shining surface, which rebounds the light back in same or in different direction, is called
(a) a mirror (b) a lens (c) reflection of light (d) point of incidence
**Ans:** (a) a mirror

20. Beam of light striking the reflecting surface is called
(a) reflecting ray (b) incident ray (c) refracted ray (d) normal ray
**Ans:** (b) incident ray

21. Band of seven colours is called
(a) VIBGYOR (b) spectrum (c) dispersion (d) reflection
**Ans:** (b) spectrum

22. Front balged part of the eyeball is called
(a) cornea (b) choroid (c) pupil (d) retina
**Ans:** (a) cornea

23. Which one of the following statements is correct regarding rods and cones in the human eye?
(a) Cones are sensitive to dim light (b) Cones are sensitive to bright light
(c) Rods are sensitive to bright light (d) Rods can sense colour
**Ans:** (b) Cones are sensitive to bright light

24. In case of reflection of light, the angle of incidence (i) and the angle of reflection (r) are related as
(a) i = r (b) i < r (c) i > r (d) no definite relation
**Ans:** (a) i = r

25. Name the type of mirror used as a backview mirror.
(a) Plane mirror (b) Concave mirror (c) Convex mirror (d) Any of these
**Ans:** (c) Convex mirror

26. Visually impaired people can read and write using
(a) electronic writer (b) digital pens (c) braille system (d) hearing aids
**Ans:** (c) braille system

27. The image formed by a camera and a simple microscope are respectively
(a) real and real (b) real and virtual (c) virtual and virtual (d) virtual and real

**Ans:** (b) real and virtual

28. What is the angle of incidence of a ray if the reflected ray is at an angle of 90° to the incident ray?
(a) 60° (b) 45° (c) 90° (d) 180°

**Ans:** (b) 45°

29. The splitting of white light into its seven constituent colours is called
(a) refraction (b) dispersion (c) deviation (d) reflection

**Ans:** (b) dispersion

30. The defect due to which a person is not able to see the distant objects clearly:
(a) Myopia (b) Hypermetropia (c) Cornea (d) Cataract

**Ans:** (a) Myopia

31. The amount of light entering the eye is controlled by
(a) eye lens (b) cornea (c) iris (d) ciliary muscle

**Ans:** (c) iris

32. Myopia can be corrected by using a
(a) concave lens (b) convex lens (c) opaque lens (d) micro lens

**Ans:** (a) concave lens

33. Light enters the eye through
(a) eye lens (b) pupil (c) cornea (d) retina

**Ans:** (c) cornea

34. If the angle of incidence of light falling on a plane mirror is 30°, what will be the angle of reflection?
(a) 90° (b) 60° (c) 30° (d) 0°

**Ans:** (c) 30°

35. When we stand in front of our dressing table, our left hand seems to be right and right seems to be left. This is called
(a) Left-right confusion (b) Lateral inversion (c) Up -side down phenomenon (d) mirage

**Ans:** (b) Lateral inversion

36. Light passing through a prism splits into seven colours. This is called
(a) Dispersion (b) Dissolution (c) Division (d) None of the above

**Ans:** (a) Dispersion

37. Rainbow is a natural phenomenon showing
(a) Reflection (b) Deflection (c) Dispersion (d) Diversion

**Ans:** (a) Reflection

38. In the retina of the eye, the area having no sensory cells is called
(a) iris (b) Blind spot (c) cornea (d) Dark spot

**Ans:** (b) Blind spot

39. If light falls perpendicularly on a plane mirror, what will be the angle in which it will be reflected?
(a) 45° (b) 90° (c) 180° (d) 360°

**Ans:** (c) 180°

40. Which of the following is not a luminous object?
(a) sun (b) candle (c) moon (d) Tube light

**Ans:** (c) moon

41. To make a kaleidoscope we require
(a) Three plane mirrors (b) Four plane mirrors (c) Three glass sheets (d) Four glass sheets

**Ans:** (a) Three plane mirrors

42. In our eye _____ cells can sense colour
(a) Rod (b) Cone (c) Both rod and cone (d) Neither rod nor cone

**Ans:** (b) Cone

43. An owl can see clearly at night but not day time because it has
(a) More rods and few cones (b) Less rod and more cones
(c) More rods and more cone (d) Less rods and less cones

**Ans:** (a) More rods and few cones

44. When all the parallel rays reflected from a rough or irregular surface are not parallel, the reflection is known

as _____.

(a) multiple reflections (b) regular reflection (c) lateral inversion (d) diffused reflection

**Ans:** (d) diffused reflection.

45. The angle between normal and incident rays is called the _____.

(a) angle of incidence (b) angle of reflection (c) angle of refraction (d) normal

**Ans:** (a) angle of incidence

46. Which part of the eye protects the interior from accidents?

(a) pupil (b) retina (c) cornea (d) rods

**Ans:** (c) cornea

47. Which one of the following works on the basis of multiple reflections?

(a) kaleidoscope (b) microscope (c) telescope (d) periscope

**Ans:** (a) kaleidoscope

48. Angle of incidence is _____equal to the angle of reflection

(a) Sometimes (b) Never (c) always (d) almost

**Ans:** (c) always

49. White light consist of _____ colours

(a) six (b) seven (c) eight (d) nine

**Ans:** (b) seven.

50. Match the following items given in Column A with that in Column 'B':

| **Column A** | **Column B** |
|---|---|
| (i) Cornea | (a) Transparent front part of eye |
| (ii) Pupil | (b) Layer on which impression of images is formed |
| (iii) Iris | (c) Point on retina where there are no nerve endings |
| (iv) Retina | (d) Sensitive for bright light |
| (v) Blind spot | (e) Is a small opening in the cornea |
| (vi) Rods | (f) Sensitive for dim light |
| (vii) Cones | (g) Controls the size of the pupil |

**Ans:** i-a, ii-e, iii-g, iv-b, v-c, vi-f, vii-d

**51. Fill in the blanks with the appropriate words:**

i) Impression of an image persists for ……. of the second on retina.

ii) Angle of reflection is always ……. to the angle of incidence.

iii) ……. is a small opening in the corner.

iv) Cones are sensitive to ……. light.

v) Muscles attached to the eye lens ……. and the lens becomes ……. when distant objects are to be seen.

vi) To keep our eyes fit our diet should include vitamin ……. rich eatables.

vii) Impression of an image in eye is formed on …….

viii) Braille system has ……. dot patterns.

**Ans:** i) $1/16^{th}$ ii) equal iii) Pupil iv) bright v) relax, thinner vi) A vii) retina viii) 63

**52. State whether the statements given below are True or False:**

a) Both incident ray and reflected ray lie in the same plane.

b) Diffused reflection is due to the failure of the laws of reflection.

c) The image formed by plane mirror is laterally inverted.

d) The iris is the coloured part of the eye.

e) Rods are sensitive to bright light.

f) Changing of the thickness of the eye lens is called accommodation.

**Ans:** a) True b) False c) True d) True e) False f) True

# CHAPTER - 8

# CHEMICAL EFFECTS OF ELECTRIC CURRENT

- **Do Liquids Conduct Electricity?**
- **Chemical Effects of Electric Current**
- **Electroplating**

## IMPORTANT POINTS

1. Some liquids are good conductors of electricity and some are poor conductors
2. Most liquids that conduct electricity are solutions of acids, bases and salts.
3. LED means Light Emitting Diodes
4. Electrode is the metallic rod/conductor through which electricity enters or leaves an electrolyte.
5. Electroplating is an example of a chemical effect of current.
6. Electroplating is a very useful process. It is widely used for coating many metal objects and parts with a thin layer of a different metal.

## DEFINITIONS

1. **Good Conductors:** The materials, which allow electric current to pass through them, are good conductors of electricity.
2. **Poor Conductors or Insulators:** The materials, which do not allow electric current to pass through them easily, are poor conductors of electricity.
3. **Electroplating:** The process of depositing a layer of any desired metal on another material by means of electricity is called electroplating.
4. **Chemical effects of currents:** The passage of an electric current through a conducting liquid causes chemical reactions. The resulting effects are called chemical effects of currents

## TEXTUAL QUESTIONS

**1. Fill in the blanks.**

**(a) Most liquids that conduct electricity are solutions of _____ , _____ and _____**

**(b) The passage of an electric current through a solution causes _____ effects.**

**(c) If you pass current through copper sulphate solution, copper gets deposited on the plate connected to the _____ terminal of the battery.**

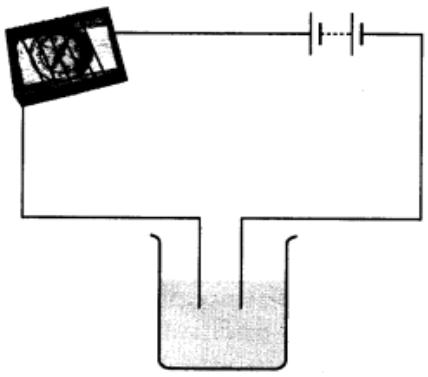
**(d) The process of depositing a layer of any desired metal on another material by means of electricity is called _____**

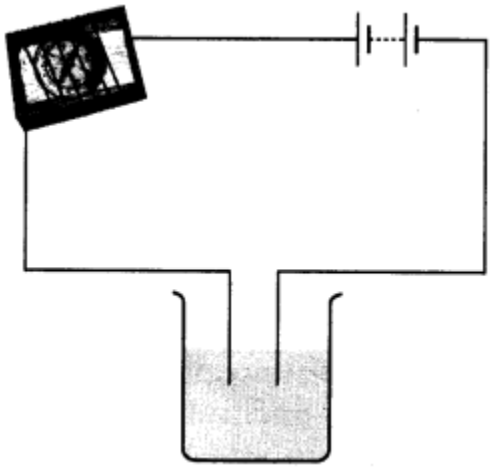
**Ans:** (a) acids, bases, salts (b) chemical (c) negative (d) electroplating

**2. When the free ends of a tester are dipped into a solution, the magnetic needle shows deflection. Can you explain the reason?**

**Ans:** The deflection in magnetic needle shows that the circuit is complete and the solution conducts electricity, i.e., it is a good conductor.

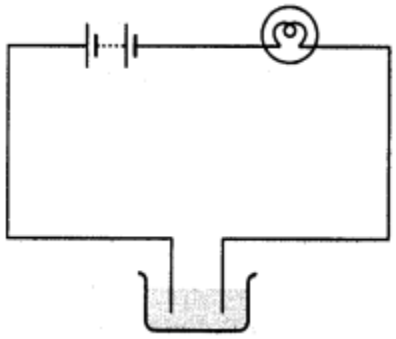
**3. Name three liquids, which when tested in the manner shown in Fig. 8.5. may cause the magnetic needle to deflect.**





**Ans:** Sodium chloride solution, lemon juice and tap water.

**4. The bulb does not glow in the setup shown in Fig. 8.6. List the possible reasons. Explain your answer.**



**Ans:** The bulb may not glow because of the following reasons:
(i) The wires in the circuit may be loosely connected.
(ii) The bulb may be fused.
(iii) The cells may be used up.
(iv) The liquid may be an insulator, i.e., a poor conductor of electricity.

**5. A tester is used to check the conduction of electricity through two liquids, labelled A and B. It is found that the bulb of the tester glows brightly for liquid A while it glows very dimly for liquid B. You would conclude that**
**(i) liquid A is a better conductor than liquid B.**
**(ii) liquid B is a better conductor than liquid A.**
**(iii) both liquids are equally conducting.**
**(iv) conducting properties of liquid cannot be compared in this manner.**

**Ans:** (i) liquid A is a better conductor than liquid B.

**6. Does pure water conduct electricity? If not, what can we do to make it conducting?**

**Ans:** No, pure water doesn't conduct electricity. But when salt is dissolved in pure water, it conducts electricity.

**7. In case of a fire, before the firemen use the water hoses, they shut off the main electrical supply for the area. Explain why they do this.**

**Ans:** The water used in the water hoses is not pure water and is a good conductor of electricity. So, the fire men shut off the electric supply before spraying water to save themselves and other people from electrocution.

**8. A child staying in a coastal region test the drinking water and also the seawater with his tester. He finds that the compass needle deflects more in the case of seawater. Can you explain the reason?**

**Ans:** The seawater contains a huge amount of salts in comparison to drinking water, hence the seawater is a

better conductor of electricity and it produces a stronger magnetic field in the wire and hence deflects the compass needle more.

**9. Is it safe for the electrician to carry out electrical repairs outdoors during heavy downpour? Explain.**

**Ans:** No, it is highly dangerous to carry out the electrical repairs outdoors during the heavy downpour. It can cause electrocution, as water is a good conductor of electricity.

**10. Paheli had heard that rainwater is as good as distilled water. So she collected some rainwater in a clean glass tumbler and tested it using a tester. To her surprise, she found that the compass needle showed deflection. What could be the reasons?**

**Ans:** Rainwater is pure water which is an insulator but it gets mixed with air pollutants like sulphur dioxide and nitrogen oxides and form acidic solution, which is a good conductor of electricity. So, the compass needle showed deflection.

**11. Prepare a list of objects around you that are electroplated.**

**Ans:** Objects that are electroplated are door handles, taps, rims of cycles, showers, the handlebar of cycles and bikes, gas burner, tin cans, metallic almirahs, buckles of belts, etc.

**12. The process that you saw in Activity 14.7 is used for purification of copper. A thin plate of pure copper and a thick rod of impure copper are used as electrodes. Copper from impure rod is sought to be transferred to the thin copper plate. Which electrode should be attached to the positive terminal of the battery and why?**

**Ans:** The thick rod of impure copper plate is to be attached to the positive terminal of the battery because when electric current is passed through the copper sulphate solution, it gets dissociated into copper and sulphate. The free copper, being positively charged, gets drawn to the negative terminal of the battery and gets deposited on it. On the other hand the loss of copper from the solution is regained from the impure copper rod which is attached to the positive terminal of the battery.

