

COMPACT SCIENCE 6

(Book Solution)

1. Sources of Food

Checkpoint 1

1. alive 2. Cereals 3. Raisins 4. energy-giving 5. enzymes

Checkpoint 2

1. Animals that eat plants or plant parts are called herbivores.
2. Yes, lion is a carnivore because it eats the flesh of other animals.
3. Crow, sparrow, hen, bear, human beings, etc., eat plants as well as other animals.
4. Vulture is called scavenger because it eats dead animals.
5. Yes, bacteria feed on dead plants and animals. They are called decomposers.

Let's Drill Our Skills

- A. 1. (d) 2. (a) 3. (c) 4. (d) 5. (a)
- B. 1. nuts; seeds 2. leafy 3. Honeybees 4. Snakes
5. curved; pointed
- C. 1. True 2. True 3. False 4. False 5. True
- D. 1. Animals that eat flesh of other animals are called carnivores.
2. Animals that eat plants or plant parts are called herbivores.
3. Animals that eat plants as well as other animals are called omnivores.
4. The carnivores that eat dead animals are called scavengers.
5. Organisms that feed on dead plants and animals are called decomposers. They are fungi and bacteria.
- E. 1. Bacteria and fungi feed on dead plants and animals.
2. Rice, maize and bajra are grouped into cereals.
3. People who do not eat meat and eggs are called vegetarians.
4. Vulture and jackal.
5. Spices add taste and aroma to our food.
- F. 1. Food provides energy; material for growth, reproduction and repair of damaged cells. It keeps us healthy and enables to fight against infections.
2. On the basis of food animals eat, they are herbivores, carnivores and omnivores.
3. We get meat, eggs, milk and honey from animals.
4. The coconut fruit and seeds of mustard, groundnut, etc., are two sources of oil.
5. Scavengers are called 'nature's cleaners' because they clear dead animals by feeding on them.

- G. 1.** Different parts of plant, i.e., root, stem, leaves, fruits, etc. can be used as source of food as follows:
- (a) **Seeds:** Seeds of wheat, rice, maize, etc., as cereals; bengal gram, green gram, etc., as pulses and mustard, groundnut, etc., for oils are used as food.
 - (b) **Fruits:** Fruits of tomato, brinjal, etc., as vegetables and apple, mango, banana, etc., are source of food.
 - (c) **Roots:** Roots of carrot, radish and turnip are taken as food.
 - (d) **Stems:** Stems of potato and ginger are source of food.
 - (e) **Leaves:** Leaves of spinach and cabbage are eaten as vegetables.
 - (f) **Flowers:** Flowers of broccoli, cauliflower, banana, etc., are eaten as food.
- 2.** Animals that eat plants or plant parts are called herbivores. Their special characteristics are as follows:
- (a) They have sharp front teeth to gnaw nuts and seeds. For example, squirrel, rat, etc.
 - (b) Some herbivores have broad and blunt teeth to grind food. For example, horse, cow, deer, etc.
- 3.** Animals that eat flesh of other animals are called carnivores. The characteristics of carnivores are as follows:
- (a) Carnivores like lions and tigers have sharp teeth and powerful jaws for catching and tearing their prey.
 - (b) Snake swallows its prey as a whole because of its movable jaw.
 - (c) Carnivorous birds like eagle have curved and pointed beak to tear the flesh.
 - (d) Chameleons and frogs have long sticky tongue to catch their prey.
- 4