## Extended Learning — Activities and Projects

**1.** Test the conduction of electricity through various fruits and vegetables. Display your result in a tabular form.

**Ans:** The conduction test of fruits and vegetable shows the following results.

Fruits such as oranges, apples, peach, and grapes are good conductors of electricity whereas fruits like kiwi, banana, Papaya, pineapple are poor conductors of electricity.

On the other hand, vegetables such as lemon, tomatoes, carrot, and reddish are good conductors of electricity whereas onion, cabbage, cauliflower are poor conductors of electricity.

**2.** Repeat Activity 8.7 with a zinc plate in place of the copper plate connected to the negative terminal of the battery. Now replace zinc plate with some other metallic object and again repeat the activity. Which metal gets deposited over which other metal? Discuss your findings with your friends.

**Ans:** When we take Zinc plate as negative electrode, copper ions are deposited on Zn plate(the process is called electroplating). Similarly, the copper ions will be deposited on the plate taken as negative electrode.

**3.** Find out if there is a commercial electroplating unit in your town. What objects are electroplated there and for what purpose? (The process of electroplating in a commercial unit is much more complex than what we did in Activity 8.7). Find out how they dispose off the chemicals they discard.

**Ans:** Students find commercial electroplating unit in local area. Electroplating is a very common and effective method to check corrosion or rusting. The surface of iron metal is coated with chromium, nickel or aluminium etc. The are quite resistant to the attack by both air and water and check corrosion. If the surface of metal is electroplated by zinc, it is known as galvanization.

Electroplating wastes are potentially hazardous to human health and environment. Hazardous solvents, liquids are managed by a hazardous waste transporter and a treatment or disposal company in accordance with hazardous waste requiremnts.

**4.** Imagine that you are an ‘entrepreneur’ and have been provided a loan by a bank to set up a small electroplating unit. What object would you like to electroplate and for what purpose? (Look up the meaning of ‘entrepreneur’ in a dictionary).

**Ans:** I will like to electroplate artificial jewelers items with gold and silver to make them attractive and to sell them.

**5.** Find out the health concerns associated with chromium electroplating. How are people trying to resolve

them?

Ans: Effluents discharged from Chromium electroplating contains large number of metals including nickel, zinc, copper, chromium, manganese and lead.

Adverse effects on health:

i) Cancer ii) Respiratory tract infection iii) Acne

iv) Pimple v) Tooth decay vi) Baldness etc

To resolve the above problem followings things are followed:

i) Non chromium alternative : nickel, tin, cobalt etc ii) Mild steel iii) Use of water insoluble chromium.

**6.** You can make a fun pen for yourself. Take a conducting metal plate and spread a moist paste of potassium iodide and starch. Connect the plate to a battery as shown in Fig. 8.11. Now using the free end of the wire, write a few letters on the paste. What do you see?

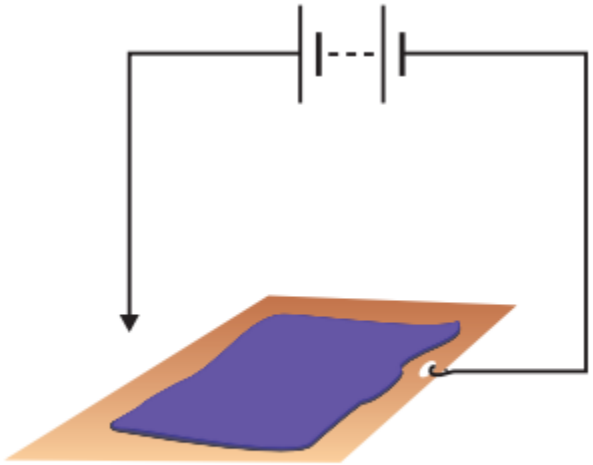


*Fig. 8.11*

**Ans:** Activity for home

## ADDITIONAL QUESTIONS

**1. Name the effect of current responsible for the glow of the bulb in an electric circuits.**

**Ans:** Heating effect of electric circuit.

**2. Why is tin electroplated on iron to make cans used for storing food?**

**Ans:** Tin is less reactive than iron. Tin coating prevents food from coming in contact with iron and thus prevents it from getting spoiled.

**3. What is the application of chemical effect of electricity in our daily life? Give examples.**

**Ans:** i) Electroplating: One metal is coated on the other substance or metal by the effect of electric current. This is called electroplating.

ii) Electrolysis: The compound is decomposed into its constituents under the effect of electric current. This phenomenon is called electrolysis.

**4. Why is a layer of zinc coated over iron?**

**Ans:** A coating of zinc is provided to protect iron from corrosion and rust.

**5. Why is chromium used for electroplating? Why the objects which have chromium plating are not made of chromium itself?**

Ans: Chromium has a shiny appearance. It does not corrode. It resists scratches. However, chromium is expensive and it may not be economical to make the whole object out of chromium. So the object is made from a cheaper metal and only a coating of chromium over it is deposited.

**6. When the free ends of a tester are dipped into a solution, the magnetic needle shows deflection. Can you explain the reason?**

**Ans:** The deflection in the magnetic needle of a compass shows that current is flowing through the wire, i.e., through the circuit. This shows that the circuit is complete since the free ends of the tester are dipped in a conducting solution. A conducting solution allows electric current to pass through it and, as a result, the magnetic needle shows a deflection.

**7. Does pure water conduct electricity? If not, what can we do to make it conduct?**

**Ans:** No, pure water does not conduct electricity as it is a poor conductor of electricity. Pure water (distilled water) is devoid of any salts. They can conduct electricity when a small amount of common salt is added to them, as the salt solution allows electricity to pass through.

**8. In case of a fire, before the firemen use the water hoses, they shut off the main electrical supply of the area. Explain why they do this.**

**Ans:** Water usually contains salts and has the ability to conduct electricity. If the area's electrical supply is not turned off and water is poured on electrical appliances, electricity may pass through the water. Electricity may harm firemen if they come in contact with wet electrical switches, electric wires, and other electrical appliances. They may get electrocuted. That is why, in the case of a fire, the main electrical supply for the area is shut off before they use the water hoses, to prevent the firemen from electrocution.

**9. A child staying in a coastal region test the drinking water and also the seawater with his tester. He finds that the compass needle deflects more in the case of seawater. Can you explain the reason?**

**Ans:** The amount of dissolved salts present in the seawater is more than the water we use for drinking purposes. As a result, seawater will conduct electricity better than drinking water. So, the compass needle shows more deflection in seawater than in drinking water.

**10. Is it safe for the electrician to carry out electrical repairs outdoors during heavy downpours? Explain.**

**Ans:** No, it is not safe for an electrician to work on electrical appliances outdoors during a heavy downpour. This is because rainwater contains a small number of dissolved salts and acids, making it a good conductor of electricity. So, the electrician may get electrical shocks while working outdoors during heavy rains or downpours.

**11. Paheli had heard that rainwater is as good as distilled water. So, she collected some rainwater in a clean glass tumbler and tested it using a tester. To her surprise, she found that the compass needle show deflection. What could be the reasons?**

**Ans:** Rainwater contains a small number of dissolved salts and impurities, making it a good conductor of electricity. Distilled water does not contain any dissolved salts or impurities; thus, it is a poor conductor of electricity. Hence, due to the presence of these salts and impurities, rainwater can allow electricity to pass through it and cause a deflection in the compass needle, while distilled water cannot.

**12. Prepare a list of objects around you that are electroplated.**

**Ans: Chromium plating:** This is done on different parts of cars, motorcycles, and buses, to give them a shiny appearance.

**Gold Plating:** A thin layer of gold is deposited by electroplating on the silver ornaments and they are called gold-plated ornaments.

**Zinc plating:** Iron used in constructing buildings, bridges, and automobiles is coated with a layer of zinc (galvanization). This provides strength and protects the iron from corrosion and rusting.

## BITS

1. The decomposition of an electrolyte when electricity is passed through it, is called
   (a) conduction (b) coating (c) electrolysis (d) electro refining

**Ans:** (c).

2. Which out of the following does not conduct electricity ?
   (a) Copper (b) Alcohol (c) Dilute sulphuric acid (d) Vinegar

**Ans:** (b)

3. The electrode, connected to the positive terminal of a battery, is called
   (a) anode (b) pole (c) cathode (d) photodiode

**Ans:** (a)

4. A metal is released in the electrolysis of a salt. It gets deposited on the
   (a) anode (b) cathode (c) half on the anode and half on the cathode (d) sides of the container

**Ans:** (b)

5. Distilled water is a
   (a) conductor (b) insulator (c) semi-conductor (d) semi-insulator

**Ans:** (b)

6. A cell is an example of conversion of
   (a) magnetic energy into chemical energy (b) electrical energy into chemical energy
   (c) chemical energy into electrical energy (d) chemical energy into magnetic energy

**Ans:** (c)

7. Which one of the following is a weak electrolyte?
   (a) Sea water (b) Oxalic acid (c) Sodium chloride (d) Nitric acid

**Ans:** (b)

8. Which of the following metal is not extracted by electrolysis?
   (a) Aluminium (b) Iron (c) Sodium (d) Potassium

**Ans:** (b)

9. Which of the following is a bad conductor of electricity?
   (a) Distilled water (b) Silver nitrate (c) Sulphuric acid (d) Copper sulphate

**Ans:** (a) Distilled water

10. Which of the following does not conduct electricity?
   (a) Sugar solution (b) Vinegar solution (c) Lemon juice solution (d) Caustic soda solution

**Ans:** (a) Sugar solution

11. An electric current can produce
   (a) heating effect (b) chemical effect (c) magnetic effect (d) all of these

**Ans:** (d) all of these

12. Pure or distilled water is a
   (a) poor conductor (b) good conductor (c) both (a) and (b) (d) none of these

**Ans:** (a) poor conductor

13. Which of the following is a good conductor?
   (a) Brick (b) Steel (c) Plastic (d) Cotton

**Ans:** (b) Steel

14. Polythene is
   (a) a conductor (b) an insulator (c) both (a) and (b) (d) none of these

**Ans:** (b) an insulator

15. Electroplating is based on
   (a) heating effect of electricity (b) chemical effect of electricity
   (c) physical effect of electricity (d) magnetic effect of electricity

**Ans:** (b) chemical effect of electricity

16. Copper is
   (a) a good conductor (b) an insulator (c) both (a) and (b) (d) none of these

**Ans:** (a) a good conductor

17. Waste from an electroplating factory must be disposed off
   (a) in the nearby river (b) in the nearby pond
   (c) in the nearby cornfield (d) according to the disposal guidelines of Waste Management Bodies

**Ans:** (d) according to the disposal guidelines of Waste Management Bodies

18. An electrolyte is
   (a) a metal (b) a liquid that conducts current (c) a non-metal (d) none of these

**Ans:** (b) a liquid that conducts current

19. Flow of electron is called
   (a) electrolyte (b) electroplating (c) electrodes (d) electric current

**Ans:** (d) electric current

20. Which is not a non-electrolyte?
   (a) Ethyl alcohol (b) Sodium chloride (c) Urea (d) Sodium solution

**Ans:** (b) Sodium chloride

21. An electric lamp glows due to
   (a) heating effect (b) magnetic effect (c) chemical effect (d) physical effect

**Ans:** (a) heating effect

22. Electroplating prevents
(a) corrosion (b) passing of current (c) dissociation (d) shining

**Ans:** (a) corrosion

23. Which of the following is not used for electroplating metal articles?
(a) Nickel (b) Silver (c) Chromium (d) Sodium

**Ans:** (d) Sodium

24.Iron objects can be protected by electroplating them with
(a) chromium (b) nickel (c) zinc (d) all of these

**Ans:** (d) all of these

25. In LEDs, the longer lead (wire) is always connected to the _____ terminal
(a) negative (b) neutral (c) positive (d) Any terminal

**Ans:** (c) positive

26. Tap water is a good conductor of electricity while distilled water is not because
(a) Tap water contain salts (b) Distilled water do not contain salt
(c) Only (a) is correct (d) Both (a) & (b) is correct

**Ans:** (b) Distilled water do not contain salt

27. When electrodes are immersed in water and electricity passed, the bubbles formed on the positive terminal is actually _____ gas.
(a) Hydrogen (b) Carbon dioxide (c) Oxygen (d) Nitrogen

**Ans:** (c) Oxygen

28. When electrodes are immersed in water and electricity passed, the bubbles formed on the negative terminal is actually _____ gas.
(a) Hydrogen (b) Carbon dioxide (c) Oxygen (d) Nitrogen

**Ans:** (a) Hydrogen

29. Why do we add little dilute sulphuric acid to copper sulphate solution during electroplating?
(a) To increase acidity (b) To increase conductivity
(c) So that the colour becomes more prominent (d) To burn copper sulphate

**Ans:** (b) To increase conductivity

30. A coating of _____is deposited on iron to protect it from corrosion and formation of rust
(a) copper (b) aluminium (c) Zinc (d) silver

**Ans:** (c) Zinc

31. Chromium plating is done on many objects such as car parts, bath taps, kitchen gas aluminum. Why?
(a) It does not corrode but prevents scratches (b) It looks beautiful
(c) It costs less (d) Articles can be sold at higher price

**Ans:** (a) It does not corrode but prevents scratches

32. The process of depositing a layer of any desired metal on another material by means of electricity is called
(a) Electric plating (b) Electroplating (c) Electric depositing (d) None of the above

**Ans:** (b) Electroplating

33. Some liquids are good conductors of electricity and some are poor conductors. Which one is a poor conductor?
(a) Acidic solution (b) Alkaline solution (c) Common Salt solution (d) Distilled water

**Ans:** (d) Distilled water

34. Tin cans, used for storing food, are made by electroplating tin onto iron. Why?
(a) Tin gives a shiny appearance (b) To make the vessel cheap
(c) Tin is less reactive than iron. (d) To make the vessel lighter

**Ans:** (c) Tin is less reactive than iron.

35. A tester is used to check the conduction of electricity through two liquids, labelled A and B. It is found that the bulb of the tester glows brightly for liquid A while it glows very dimly for liquid B. You would conclude that
(a) liquid A is a better conductor than liquid B. (b) liquid B is a better conductor than liquid A.
(c) Both liquids are equally conducting.

(d) Conducting properties of liquid cannot be compared in this manner.

**Ans:** (a) Liquid A is a better conductor than liquid B.

36. Match the items given in column I suitably with those given in column II.

| Column I | Column II |
|---|---|
| 1. Closed path | (a) Good conductor |
| 2. LED | (b) Deflection of compass |
| 3. Carbon rod | (c) Positively charged ion |
| 4. Galvanisation | (d) Poor conductor of electricity |
| 5. Distilled water | (e) Coating with zinc |
| 6. Salt solution | (f) Electrodes |
| 7. Cation | (g) Light emitting diodes |
| 8. Magnetic effect of current | (h) Electric circuit |
| 9. Chromium | (i) Negatively charged ion |
| 10. Anion | (j) Electroplating |

**Ans:** 1-h, 2-g, 3-f, 4-e, 5-d, 6-a, 7-c, 8-b, 9-j, 10-i

**37. Fill in the blanks with suitable word/s.**

i) A cation has _____ charge.

ii) Distilled water when mixed with salts becomes a _____ conductor of electricity.

iii) Light emitting diodes (LED) glow even when a _____ electric current flows through it.

iv) The passage of an electric current through a conducting solution causes _____.

v) Change in colour is an example of the _____ effect of current.

vi) In an LED, the longer lead is attached to the _____ terminal of the battery and the shorter lead to the _____ terminal.

vii) Chromium has a _____ appearance.

viii) Iron tends to _____ and _____.

ix) A coating of _____ is deposited on iron to protect it from corrosion and formation of rust.

x) An electric lamp glows due to _____ effect of electric current.

xi) Electrodes are _____.

xii) The deflection in _____ shows that current is passing.

**Ans:** i) positive ii) good iii) weak iv) chemical reaction v) chemical vi) positive, negative vii) shiny viii) corrode, rust ix) zinc x) heating xi) conductors xii) magnetic compass

**38. State whether the given statements are true or false.**

a) All liquids conduct electricity.

b) Distilled water is free of salt.

c) Most liquids that conducts electricity are solutions of acids, bases and salts.

d) Electroplating is based on magnetic effect of electricity.

e) Small amount of some mineral salts are naturally present in water.

f) Chromium is carcinogenic.

g) An electric bulb glows due to chemical effect of electricity.

h) LED is an electric bulb which is used in a tester.

i) Electric current produces a magnetic effect.

j) Jewellery makers electroplate silver and gold on expensive metals.

k) Electroplating wastes are useful to human health and environment.

**Ans:** a) False b) True c) True d) False e) True f) True g) False h) True i) True j) False k) False

## Textual Table

Table 8.1 : Good/Poor Conducting Liquids

| Test Tube Label | Metal/ Non-metal | Reaction with Dilute Hydrochloric Acid | | Reaction with Dilute Sulphuric Acid | |
|---|---|---|---|---|---|
| | | Room Temperature | Warm | Room Temperature | Warm |
| A. | Magnesium (ribbon) | Reacts to give hydrogen | Rapid reaction | Reacts to give hydrogen | Rapid reaction |
| B. | Aluminium (foil) | Reacts to give hydrogen | Rapid reaction | Reacts to give hydrogen | Rapid |
| C. | Iron (filings) | Reacts to give hydrogen | Rapid reaction | Reacts to give hydrogen | Rapid |
| D. | Copper (Peeled flexible wire) | No reaction | No reaction | No reaction | No reaction |
| E. | Charcoal (powder) | No reaction | No reaction | No reaction | No reaction |
| F. | Sulphur (powder) | No reaction | No reaction | No reaction | No reaction |

# CHAPTER - 9

# SOME NATURAL PHENOMENA

- **Lightning**
- **Charging by Rubbing**
- **Types of Charges and Their Interaction**
- **Transfer of Charge**
- **The Story of Lightning**
- **Lightning Safety**
- **Earthquakes**

## IMPORTANT POINTS

1. In 1752 Benjamin Franklin, an American scientist, showed that lightning and the spark from your clothes are essentially the same phenomena.
2. Some objects can be charged by rubbing with other objects.
3. There are two kinds of charges — positive charge and negative charge.
4. Like charges repel and unlike charges attract each other.
5. When charges move, they constitute an electric current.
6. The electrical charges generated by rubbing are static.
7. Electroscope is a device used to test whether an object is carrying charge or not.
8. Earthing is provided in buildings to protect us from electrical shocks due to any leakage of electrical current.
9. Lightning and Earthquake are examples of natural phenomena.
10. Lightning strike could destroy life and property.
11. Lightning conductors can protect buildings from the effects of lightning.
12. An earthquake is a sudden shaking or trembling of the earth.
13. Earth has three layers. They are crust, mantle and core.
14. Earthquakes are caused by the movement of plates, the boundaries of the plates are the weak zones where earthquakes are more likely to occur.
15. Earthquake is caused by a disturbance deep inside the earth's crust.
15. Destructive energy of an earthquake is measured on the Richter scale.
16. Really destructive earthquakes have magnitudes higher than 7 on the Richter scale.
17. It is not possible to predict the occurrence of an earthquake.

## DEFINITIONS

1. **Charged objects:** When a object is rubbed with another, it acquires a small electric charge. These objects are called charged objects.
2. **Static electricity:** The chemical charge generated by rubbing is called static electricity.
3. **Negative charge:** When the charge of an object is due to excess of electrons, it is called negative charge
4. **Positive charge:** When the charge of an object is due to loss of electrons, it is called positive charge.
5. **Earthing:** The process of transfer of charges from a charged object to the earth is called earthing.
6. **Lightning:**The process of electric discharge between clouds and the earth or between different clouds is called lightning.
7. **Earthquake:** An earthquake is a sudden shaking or trembling of the earth.
8. **Earth's plate:** The outermost layer of the earth is not in one piece. It is fragmented. Each fragment is called a plate.
9. **Fault zones:** Earthquakes tend to occur at the boundaries of earth's plates. These boundaries are known as fault zones
10. **Richter scale:** The power of an earthquake is expressed in terms of magnitudes on a scale called Richter scale.
11. **Seismograph:** The seismic waves are recorded by an instrument in the form of graph called the

seismograph.

## TEXTUAL QUESTIONS

Select the correct option in Questions 1 and 2.

**1. Which of the following cannot be changed easily by friction?**

(a) A plastic scale (b) A copper rod
(c) An inflated balloon (d) A woollen cloth

**Ans:** (b) A copper rod

**2. When a glass rod is rubbed with a piece of silk cloth the rod**

(a) and the cloth both acquire a positive charge.
(b) becomes positively charged while the cloth has a negative charge.
(c) and the cloth both acquire a negative charge.
(d) becomes negatively charged while the cloth has a positive charge

**Ans:** (b) becomes positively charged while the cloth has a negative charge.

**3. Write T against true and F against false in the following statements.**

(a) Like charges attract each other.
(b) A charged glass rod attracts a charged plastic straw.
(c) Lightning conductor cannot protect a building from lightning.
(d) Earthquakes can be predicted in advance.

**Ans:** (a) False (b) True (c) False (d) False

**4. Sometimes, a crackling sound is heard while taking off a sweater during winters. Explain.**

Ans: The electric discharge takes place between the body and the sweater due to friction. At the time of electric discharge some energy is released. In this case energy is released in the form of crackling sound.

**5. Explain why a charged body loses its charge if we touch it with our hand.**

**Ans:** Human body is a conductor of electricity. When a charged body is touched with hand, our body conducts its charges to the earth. Hence, by this way charged body loses its charge.

**6. Name the scale on which the destructive energy of an earthquake is measured. An earthquake measures 3 on this scale. Would it be recorded by a seismograph? Is it likely to cause much damage?**

**Ans:** The destructive energy of an earthquake is measured on a scale called the Richter Scale.
Yes, it would be recorded by seismograph because this scale has the readings from 1 to 10. No it is not likely to cause much damage as earthquakes of magnitude higher than 5 is considered destructive in nature.

**7. Suggest three measures to protect ourselves from lightning.**

**Ans:** (i) Do not use TV or cable phone during lightning.
(ii) Stay indoor or under covered area.
(iii) Don't take bath during lightning.

**8. Explain why a charged balloon is repelled by another charged balloon whereas an uncharged balloon is attracted by another charged balloon?**

**Ans:** A charged balloon is repelled by another charged balloon because both carry same type of charges. On the other hand, an uncharged balloon is attracted by another charged balloon as they have opposite charges. We know that same charges repel and opposite charges attract each other.

**9. Describe with the help of a diagram an instrument which can be used to detect a charged body.**

**Ans:** Electroscope is a device which is used to detect the charge on a body. It works on the principle that like charges repel each other while unlike charges attract each other. It consists of a metal rod with thin metal strip or leaf attached to it at the bottom.

At the top, the metal rod enters in a metallic cup or disc. The bottom of the rod and the metal leaf are enclosed in a glass box for protection. When the disc of the electroscope is touched with a charged ebonite or glass rod, the metal leaves open out or diverge.

The extent of divergence depends upon the amount of charge on the electroscope. When the metal strips repel each other proves that the body is charged because repulsion is the sure test to detect that body is charged or not through an electroscope.

*A simple electroscope*

**10. List three states in India where earthquakes are more likely to strike.**

**Ans:** Kashmir, Rajasthan and Gujarat.

**11. Suppose you are outside your home and an earthquake strikes. What precaution would you take to protect yourself?**

**Ans:** (i) Move to open space. Find a clean spot away from buildings, trees and overhead power lines. Drop to the ground.

(ii) If we are in a car or a bus, will not come out. Drive slowly to a clear spot and remain in it till the earthquake stops.

**12. The weather department has predicted that a thunderstorm is likely to occur on a certain day. Suppose you have to go out on that day. Would you carry an umbrella? Explain.**

**Ans:** No, it is not advisable to carry an umbrella at all. Its metallic objects are more prone to lightning stroke. So an umbrella increases the risk.

## Extended Learning — Activities and Projects

**1.** Open a water tap. Adjust the flow so that it forms a thin stream. Charge a refill. Bring it near the water stream. Observe what happens. Write a short report on the activity.

**Ans:** Water stream is attracted towards the charged refill. It is just like the attraction of pieces of papers by the charged comb.

**2.** Make your own charge detector. Take a paper strip roughly 10 cm × 3 cm. Give it a shape as shown in Fig. 9.15. Balance it on a needle. Bring a charged body near it. Observe what happens. Write a brief report, explaining its working.

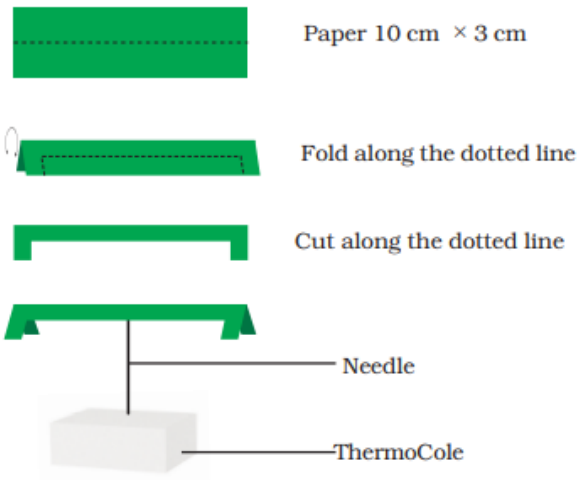



*Fig. 9.15*

**Ans:** Paper strips will open when we touch one side of the paper with a charged rod. This is because the two sides of paper strips get the same type of charge from the charged rod and thus they repel each other.

**3.** This activity should be performed at night. Go to a room where there is a fluorescent tube light. Charge a balloon. Switch off the tube light so that the room is completely dark. Bring the charged balloon near the tubelight. You should see a faint glow. Move the balloon along the length of the tube and observe how the glow changes. Caution : Do not touch the metal parts of the tube or the wires connecting the tube with the mains.

**Ans:** Activity for home

**4.** Find out if there is an organisation in your area which provides relief to those suffering from natural disaster. Enquire about the type of help they render to the victims of earthquakes. Prepare a brief report on the problems of the earthquake victims.

**Ans:** Following are the organizations involved in providing the relief from the natural disaster:

i) Food and Agriculture Organization(FAC) Provides the food supply during the crisis.

ii) International Organization for Migration(IOM) helps transfer refugees, internally displaced persons

iii) United Nations Children's Emergency Fund (UNICEF) works to uphold children's rights, survival, development and protection by intervening in health, education, water, sanitation, hygiene and protection.

iv) World Health Organization (WHO) provides global public health leadership by setting standards, monitoring health trends, and providing direction on emergency health issues.

Following are the problems faced by victims of earthquake:

i) It causes massive damage of infrastructure of the place due to which homes of people are destroyed.

ii) Lots of injuries occur due to cuts and falling of trees, electric poles, and buildings on victims.

iii) Scarcity of food due to destruction of crops and vegetables in fields of farmers.

iv) Lack of money due to shut down of Banks and ATM.

v) Loss of study due to closing of colleges and schools.

## ADDITIONAL QUESTIONS

**1. If air and cloud were good conductors of electricity, do you think lightning could occur? Explain.**

**Ans: No, lightning will not occur** because the separation of charges cannot take place in conductors. Hence charges will not accumulate on clouds and lightning cannot take place.

**2. During the construction of a building the lightning conductor was left hanging in the air by mistake. Would the lightning conductor be still effective? Explain?**

**Ans:** Lightning conductor will not work, if left hanging in the air because in order to work, it must be connected to the ground by using any metal (copper) plate, so that the charge can pass through it to the ground.

**3. Explain how lightning conductor protects a building from getting struck by lightning.**

**Ans:** Lightning conductor does not allow the charge to accumulate on a building as it conducts the charge to the earth, protecting building from being struck by lightning.

**4. Explain why it is safer to use a wireless telephone instead of a landline telephone during lightning.**

**Ans:** Lightning is an electrical discharge. During lightning atmospheric electric charge may discharge landline phone wires and may become dangerous. Therefore, it is safer to use a wireless telephone instead of a landline telephone during lightning.

**5. Mention three precautions that you will take to protect yourself if earthquake strikes when you are inside the house.**

**Ans:** i) Take shelter under a table and stay there till the striking stops

ii) Stay away from tall and heavy objects that may fall on you.

iii) If you are in bed, do not get up. Protect your head with a pillow.

**6. What is the main purpose of providing earthing in buildings?**

**Ans:** There may be an accidental or unattended leakage of electric current in buildings.Also during monsoons, there are chances of a live wire coming in contact with the building wall. In such cases, earthing helps to divert the path of the current to earth in order to protect us from getting an electric shock. Therefore, the main purpose of providing earthing in buildings is to protect ourselves from electrical shocks due to any leakage of electrical current.

**7. Why does a plastic comb rubbed with dry hair attract tiny pieces of paper?**

**Ans:** Plastic comb gets electrically charged due to rubbing & therefore it attracts tiny pieces of paper which are

neutral, as a charged body can attract an uncharged body.

**8. What do you mean by lightning conductor?**

**Ans:** Lightning conductor is a device used to protect tall buildings from the damaging effects of lightning. It runs from the top to the bottom, along the outer wall or any other object of the building, which is to be protected. If lightning strikes the building or any other objects, then the lightning conductor provides an easy and direct path for the lightning bolt to pass to the ground without affecting them.

**9. What are the uses of an electroscope?**

**Ans:** a) To detect & measure the charge on a body. b) To determine the nature of charge on a body.

**10. What causes an earthquake?**

**Ans:** The tectonic plates are in continual motion, when they brush past each other a plate goes under another because of collision, and that causes a disturbance in earth's crust, this disturbance shows up as an earthquake on the surface of earth. Volcanic eruptions can also be a cause of tremors over the earth's surface.

**11. How is an earthquake measured?**

**Ans:** The power of an earthquake is measured in terms of a magnitude on a scale called the Richter scale. Really destructive earthquakes have magnitudes higher than 7 on the Richter scale.

**12. Why a copper rod cannot be charged by friction, if held by hand?**

**Ans:** Copper is a conducting item, and the electric charge created on its surface by rubbing with another substance. flows through our fingers and body into the soil, while it is left uncharged.

**13. Explain the process of occurrence of lightning.**

**Ans:**During the development of a thunderstorm, the air currents move upward while the water droplets move downward. These vigorous movements cause separation of charges. The positive charges are collected near the upper edges of the clouds while the negative charges accumulate near the lower edges. There is accumulation of positive charges near the ground also. When the magnitude of the accumulated charges becomes very large, the air which is normally a poor conductor of electricity, is no longer able to resist their flow. Negative and positive charges meet, producing streaks of bright light and sound. We see streaks as lightning. This process is called an electric discharge. The process of electric discharge can occur between two or more clouds, or between clouds and the earth.

**14. Explain the precautions to be taken during a lightning or thunderstorm.**

**Ans:** i) We have to find a safe place indoors: Outdoor places are not safe during lightning and thunderstorms. A house or a building is a safe place. If we are travelling by car or by bus, we are safe inside with windows and doors of the vehicle shut.

ii) Carrying an umbrella is not at all a good idea during thunderstorms. If in a forest, take shelter under shorter trees. If no shelter is available and we are in an open field, stay far away from all trees. Stay away from poles or other metal objects.

iii) We should not lie on the ground. Instead, squat low on the ground. Placing hands on knees with head between the hands. This position will make us the smallest target to be struck.

iv) Inside the house, lightning can strike telephone cords, electrical wires and metal pipes. During a thunderstorm contact with these should be avoided. It is safer to use mobile phones and cordless phones. However, it is not wise to call up a person who is receiving your phone through a wired phone.

v) Bathing should be avoided during thunderstorms to avoid contact with running water.

vi) Electrical appliances like computers, TVs, etc., should be unplugged. Electrical lights can remain on. They do not cause any harm.

## BITS

1. Like charges when brought near each other then they

(a) repel (b) attract (c) sometimes attract and sometimes repel (d) have no effect

**Ans:** (a)

2. A device used to test the charge on an object is called

(a) ammeter (b) electroscope (c) seismograph (d) none of these

**Ans:** (b)

3. A major earthquake occurred on 8th October 2005 in

(a) Gujarat (b) Delhi (c) Haryana (d) North Kashmir

**Ans:** (d)

4. A sudden shaking of the earth lasting for a very short time is known as

(a) lightning (b) thunder (c) earthquake (d) Tsunami

**Ans:** (c)

5. A major Tsunami occurred in the Indian Ocean on

(a) 26th December 2001 (b) 26th December 2002 (c) 26th December 2003 (d) 26th December 2004

**Ans:** (d)

6. Instrument used to find the source of seismic waves is known as

(a) seismometer (b) voltammeter (c) galvanometer (d) ammeter

**Ans:** (a)

7. Richter scale is used to measure the magnitude of

(a) lightning (b) charges (c) earthquake (d) rainfall

**Ans: (c)**

8. The process of transfer of charges from a charged object to the earth is called

(a) earthing (b) lightning (c) oscillation motion (d) electron movement

**Ans:** (a) earthing

9. The power of an earthquake is expressed on a scale called

(a) seismic scale (b) iron scale (c) richter scale (d) large scale

**Ans:** (c) richter scale

10. Which instrument is used to measure earthquake?

(a) Richter scale (b) Seismograph (c) Polygraph (d) None of these

**Ans:** (b) Seismograph

11. Which is not a natural phenomena?

(a) Earthquakes (b) Cyclones (c) Lightning (d) Earthing

**Ans:** (d) Earthing

12. How many types of charges are gained by rubbing objects?

(a) 2 (b) 1 (c) 3 (d) 4

**Ans:** (a) 2

13. Where is the lightning rod attached to protect the building from lightning?

(a) On the top of the building (b) On the bottom of the building

(c) In the middle of the building (d) All of these

**Ans:** (a) On the top of the building

14. Lightning always follows

(a) a thunder (b) rain pour (c) the easiest path (d) a straight path

**Ans:** (a) a thunder

15. Tsunami means

(a) earthquake (b) floods (c) earthquake under the sea (d) eruption of volcano in a sea

**Ans:** (c) earthquake under the sea

16. The waves produced on the earth's surface is called

(a) seismic wave (b) longitudinal wave (c) Micro wave (d) Radio wave

**Ans:** (a) seismic wave

17. Amber is a

(a) metal (b) rubber (c) resin (d) sugar

**Ans:** (c) resin

18. Which is the surest test of charge on a body?

(a) Repulsion (b) Lightning (c) Combustion (d) Insulation

**Ans:** (a) Repulsion

19. Which of the following can be charged with static electricity ?

(a) Metal (b) Alloy (c) Insulator (d) Semiconductor

**Ans:** (c) Insulator

20. Which of the following occurs during lightning?
(a) Acid rain (b) Nitrogen fixation (c) Green house effect (d) Earthing

**Ans:** (b) Nitrogen fixation

21. Which of the following can be charged by rubbing?
(a) Ebonite (b) Plastic (c) Amber (d) All of these

**Ans:** (d) All of these

22. When two bodies are rubbed against each other, they acquire
(a) equal and like charges (b) equal and unlike charges
(c) unequal and like charges (d) unequal and unlike charges

**Ans:** (b) equal and unlike charges

23. It is a convention to call the charge acquired by a glass rod when it is rubbed with silk as _____
(a) Negative (b) Positive (c) Neutral (d) Can be any one

**Ans:** (b) Positive

24. A device used to test whether an object is carrying charge or not is called _____.
(a) Electrometer (b) Charge meter (c) Electroscope (d) Chargoscope

**Ans:** (c) Electroscope

25. During lightning actually _____ takes place
(a) Electric discharge (b) Electric charging (c) Electric charge accumulation (d) All of the above

**Ans:** (a) Electric discharge

26. During a thunderstorm which action may be done?
(a) Using Telephone having cord (b) Switching on / off electric lights
(c) Using a mobile phone (d) None of the above

**Ans:** (c) Using a mobile phone

27. To protect tall buildings from the damage of lightning, what can be done?
(a) Not to build tall buildings (b) Install lightning conductors
(c) Install many TV antennas (d) Have a roof top garden with tall trees

**Ans:** (b) Install lightning conductors

28. A major earthquake occurred on 26th January 2001 in which part of India?
(a) Uri (Kashmir) (b) Mumbai (Maharastra) (c) Guwahati (Assam) (d) Bhuj (Gujarat)

**Ans:** (d) Bhuj (Gujarat)

29. During thunderstorm it is safer to
(a) Carry an open umbrella (b) Take shelter under short trees
(c) Take shelter under tall trees (d) Stand in open fields

**Ans:** (b) Take shelter under short trees

30. Seismograph is an instrument used to
(a) Record strength of wind (b) Record vibrations of earthquake
(c) Record lightening (d) Record temperature

**Ans:** (b) Record vibrations of earthquake

31. The power of an earthquake is expressed in terms of magnitude on a scale called
(a) Righter Scale (b) Quake scale (c) Richter Scale (d) Earth Scale

**Ans:** (c) Richter Scale

32. Which of the following cannot be charged easily by friction?
(a) A plastic scale (b) A copper rod (c) An inflated balloon (d) A woollen cloth

**Ans:** (b) A copper rod

33. When a glass rod is rubbed with a piece of silk cloth the rod
(a) And the cloth both acquire positive charge.
(b) Becomes positively charged while the cloth has a negative charge.
(c) And the cloth both acquire negative charge.
(d) Becomes negatively charged while the cloth has a positive charge.

**Ans:** (b) becomes positively charged while the cloth has a negative charge.

34. Match the following items given in Column 'A' with that in Column 'B':

| Column A | Column B |
|---|---|
| (i) Richter scale | (a) Sudden shaking of the earth |
| (ii) Waves recorder | (b) Conductor |
| (iii) Earthquake | (c) Earthing |
| (iv) Copper | (d) Earthquake under sea |
| (v) Transfer of charge to the earth | (e) Lightning |
| (vi) Tsunami | (f) Seismograph |
| (vii) Nitrogen fixation | (g) Power of earthquake |
| (viii) Insulator | (h) Plastic |

**Ans:** i- g, ii- f, iii- a, iv- b, v- c, vi- d, vii- e, viii- h

**35. Fill in the blanks with the appropriate words:**

(a) The electrical charge generated by rubbing two objects is …….
(b) ……. is the sudden shaking of the Earth.
(c) Seismograph is the instrument that records …….
(d) Richter scale is used to express the ……. of an earthquake.
(e) Earthquakes are caused due to the movement of ……
(f) Lightning always follows …….
(g) ……. types of charges are gained by rubbing objects.
(h) Nitrogen fixation occurs during …….

**Ans:** (a) static electricity (b) Earthquake (c) seismic waves (d) magnitude
(e) Earth's plates (f) thunder (g) Two (h) lightning

**36. State whether the statements given below are True or False:**

(a) An earthquake is a sudden shaking of the earth.
(b) The process of transfer of charges from a charged object to the earth is called lightning.
(c) The tremors produce waves on the surface of the earth.
(d) The waves are recorded by Richter scale.
(e) Lightning rod is a device used to secure tall buildings from the effect of lightning.
(f) During earthquake take shelter under a table.

**Ans:** (a) True (b) False (c) True (d) False (e) True (f) True

**37. Write T against true and F against false in the following statements.**

(a) Like charges attract each other.
(b) A charged glass rod attracts a charged plastic straw.
(c) Lightning conductors cannot protect a building from lightning.
(d) Earthquakes can be predicted in advance.

**Ans:** (a) False (b) True (c) False (d) False

## Textual Table

Table:9.1

| Objects Rubbed | Materials Used for Rubbing | Attracts/does not Attract Pieces of Paper | Charged/Not Charged |
|---|---|---|---|
| Refill | Polythene, woollen cloth | Attracts | Charged |
| Balloon | Polythene, woollen cloth, dry hair | Attracts | Charged |
| Eraser | Wool | Attracts | Charged |
| Steel spoon | Polythene, woollen cloth | Does not attract | Not charged |
| Coin | Woolen cloth | Does not attract | Not charged |
| Ball pen | Hair | Attracts | Charged |

# CHAPTER-10

## COMBUSTION AND FLAME

- What is Combustion?
- How Do We Control Fire?
- Types of Combustion
- Flame
- Structure of a Flame
- What is a Fuel?
- Fuel Efficiency

### IMPORTANT POINTS

1. The burning of wood is an example of combustion.
2. Oxygen (in air) is essential for combustion.
3. During the process of combustion, heat and light are given out.
4. Inflammable substances have very low ignition temperature.
5. Water is commonly used to control fires.
6. Water cannot be used to control fires involving electrical equipment or oils.
7. There are various types of combustions such as rapid combustion, spontaneous combustion, explosion, etc.
8. There are three different zones of a flame - dark zone, luminous zone and non-luminous zone.
9. The fuel may be solid, liquid or gas.
10. Examples of inflammable substances are petrol, alcohol, Liquified Petroleum Gas (LPG) etc.
11. Water cools the combustible material so that its temperature is brought below its ignition temperature.
12. The calorific value of a fuel is expressed in a unit called kilojoule per kg (kJ/kg).
13. The increasing fuel consumption has harmful effects on the environment.
14. Combustion of most fuels releases carbon dioxide in the environment. Increased concentration of carbon dioxide in the air is believed to cause global warming.
15. CNG produces the harmful products in very small amounts. CNG is a cleaner fuel.

### DEFINITIONS

1. **Combustion:** A chemical process in which a substance reacts with oxygen to give off heat and light is called combustion.
2. **Fuel:** The substance that undergoes combustion is said to be combustible. It is also called a fuel.
3. **Ideal fuel:** The fuel, which fulfills all the requirement for a particular use is called an ideal fuel.
4. **Ignition temperature:** The lowest temperature at which a substance catches fire is called its ignition temperature.
5. **Inflammable substances:** The substances which have very low ignition temperature and can easily catch fire with a flame are called inflammable substances.
6. **Rapid combustion:** A combustion, that takes place rapidly/high speed,with the production of heat and light is called rapid combustion
7. **Spontaneous combustion:** A combustion in which a material suddenly bursts into flames, without the application of any apparent cause is called spontaneous combustion.
8. **Explosion:** The process of combustion in which a large amount of gases are evolved with the production of tremendous amount of heat,light and sound is called explosion.
9. **Luminous zone of flame:** The middle zone of partial combustion that is yellow in colour and produces light is called luminous zone of flame.
10. **Calorific value:** The amount of heat energy produced on complete combustion of 1 kg of a fuel is called its calorific value.
11. **Acid rain:** Oxides of sulphur and nitrogen dissolve in rain water and form acids. Such rain is called acid

rain.

## TEXTUAL QUESTIONS

**1. List conditions under which combustion can take place.**

Ans: (a) A combustible substance.
(b) Oxygen, that is, the supporter of combustion.
(c) Attainment of ignition temperature of the substance.

**2. Fill in the blanks.**

(a) Burning of wood and coal causes _____ of air.
(b) A liquid fuel, used in homes is _____
(c) Fuel must be heated to its _____ before it starts burning.
(d) Fire produced by oil cannot be controlled by _____

Ans: (a) pollution (b) LPG (c) ignition temperature (d) water

**3. Explain how the use of CNG in automobiles has reduced pollution in our cities.**

Ans: The use of CNG in automobiles has reduced pollution in our cities as it is a quality fuel and has some benefits:
(a) It gives out less carbon dioxide gas, carbon monoxide gas, sulphur dioxide and nitrogen dioxide, which is beneficial as they play crucial role in global warming and acid rain.
(b) It leaves behind no residue after its combustion and high calorific value.

**4. Compare LPG and wood as fuels.**

**Ans:**

| **LPG** | **Wood** |
|---|---|
| (i) It does not cause pollution on combustion. | (i) It pollutes air on its combustion. |
| (ii) No smoke is produced. | (ii) It produces smoke. |
| (iii) It is a liquid fuel. | (iii) It is a solid fuel. |
| (iv) It has more calorific value (55000 kJ/kg). | (iv) It has less calorific value (17000 kJ/kg). |
| (v) It can be easily transported, as it is stored in cylinders. | (v) It can't be transported easily like LPG fuels. |

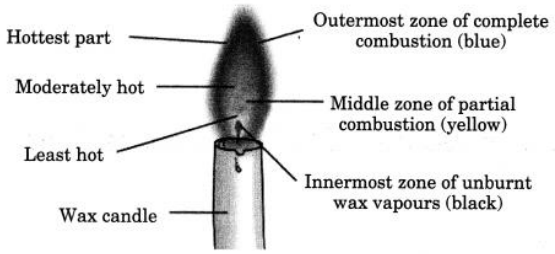
**5. Give reasons.**

**(a) Water is not used to control fires involving electrical equipment.**
**(b) LPG is a better domestic fuel than wood.**
**(c) Paper by itself catches fire easily whereas a piece of paper wrapped around an aluminium pipe does not.**

**Ans:** (a) Since water is a good conductor of electricity, it may result in electric shocks to the person trying to extinguish fire.
(b) LPG is better domestic fuel than wood because it does not produce gases, nor does it leave any residue behind. Moreover, it has more calorific value than wood.
(c) As its ignition temperature is low, the paper by itself catches fire easily. But a piece of paper wrapped around an aluminium pipe does not catch fire easily, as the heat being given gets absorbed by the aluminium pipe and the piece of paper does not get its ignition temperature.

**6. Make a labelled diagram of a candle flame.**

Ans:




*A candle flame*

**7. Name the unit in which the calorific value of a fuel is expressed.**

Ans: The unit in which the calorific value of a fuel is expressed is kilojoules per kilogram (kJ/kg).

**8. Explain how CO2 is able to control fires.**

Ans: As CO2 is heavier than oxygen, it forms a blanket around fire, because of which the supply of air is stopped. Men over, it brings down the temperature of the burning substance. In these ways, it plays a significant role in controlling fire.

**9. It is difficult to burn a heap of green leaves but dry leaves catch fire easily. Explain.**

Ans: The green leaves hold some amount of water, so its ignition temperature gets increased and it does not burn easily. On the other hand, dry leaves are waterless, so they catch fire easily (having low ignition temperature).

**10. Which zone of a flame does a goldsmith use for melting gold and silver and why?**

Ans: A goldsmith uses the outermost zone of a flame, which is non-luminous, to melt gold and silver as it is the hottest zone of the flame, having more temperature.

**11. In an experiment, 4.5 kg of a fuel was completely burnt. The heat produced was measured to be 180,000 kJ. Calculate the calorific value of the fuel.**

Ans: Calorific value of a fuel = HeatProduced/Amountoffuel

= 180000/4.5 kJ/kg

= 40,000 kJ/kg.

**12. Can the process of rusting be called combustion? Discuss.**

Ans: The process of rusting emits heat during the formation of its oxide. So we can call the process of rusting as slow combustion.

**13. Abida and Ramesh were doing an experiment in which water was to be heated in a beaker. Abida kept the beaker near the wick in the yellow part of the candle flame. Ramesh kept the beaker in the outermost part of the flame. Whose water will get heated in a shorter time?**

Ans: The water which was put by Ramesh will get heated in a shorter time; because he had put it nearer to the hottest zone of the flame.

## Extended Learning — Activities and Projects

**1.** Survey the availability of various fuels in your locality. Find out their cost per kg and prepare a tabular chart showing how many kJ of various fuels you can get for every rupee.

**Ans:** The costs and calorific values of majorly used fuels are as follows:

| Fuel | Cost( Rupees) | Calorific Value (kJ/kg) |
|---|---|---|
| Petrol | 112/L | 45OOO |
| Kerosene | 47/L | 450000 |
| Diesel | 101/L | 45000 |
| CNG | 75.25/KG | 50000 |
| LPG | 73.5/KG | 55000 |

**2.** Find out the number, type and location of fire extinguishers available in your school, nearby shops and factories. Write a brief report about the preparedness of these establishments to fight fire.

**Ans:** **School**: Total fire extinguishers **05** (4 Water, 1 Foam)

All fire extinguishers are serviced quarterly by the authorised dealer ABC company and found to be in good working condition. Located at easily accessible points throughout school.

**Shop**: Total fire extinguishers **3** (1 Water, 1 Foam, 1 Gas)

Fire extinguishers have not been serviced for more than a year and hence their usability is doubtful. Shop owner has been informed.

**Factory**: Total fire extinguishers **13**(9 Water, 3 Foam, 1 Gas)

Fire extinguishers are distributed across the factory and located at strategic points, hence easily accessible in the event of fire. Serviced every quarter by authorised agent. However, more extinguishers using water could be located near the storage depot, where cotton bales are stored.

Types of fire extinguishers used – Water, Foam, Gas (Carbon Dioxide)

Water – to fight fires caused by combustible materials like wood, textile etc.
Foam – to fight fires caused by electricity, inflammable oils.
Carbon Dioxide ($CO_2$) – to fight fires caused by electricity and flammable liquids (no residue is left behind).

**3.** Survey 100 houses in your area. Find the percentage of households using LPG, kerosene, wood and cattle dung as fuel.

**Ans:** I done survey 100 houses in our area and I find that:
Total number of families in my society=100
No. of families using LPG=86
No. of families using kerosene=5
No. of families using wood=6
No. of families using cattle dung=3
Percentages :- LPG=86%
Kerosene=5%
Wood=6%
Cattle dung=3%

**4.** Talk to people who use LPG at home. Find out what precautions they take in using LPG.

**Ans:** i) Close the supply of LPG from the regulator when the burner is not in use.
ii) Cleaning of gas burner regularly.
iii) Regular check-up of related appliances.
iv) Change the delivery pipe at regular intervals.

**5.** Make a model of a fire extinguisher. Place a short candle and a slightly taller candle in a small dish filled with baking soda. Place the dish at the bottom of a large bowl. Light both the candles. Then pour vinegar into the dish of baking soda. Take care. Do not pour vinegar on the candles. Observe the foaming reaction. What happens to the candles? Why? In what order?

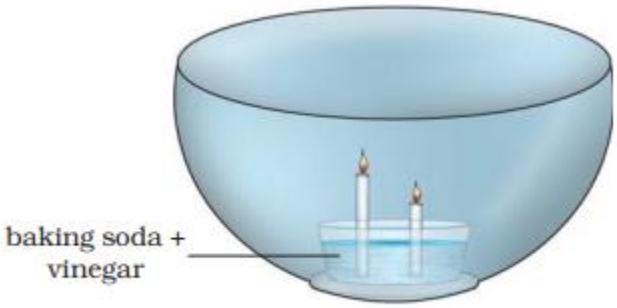


*Fig. 10.15*

**Ans:** Candles blow off. First shorter one and then the taller one. This is because of the formation of carbon dioxide. It reaches to the flame of shorter candle first and then to the taller one.

## ADDITIONAL QUESTIONS

**1. Explain the turm "global warning"**

**Ans:** The combustion of fuels release carbon dioxide in the environment. When the percentage of carbon dioxide increases in the atmosphere and makes the earth's surface hot, it is believed to cause global warming.

**2. List the common products of all combustions.**

**Ans:** Carbon dioxide and water

**3. Two glass jars A and B are filled with carbon dioxide and oxygen gases respectively. In each jar a lighted candle is placed simultaneously. In which jar will the candle remain lighted for a longer time and why?**

**Ans:** In jar B, because oxygen is a supporter of combustion.

**4. People usually keep angethi/burning coal in their closed rooms during winter season. Why is it advised to keep the door open?**

**Ans:** It is advised to keep the door open in this situation because due to insufficient availability of oxygen in the

closed room carbon monoxide gas is produced which can kill person sleeping in that room.

**5. Why do we wrap a blanket around a person who catches fire?**

**Ans:** Blanket stops the oxygen required for the combustion and gets the fire extinguished.

**6. Why is middle zone of a flame yellow coloured?**

**Ans:** Middle zone part has amount of oxygen is less due to which unburnt carbon particles burn with yellow flame.

**7. "Food is a fuel for our body". Explain why?**

**Ans:** In our body, food is broken down by reaction with oxygen and heat is produced that is why food is a type of fuel for our body.

**8. Give two examples each for a solid, liquid and gaseous fuel along with some important uses.**

**Ans:** Solid fuels: Coal, Wood
Uses: Cooking
Liquid fuels: Kerosense, Petrol
Uses: Fuels for stove, lamps and machines
Gaseous fuels: CNG, LPG
Uses: Fuels for industry.

**9. What are the different harmful products formed by the burning of a fuel?**

**Ans:** i) Carbon fuels release unburnt carbon particles, which are dangerous pollutants that cause respiratory disorders.
ii) Incomplete combustion of carbon fuels gives carbon monoxides, a poisonous gas that can even kill a person sleeping in a closed room.

**10. Explain How the Use of CNG in Automobiles Has Reduced Pollution in Our Cities.**

**Ans:** The use of CNG in automobiles has reduced pollution in our cities because it is a clean fuel and the amount of unburnt fuel in CNG is very less compared to petroleum. It does not produce smoke and harmful substances that are produced in petroleum.

**11. Compare LPG and Wood as Fuels.**

**Ans:** The difference between LPG and wood as fuels is:

| LPG | Wood |
|---|---|
| LPG is a by-product of natural gas and crude oil refining. | Wood is a fuel that is obtained from trees. |
| Its efficiency is 55,000 kJ/kg55,000 kJ/kg. | Its efficiency is 17,000−22,000 kJ/kg17,000−22,000 kJ/kg. |
| It is a gaseous fuel. | It is a solid fuel. |
| It produces less pollution on combustion. | It produces a lot of smoke on combustion and causes respiratory problems. |

**12. Give Reasons.**

**a) Water is not used to control fires involving electrical equipment.**
**b) LPG is a better domestic fuel than wood.**
**c) Paper by itself catches fire easily whereas a piece of paper wrapped around an aluminum pipe does not.**

**Ans:** (a) Water is not used to control fires involving electrical equipment because water is a good conductor of electricity due to which the person may be electro-conducted and it may damage the equipment.
(b) LPG is a better domestic fuel than wood because wood produces a lot of smoke on combustion and causes respiratory problems. Also, its efficiency is lower than LPG.
(c) Paper by itself catches fire easily whereas a piece of paper wrapped around an aluminum pipe does not because aluminum is a good conductor of heat which absorbs the heat from the paper and the paper does not catch fire. Whereas, the paper by itself catches fire.

**13. Make a labeled diagram of a Candle Flame.**

**Ans:**

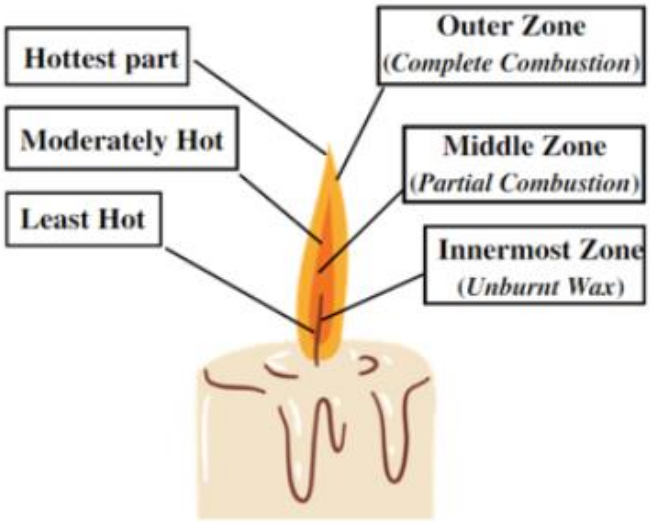



*Image: Candle Flame*

**14. Name the unit in which the calorific value of a fuel is expressed.**

**Ans:** "Kilo Joule per Kilogram (kJ/kg)" is used to express the calorific value of a fuel.

**15. Explain how $CO_2$ is able to control fires.**

**Ans:** (i) $CO_2$ is heavier than oxygen and hence it acts as a protective blanket and prevents oxygen from reaching the fire.

(ii) Since $CO_2$ is stored in a liquid state, therefore, when it is used on the fire, it expands and cools which lowers down the temperature. This prevents heat from reaching the fire.

**16. It is difficult to burn a heap of green leaves, but dry leaves catch fire easily. Explain.**

**Ans:** It is difficult to burn a heap of green leaves, but dry leaves catch fire easily because combustion takes place in the presence of heat - the minimum temperature at which a substance catches fire, known as ignition temperature. Green leaves have high moisture than dry leaves and hence, it takes more time for green leaves to reach ignition temperature than dry leaves.

**17. Which zone of a flame does a goldsmith use for melting Gold and Silver and Why?**

**Ans:** Goldsmiths use the outermost zone of the flame to melt gold and silver because gold and silver have a high melting point and the outermost part undergoes complete combustion and it is the hottest part of the flame which supply the adequate amount of heat required for melting.

**18. In an Experiment 4.5 kg of a fuel was completely burnt. The heat produced was measured to be 180,000 kJ. Calculate the calorific value of the fuel.**

**Ans:** Calorific Value=Heat produced during combustion / Quantity of fuel

=180,000 / 4.5 kJ/kg

∴Calorific Value=40,000 kJ/kg

**19. Can the process of rusting be called Combustion? Discuss.**

**Ans:** A chemical process in which a substance reacts with oxygen to give off heat is called combustion. When an iron metal combines with the oxygen in the presence of water to form a compound iron oxide is known as rusting.

Therefore, the process of rusting can be called combustion because in both processes, heat, and light are produced. Rusting is known as slow combustion.

**13. Abida and Ramesh Were Doing an Experiment in Which Water Was To Be Heated in a Beaker. Abida Kept the Beaker Near the Wick in the Yellow Part of the Candle Flame. Ramesh Kept the Beaker in the Outermost Part of the Flame. Whose Water Will Get Heated in a Shorter Time?**

**Ans:** Observe that the innermost zone of the candle which is near to the wick is the least hot whereas the outer zone of the candle is the hottest part of the candle flame.

Since Ramesh kept the beaker in the outermost part of the flame, therefore his beaker will be heated in a shorter time as compared to Abida.

## BITS

1. The gas required for combustion is
(a) oxygen (b) nitrogen (c) carbon dioxide (d) hydrogen
**Ans:** (a)
2. Burning of hydrogen is an example of
(a) slow combustion (b) rapid combustion (c) explosion (d) spontaneous combustion
**Ans:** (c)
3. The gas produced in the working of soda-acid type fire extinguisher is
(a) carbon dioxide (b) oxygen (c) sulphur dioxide (d) hydrogen
**Ans:** (a)
4. The fuel used in the human body to produce energy, is
(a) coal (b) food (c) juices (d) paper
**Ans:** (b).
5. Burning of LPG at home is an example of
(a) slow combustion (b) rapid combustion (c) spontaneous combustion (d) explosion
**Ans:** (b)
6. Which one of the following will show spontaneous combustion?
(a) Sodium (b) Calcium (c) Sulphur (d) Carbon
**Ans:** (a)
7. Which of the following can be used to extinguish fire at the petrol pump ?
(a) Water (b) Carbon dioxide (c) Blanket (d) None of these
**Ans:** (b)
8. While shaping gold into ornaments, which part of the flame directly used by goldsmith?
(a) Non-luminous (b) Luminous (c) Innermost zone (d) Whole flame
**Ans:** (a)
9. Which fuel is the ideal fuel to be used at home ?
(a) LPG (b) CNG (c) Wood (d) Coal
**Ans:** (a)
10. Which one of the following gases is used in combustion?
(a) Hydrogen (b) Oxygen (c) Nitrogen (d) Carbon dioxide
**Ans:** (b) Oxygen
11. The burning of LPG is an example of
(a) rapid combustion (b) spontaneous combustion (c) slow combustion (d) explosion
**Ans:** (a) rapid combustion
12. A temperature at which the substance burns is called
(a) melting (b) boiling temperature (c) kindling temperature (d) evaporation
**Ans:** (c) kindling temperature
13. Which is non-renewable source of energy'?
(a) Natural gas (b) Wind energy (c) Tidal energy (d) Mechanical energy
**Ans:** (a) Natural gas
14. Which of the following is not a fossil fuel?
(a) Coal (b) Petroleum (c) Natural gas (d) Water gas
**Ans:** (d) Water gas
15. Which is non-combustible substance?
(a) Wood (b) Paper (c) Iron nails (d) Straw
**Ans:** (c) Iron nails
16. The amount of heat energy produced on complete combustion of 1 kg of a fuel is called
(a) calorific value (b) significant value (c) heat value (d) internal energy
**Ans:** (a) calorific value
17. Which zone represents the partial combustion in candle flame?
(a) Outer zone (b) Middle zone (c) Inner zone (d) Lower zone

**Ans:** (b) Middle zone

18. Burning coal in a closed room will produce
(a) nitrogen oxides (b) carbon dioxide (c) carbon monoxide (d) oxygen

**Ans:** (c) carbon monoxide

19. Substances which catch fire are called
(a) acids (b) bases (c) combustible (d) burners

**Ans:** (c) combustible

20. Out of these, which is able to control fires?
(a) $NH_3$ (b) $H_2$ (c) $CO_2$ (d) $F_2$

**Ans:** (c) $CO_2$

21. Which zone of a flame does a goldsmith use for melting gold and silver ?
(a) Outer zone (b) Middle zone (c) Inner zone (d) Lower zone

**Ans:** (a) Outer zone

22. Calorific value of a fuel is expressed in
(a) kilojoule per kilogram (b) kilojoule per gram (c) joule per milligram (d) kilojoule per milligram

**Ans:** (a) kilojoule per kilogram

23. Acid rain contains mainly
(a) oxygen and nitrogen gas (b) fluorine and chlorine gas
(c) magnesium oxide (d) nitrogen oxide and sulphur dioxide

**Ans:** (d) nitrogen oxide and sulphur dioxide

24. Match the following items given in Column A' with that in Column 'B'.

| **Column A** | **Column B** |
|---|---|
| i) Fire extinguisher | a) Burning of candle |
| ii) Slow oxidation | b) Renewable source |
| iii) Kindling temperature | c) Natural gas |
| iv) Tidal energy | d) Cooking gas |
| v) Fossil fuel | e) Inflammable |
| vi) Oxygen gas | f) Burning starts |
| vii) LPG | g) Carbon dioxide |
| viii) Alcohol | h) Supporter of combustion |

**Ans:** i – g, ii – a, iii – f, iv – b, v – c, vi – h, vii – d, viii - e

**25. Fill in the Blanks**

(a) . …… of fuel forms poisonous carbon monoxide gas.
(b) . …… is expressed in terms of its calorific value.
(c) . …… have very low ignition temperature.
(d) . …… is essential for combustion.
(e) The substances, which burn in air, are called ……
(f) …… is better domestic fuel than wood.
(g) Goldsmith uses the …… zone of the flame for melting gold and silver.

**Ans:** (a) Incomplete combustion (b) Fuel efficiency (c) Inflammable substance (d) Oxygen \
(e) combustible (f) LPG (g) outermost

**26. State whether the statement given below are True or False.**

(a) Food is a fuel for our body.
(b) Burning of charcoal produces flame with four distinct zones.
(c) The fuel can be only liquid in nature.
(d) Sun produces heat and light because of combustion.
(e) It is easy to burn a piece of wood through matchstick.
(f) Soda acid fire extinguisher contains sodium bicarbonate + dil. Sulphuric acid.
(g) The inner central dark zone of a candle flame is the hottest region.
(h) The principle of all fire-extinguisher is to cut off the air supply and to cool the burning substance below its ignition temperature.

**Ans:** (a) True (b) False (c) False (d) False (e) False (f) True (g) False (h) True

## Textual Table

Table 10.1 : Combustible and Non-combustible Substance

| Material | Combustible | Non-combustible |
|---|---|---|
| Wood | ✓ | |
| Paper | ✓ | |
| Iron nails | | ✓ |
| Kerosene oil | ✓ | |
| Stone piece | | ✓ |
| Straw | ✓ | |
| Charcoal | ✓ | |
| Matchsticks | ✓ | |
| Glass | | ✓ |

Table 10.2 Materials forming Flame on Burning

| S.No. | Material | Forms flame | Does not form flame |
|---|---|---|---|
| 1 | Candle | ✓ | |
| 2 | Magnesium | ✓ | |
| 3 | Camphor | | ✓ |
| 4 | Kerosene Stove | ✓ | |
| 5 | Charcoal | | ✓ |

Table 10.3 : Types of Fuels

| S.No | Solid Fuels | Liquid Fuels | Gaseous Fuels |
|---|---|---|---|
| 1 | Coal | Kerosene oil | Natural gas |
| 2 | Wood | Petrol | Methane |
| 3 | Cow dung | Diesel | Butane |

# CHAPTER - 11

# STARS AND THE SOLAR SYSTEM

- **The Moon**
- **The Stars**
- **Constellations**
- **The Solar System**
- **Some Other Members of the Solar System**

## IMPORTANT POINTS

1. We can see many celestial bodies in a clear night sky.
2. Stars are one of the celestial bodies which emit light of their own.
3. Sun is also one of the stars which emits light and is a great source of heat.
4. Sun is the closest star and is the centre of our solar system.
5. Constellations are named after the objects which they seemed to resemble such as an animals, a human being.
6. The stars are millions of km far from earth. Such large distances are expressed as light year.
7. One light year = $9.46 \times 10^{12}$ km.
8. Stars appear to travel from east to west.
9. Pole star is the most shining star in the night sky. It appears to be stationary.
10. Our solar system consists of 8 planets revolving around the Sun. It also consists of asteroids, comets and meteors.
11. First four planets Mercury, Venus, Earth and Mars are Inner or Terrestrial planets.
12. Jupiter, Saturn, Uranus and Neptune are Outer or Jovian planets.
13. Mercury: It is the closest planet to the Sun. It appears very bright in the sky. Life cannot exist on Mercury. It has no satellite of its own.
14. Venus: It is called as twin of Earth. It appears very bright in the sky. It is called as Morning star and Evening star. It is covered by thick blanket of cloud. No life is possible on this planet. It has no satellite of its own.
15. Earth: Its distance from the Sun is $149 \times 10^6$km. It has one satellite called moon.
16. Mars: It has reddish appearance. It has 2 natural satellites. It has no protective blanket to protect it from harmful solar radiations.
17. Jupiter: The largest planet of the solar system. It has 12 satellites. There is a faint ring consisting of extremely small particles around Jupiter.
18. Saturn: Second biggest planet of the solar system. It looks like a large yellow star. It possesses well-developed set of rings around it. It has 30 satellites.
19. Uranus: It has 21 satellites and its atmosphere contains hydrogen and methane.
20. Neptune: This is the eighth planet from the Sun. It has 8 satellites revolving around it.
21. The artificial satellites revolve around the earth.
22. Artificial satellites are used for weather forecasting, long distance communication and remote sensing.
23. Meteorites help scientists in investigating the nature of the material from which the solar system was formed.
24. Halley's comet, which appears after nearly every 76 years. It was last seen in 1986.
25. Aryabhata was the first Indian satellite.
26. The star Sirius, which is the brightest star in the sky, is located close to Orion.

## DEFINITIONS

1. **Celestial objects:** The stars, the planets, the moon and many other objects in the sky are called celestial objects.
2. **Astronomy:** The study of celestial objects and associated phenomena is called astronomy

3. **Phases of the moon:** The various shapes of the bright part of the moon as seen during a month are called phases of the moon
4. **Constellation:** The stars forming a group that has a recognisable shape is called a constellation.
5. **Orbit:** A planet has a definite path in which it revolves around the Sun. This path is called an orbit.
6. **Period of rotation:** The time taken by a planet to complete one rotation is called its period of rotation.
7. **Satellite:** Any celestial body revolving around another celestial body is called its satellite.
8. **Asteroids:** A large number of small objects which revolve around the sun between the large gap of Mars and Jupiter orbits are called asteroids.
9. **Comets:** Comets are celestial bodies that revolve around the Sun in highly elliptical orbits.
10. **Meteorites:** Some meteors are so large that a part of them reaches the surface of the earth before they evaporate completely. These are called meteorites.
11. **Light Year:** Distance travelled by light in one year.
12. **Orion:** Orion is a constellation of 7 or 8 stars which looks like a hunter.
13. **Ursa Major:** It is a group of 7 stars and is also known as "Saptarishi"
14. **Pole star:** It is the only star which always appears to remain at the same position in the sky.

## TEXTUAL QUESTIONS

**Choose the correct answer in Questions 1-3.**

**1. Which of the following is NOT a member of the solar system?**

**(a) An asteroid** **(b) A satellite**
**(c) A constellation** **(d) A comet**

**Ans:** (c) A constellation

**2. Which of the following is NOT a planet of the sun?**

**(a) Sirius** **(b) Mercury**
**(c) Saturn** **(d) Earth**

**Ans:** (a) Sirius

**3. Phases of the moon occur because**

**(a) we can see only that part of the moon which reflects light towards us.**
**(b) our distance from the moon keeps changing.**
**(c) the shadow of the Earth covers only a part of the moon's surface.**
**(d) the thickness of the moon's atmosphere is not constant.**

**Ans:** (a) we can see only that part of the moon which reflects light towards us.

**4. Fill in the blanks.**

**(a) The planet which is farthest from the Sun is _____**
**(b) The planet which appears reddish in colour is _____**
**(c) A group of stars that appear to form a pattern in the sky is known as a _____**
**(d) A celestial body that revolves around a planet is known as _____**
**(e) Shooting stars are actually not _____**
**(f) Asteroids are found between the orbits of and _____**

**Ans:** (a) Neptune (b) Mars (c) constellation
(d) satellite (e) stars (f) Mars, Jupiter

**5. Mark the following statements as true (T) or false (F).**

**(a) Pole star is a member of the solar system.**
**(b) Mercury is the smallest planet of the solar system.**
**(c) Uranus is the farthest planet in the solar system.**
**(d) INSAT is an artificial satellite.**
**(e) There are nine planets in the solar system.**
**(f) Constellation Orion can be seen only with a telescope.**

**Ans:** (a) False (b) True (c) False
(d) True (e) False (f) False

**6. Match items in column A with one or more items in column B.**

| A | B |
|---|---|
| (i) Inner planets | (a) Saturn |
| (ii) Outer planets | (b) Pole star |
| (iii) Constellation | (c) Great Bear |
| (iv) Satellite of the Earth | (d) Moon |
| | (e) Earth |
| | (f) Orion |
| | (g) Mars |

**Ans:** (i) (e) (g) (ii) (a) (iii) (c) (f) (iv) (d)

**7. In which part of the sky can you find Venus if it is visible as an evening star?**

**Ans:** In west side of the sky or western part of the sky or western sky

**8. Name the largest planet of the solar system.**

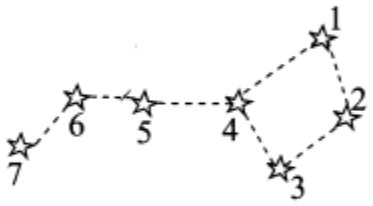
**Ans:** Jupiter

**9. What is a constellation? Name any two constellations.**

**Ans:** A group of stars which has a recognizable shape is called a constellation.
Example: Ursa Major, Orion

**10. Draw sketches to show the relative positions of prominent stars in**
**(i) Ursa Major and (ii) Orion**

**Ans:**




(i) Ursa Major


(ii) Orion

**11. Name two objects other than planets which are members of the solar system.**

**Ans:** Comets and asteroids.

**12. Why is the distance between stars expressed in light years? What do you understand by the statement that a star is eight light years away from the Earth?**

**Ans:** The stars are very far away from the Earth and it is not convenient to express such distances in kilometres. Thus, such large distances are expressed in unit known as light year.
If we say that a star is eight light years away from Earth, it means that the light from star will reach the Earth in eight years.

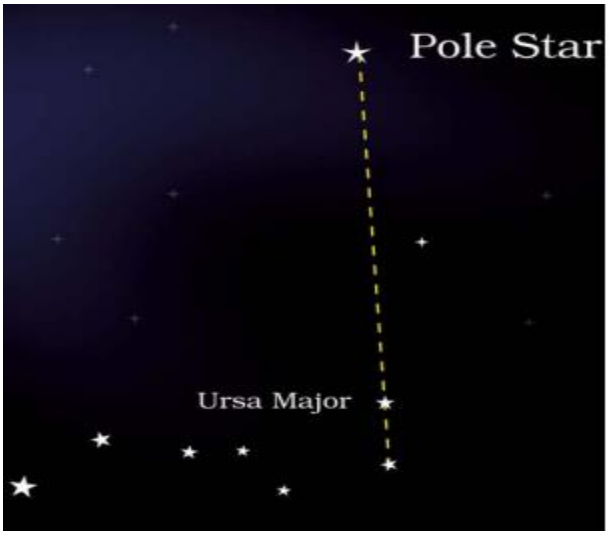
**13. Do all the stars in the sky move? Explain.**

**Ans:** No, all the stars do not move in the sky. Due to the rotation of the Earth on its own axis stars seem to move in the sky.

**14. Explain how you can locate the Pole star with the help of Ursa Major.**

**Ans:** Pole star can be located with the help of two stars at the end of Ursa Major. Imagine a straight line passing

through these stars. Extend the imaginary line in North direction. This line is about five times the distance between two stars. A star is seen in this direction which is called Pole star.




**15. The radius of Jupiter is 11 times the radius of the Earth. Calculate the ratio of the volumes of Jupiter and the Earth. How many Earths can Jupiter accommodate?**

**Ans:** Let the radius of Earth be r units.

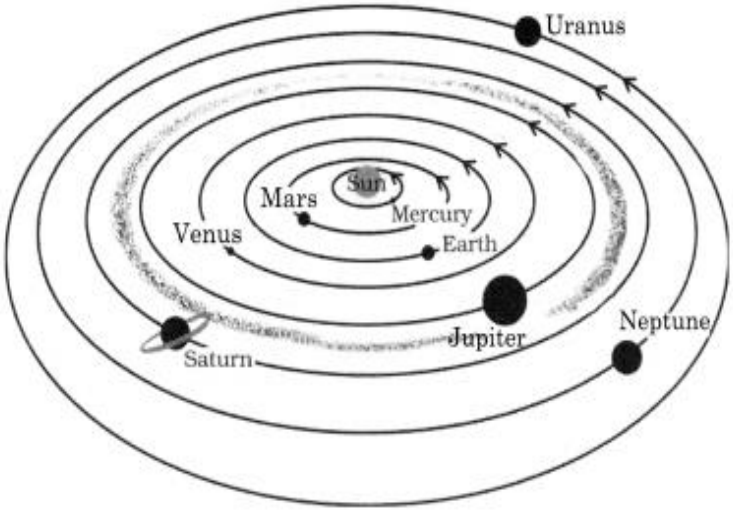
$$\text{Earth's volume} = \frac{4}{3}\pi(r^3)$$

$$\text{Radius of Jupiter} = 11r$$

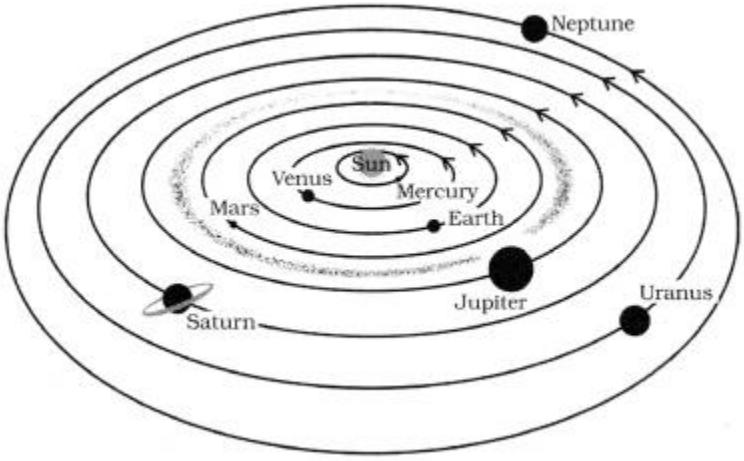
$$\therefore \text{Volume of Jupiter} = \frac{4}{3}\pi(11r)^3 = 1331\left(\frac{4}{3}\pi r^3\right)$$

$$\therefore \frac{\text{Volume of Jupiter}}{\text{Volume of Earth}} = \frac{1331\left(\frac{4}{3}\pi r^3\right)}{\frac{4}{3}\pi r^3} = 1331$$

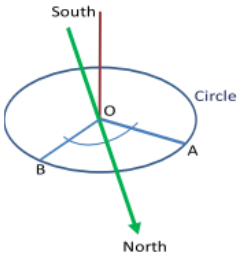
**16. Boojho made the following sketch (Fig. 11.6) of the solar system. Is the sketch correct or not, correct it.**




**Ans:** No, the sketch made by Boojho is not correct. The correct sketch is given below:




## Extended Learning — Activities and Projects




**1.** The North-South line at your place Let us learn to draw the north-south line with the help of the shadow of a stick. Fix a straight stick vertically in the ground where the Sun can be seen for most of the day. Call the foot of the stick as point O. Sometime in the morning, mark the tip of the shadow of the stick. Say this point is A. With OA as radius draw a circle on the ground. Wait till the shadow becomes shorter and then starts increasing in size. When the shadow again touches the circle, mark it as point B. Draw the bisector of the angle AOB. This is your North-South line. To decide which side of this line shows North, use a magnetic compass.

**Ans:** Activity at home

**2.** If possible, visit a planetarium. There are planetariums in many cities. In a planetarium you can see the motion of the stars, constellations and planets on a large dome.

**Ans:** Activity at home

**3.** On a moonless night observe the sky for a few hours. Look out for a meteor, which appears as a streak of light. September-November is a good time for observing meteors.

**Ans:** Activity at home

**4.** Learn to identify the planets visible to the naked eye and some prominent constellations such as Great Bear (Saptarshi) and Orion. Also try to locate the Pole Star and the star Sirius.

**Ans:** Activity at home

**5.** Position of the rising Sun – Uttarayan and Dakshinayan: This activity may last for several weeks. Choose a place from where eastern horizon is clearly visible. Choose also a marker, such as a tree or an electric pole, to mark the position of the rising Sun. It will be sufficient if you take the observation once every week. On any day, note down the direction of the rising Sun. Repeat this observation every week. What do you find? You would have noted that the point of sunrise changes continuously. From summer solstice (around 21 June), the point of sunrise gradually shifts towards the south. The Sun is then said to be in dakshinayan (moving south). It keeps doing so till winter solstice (around 22 December). Thereafter, the point of sunrise changes direction and starts moving towards north. The Sun is now said to be in uttarayan (moving north). From the equator, only on two days, on the days of the equinoxes (around 21 March and 23 September) the Sun rises in the east. On all other days, it rises either north of east or south of east. So, the direction of the rising Sun is not a good guide to determine directions. The Pole Star, which defines North, is a much better indicator of directions.

**Ans:** Activity at home

**6.** Form a group of students. Prepare a model of the solar system showing the planets, and their relative sizes. For this take a large chart paper. Make spheres representing different planets according to their relative size (Use Table 11.1). You may use newspaper, clayor plasticine to make spheres. You can cover these spheres with paper of different colours. Exhibit your models in the class.

| Name of Planet | Approximate radius (assuming Earth as 1 unit) | Approximate distance from the Sun (assuming distance of the Earth as 1 unit) | Period of revolution | Period of rotation |
|---|---|---|---|---|
| Mercury | 0.40 | 0.39 | 88 days | 59 days |
| Venus | 0.95 | 0.72 | 225 days | 243 days |
| Earth | 1.00 | 1.00 | 365.25 days | 24 hours |
| Mars | 0.55 | 1.50 | 687 days | 24 hours 37 min |
| Jupiter | 11.00 | 5.20 | 12 years | 9 hours 55 min |
| Saturn | 9.00 | 9.50 | 29.46 years | 10.66 hours |
| Uranus | 4.00 | 19.20 | 84 years | 17.2 hours |
| Neptune | 3.90 | 30.00 | 165 years | 16.1 hours |

**Ans:** Activity at home

7. Try to make a scale model of the solar system showing distances of the planets from the Sun (Use Table 11.1). Did you face any difficulty? Explain it

**Ans:** Activity at home

**8.** Solve the following riddle and try to make similar riddles yourself:

My first is in VAN but not in PAN
My second is in EARTH and also in HEAVEN
My third is in ONE and not in TWO
My fourth is in BUN and also in FUN
My last is in STAR but not in RADAR
I am a planet that moves round the Sun.

**Ans:** Venus

## ADDITIONAL QUESTIONS

**1. What do you mean by a full moon day?**

**Ans:** The day on which the whole bright disc of moon is visible to us on the Earth is called the full moon day.

**2. Why does the moon change its shape daily?**

**Ans:** The moon changes its shape because we see only that part of the moon from which the light of the sun is reflected towards us.

**3. Name the star which is nearest to the Earth.**

**Ans:** Alpha Centauri

**4. Do stars emit light only during night?**

**Ans:** No, they emit light all the time.

**5. A star is ten light years away from the earth. Suppose it brightens up suddenly today. After how much time shall we see this change?**

**Ans:** We will see the change seen after 10 years

**6. Which planet of the solar system is (a) largest and (b) smallest in sizes?**

**Ans:** (a) Largest planet: Jupiter (b) Smallest planet: Mercury

**7. How are the phases of moon related to our day to day life?**

**Ans:** i) We celebrate Diwali on the new moon day.
ii) Budh Poornima and Guru Nanak's birthday are celebrated on full moon day.
iii) On the thirteenth day when the moon is waning, we celebrate Maha Shivarathri.

**8. Suppose the distance between earth and sun becomes half of its present distance. What is likely to**

**happen to life?**

**Ans:** Life may no longer exist because some special environmental conditions are needed for the existence and continuation of life on the earth. The right distance of the earth from the Sun is necessary so that it has the right temperature range, the presence of water and suitable atmosphere, and a blanket of ozone.

**9. Why does the tail of a comet always point away from Sun?**

**Ans:** Since the tail of a comet is caused due to light radiations from the sun, hence it always points away from it.

**10. What are the difference between a natural and an artificial satellite?**

**Ans:**

| Natural satellite | Artificial satellite |
|---|---|
| Heavenly bodies revolving around a planet in their fixed orbits | Man-made bodies fitted with sophisticated instruments and cameras. |
| These are comparatively bigger in size and are made up rocky materials or gases | These are made to rotate around their planets in pre-fixed orbits. |

**11. What are the difference between a star and a shooting star?**

**Ans:**

| Star | Shooting star |
|---|---|
| i) A star is made up of hot gases like hydrogen | i) A shooting star is made up of rock and metal. |
| ii) A star is luminous | ii) A shooting star has no light of its own. |
| iii) A star does not get destroyed due to friction | iii) A shooting star burns due to heat of friction when entering the atmosphere of the Erath. |
| iv) A star is very big in size | iv) A shooting star is very small |

**12. Match items in column A with one or more items in column B.**

| A | B |
|---|---|
| **Inner planets** | **Saturn** |
| **Outer planets** | **Pole star** |
| **Constellation** | **Great Bear** |
| **Satellite of the Earth** | **Moon** |
| | **Earth** |
| | **Orion** |
| | **Mars** |

**Ans:** (i) Inner planets – e) Earth, g) Mars
(ii) Outer planets – a) Saturn
(iii) Constellation – c) Great Bear, f) Orion
(iv) Satellite of earth – d) Moon

**13. In which part of the sky can you find Venus if it is visible as an evening star?**

**Ans:** The part of the sky where we can find Venus if it is visible as an evening star is the west side of the sky.

**14. Name the largest planet of the solar system.**

**Ans:** The largest planet of the solar system is Jupiter and the smallest planet is Mercury.

**15. What is a constellation? Name any two constellations.**

**Ans:** A constellation is a group of stars forming a definite shape. The two constellations are:

**i) Orion:** It is located on the celestial equator and is visible throughout the world. It is a constellation in the night sky.

**ii) Great Bear:** It is located in the northern sky.

**16. Name two objects other than planets that are members of the solar system.**

**Ans:** The two other objects other than planets that are members of the solar system are:

**i) Stars:** Stars are celestial bodies made up of gases; they are huge in size and have very high temperatures

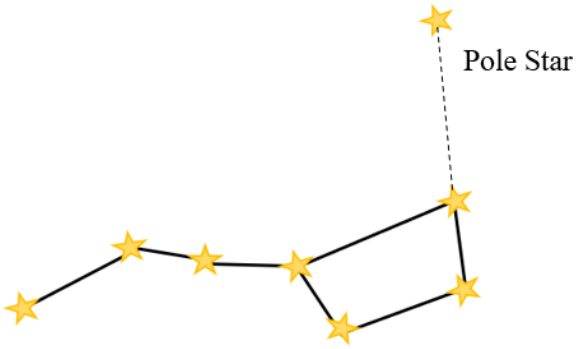
**ii) Asteroid:** Asteroids are small, rocky objects that orbit the sun.

**17. Do all the stars in the sky move? Explain.**

**Ans:** No, the stars in the sky do not move because the Pole star is located above the axis of rotation of the Earth in the north direction. And hence it appears to be stationary and all other stars in the sky appear to move from East to West.

**18. Explain how you can locate the Pole Star with the help of Ursa Major.**

**Ans:** We locate the Pole Star with the help of Ursa Major with the help of the three stars at the end of Ursa Major. To do so, create a straight line passing through the last three stars and extend that line in the north direction. The star seen in that direction is the Pole star.




**Ursa Major**

**18. Do all the stars in the sky move? Explain.**

**Ans:** No, the stars in the sky do not move because the Pole star is located above the axis of rotation of the Earth in the north direction. And hence it appears to be stationary and all other stars in the sky appear to move from East to West.

**19. Fill in the blanks:**

(a) The planet which is farthest from the sun is _____.
(b) The planet which appears reddish in colour is _____.
(c) A group of stars that appear to form a pattern in the sky is known as a _____.
(d) A celestial body that revolves around a planet is known as a _____.
(e) Shooting stars are actually not _____.
(f) Asteroids are found between the orbits of ____ and _____.

**Ans:** (a) Neptune. (b) Mars (c) Constellation. (d) satellite. (e) stars. (f) Mars and Jupiter.

**20. Mark the following statement as true (T) or false (F).**

(a) Pole star is a member of the solar system.
(b) Mercury is the smallest planet in the solar system.
(c) Uranus is the farthest planet in the solar system.
(d) INSAT is an artificial satellite.
(e) There are nine planets in the solar system.
(f) Constellation Orion can be seen only with a telescope.

**Ans:** (a) True (b) True (c) False (d) True (e) False (f) True

**21. State whether the statements given below are True or False:**

(a) Sun is a star
(b) Orion has 10 bright stars
(c) Mercury has no satellite of its own
(d) Planets do twinkle
(e) Jupiter is the largest planet.

**Ans:** (a) True (b) False (c) True (d) False (e) True

## BITS

1. Out of the following, the only one that is a Galaxy, is
(a) Alpha centuari (b) Jupiter (c) Halley's comet (d) The Milky Way

**Ans:** (d)

2. The constellation, of which pole star is a part, is

(a) Ursa Major (b) Ursa Minor (c) Orion (d) Scorpio

**Ans:** (b)

3. The large number of rocky objects, that lie between the orbits of Mars and Jupiter, are known as

(a) Comets (b) Asteroids (c) Meteorites (d) Meteors

**Ans:** (b)

4. The largest planet in the solar system is

(a) Neptune (b) Earth (c) Jupiter (d) Uranus

**Ans:** (c)

5. Which one of the following is better known as morning and evening star ?

(a) Neptune (b) Mercury (c) Proxima centauri (d) Venus

**Ans:** (d)

6. Which of the following is NOT a member of the solar system ?

(a) An asteroid (b) A satellite (c) A constellation (d) A comet

**Ans:** **(b)** A satellite.

7. Which of the following is NOT a planet of the sun ?

(a) Sirius (b) Mercury (c) Saturn (d) Earth

**Ans:** **(a)** Sirius.

8. Which of the following does not belong to the solar family?

(a) Planet (b) Galaxy (c) Meteors (d) Comet

**Ans:** **(b)** Galaxy

9. Which planet is called morning star or evening star?

(a) Jupiter (b) Venus (c) Mercury (d) Mars

**Ans:** **(b)** Venus

10. Shooting stars are called

(a) asteroids (b) galaxies (c) meteors (d) andromedia

**Ans:** **(c)** meteors

11. Which of the following is NOT a member of the solar system?

(a) An asteroid (b) A satellite (c) A constellation (d) A comet

**Ans:** (c) A constellation

12. Which of the following is NOT a planet of the sun?

(a) Sirius (b) Mercury (c) Saturn (d) Earth

**Ans:** (a) Sirius

13. Phases of the moon occur because

(a) We can see only that part of the moon that reflects light towards us.
(b) Our distance from the moon keeps changing.
(c) The shadow of the Earth covers only a part of the moon's surface.
(d) The thickness of the moon's atmosphere is not constant.

**Ans:** (a) We can see only that part of the moon that reflects light towards us.

14. Orion is a

(a) Constellation (b) Star (c) Planet (d) Satellite

**Ans:** (a) Constellation

15. Which of the following does not belong to the family of solar system?

(a) Planet (b) Galaxy (c) Meteors (d) Comet

**Ans:** (b) Galaxy

16. The Halley's Comet is seen after every

(a) 76 months (b) 76 years (c) 56 months (d) 56 years

**Ans:** (b) 76 years

17. Ursa Major is a

(a) star (b) constellation (c) seen only with telescope (d) satellite

**Ans:** (b) constellation

18. Which planet has the largest number of satellites?

(a) Jupiter (b) Saturn (c) Mercury (d) Mars

**Ans:** (b) Saturn

19. Which unit is used to measure astronomical distances?
(a) Leap year (b) Light year (c) Century (d) Sound year

**Ans:** (b) Light year

20. The stars forming a recognizable shape is called
(a) constellation (b) system (c) galaxy (d) asteroids

**Ans:** (a) constellation

21. Which star is nearest to Earth?
(a) Pole star (b) Orion (c) Cassiopeia (d) Sun

**Ans:** (d) Sun

22. What term is used for celestial bodies that revolve around the Sun in highly elliptical orbit?
(a) Comet (b) Meteors (c) Asteroids (d) Planets

**Ans:** (a) Comet

23. Which small objects revolve between the orbits of Mars and Jupiter?
(a) Satellites (b) Comets (c) Asteroids (d) Meteorites

**Ans:** (c) Asteroids

24. Our galaxy is known as
(a) Earth galaxy (b) Sun galaxy (c) Milky Way (d) Constellation

**Ans:** (c) Milky Way

25. Which of the following is not a planet?
(a) Mercury (b) Saturn (c) Jupiter (d) Great bear

**Ans:** (d) Great bear

26. The planet farthest from the Sun is
(a) Uranus (b) Neptune (c) Saturn (d) Mercury

**Ans:** (b) Neptune

27. If I am 13 years old, I have gone round the sun ___ times.
(a) Never gone round the sun (b) 13 (c) 26 (d) Shall go round the sun when I shall be 15

**Ans:** (b) 13

28. The least dense planet is
(a) Earth (b) Jupiter (c) Saturn (d) Uranus

**Ans:** (c) Saturn

29. ____ appears as a bright head with a long tail. The tail grows in size as it approaches the sun.
(a) Asteroid (b) Comet (c) Planet (d) Meteor

**Ans:** (b) Comet

30. During a clear night sky, bright light streaks are often visible. They are called shooting stars. They are actually
(a) Falling stars (b) Comet (c) Meteors (d) Planet

**Ans:** (c) Meteors

31. _____ was the first Indian satellite.
(a) INSAT (b) EDUSAT (c) IRS (d) Aryabhatta

**Ans:** (d) Aryabhatta

32. If Saturn is thrown into an ocean,
(a) It will float (b) It will sink (c) It will dissolve (d) It will soak all water

**Ans:** (a) It will float

33. It is difficult to observe Mars because
(a) It is the smallest planet of this universe (b) It is too far away from our planet
(c) It is hidden by the glare of the sun (d) None of the above

**Ans:** (c) It is hidden by the glare of the sun

34. Ravi was looking for Venus in the sky at midnight. Mohan laughed at him because Venus
(a) Appears 1-3 hours after sunrise or 1-3 hours after sunset
(b) Appears 1-3 hours before sunrise or 1-3 hours after sunset

(c) Appears 1-3 hours before sunrise or 1-3 hours before sunset
(d) Appears 1-3 hours after sunrise or 1-3 hours before sunset

**Ans:** (b) Appears 1-3 hours before sunrise or 1-3 hours after sunset

35. Earlier we had 9 planets in our solar system of which one name has been eliminated as per IAU (2006). The planet is

(a) Uranus (b) Neptune (c) Pluto (d) Earth

**Ans:** (c) Pluto

36. Light Year is

(a) Year full of light (b) Year having light work
(c) Year which earth shall become lighter (d) Distance travelled by light in 1 year

**Ans:** (d) Distance travelled by light in 1 year

37. Match the following items given in Column A with that in Column 'B'

| Column A | Column B |
|---|---|
| (i) Nearest of the Sun | (a) Jupiter |
| (ii) Largest planet | (b) Star |
| (iii) Comets | (c) Artificial satellites |
| (iv) Alpha Centauri | (d) A constellation |
| (v) INSAT 3E | (e) Other than planets |
| (vi) Ursa major | (f) Neptune |
| (vii) Planet | (g) Mercury |

**Ans:** i-g, ii-a, iii-e, iv-b, v-c, vi-d, vii-f

38. _____are celestial bodies of the universe and continuously emit heat and light.

**Ans:** Stars

39. _____ is the distance travelled by the light in one year and is equal to $9.46 \times 10^{12}$ kilometers.

**Ans:** Light year

40. _____ is the star which appears to be stationary near the northern horizon.

**Ans:** Pole star

41. _____ are the celestial bodies revolving around a planet.

**Ans:** Satellites

42. _____ is a group of stars arranged in a definite pattern.

**Ans:** Constellation

43. _____ are bright objects that revolve around the Sun.

**Ans:** Planets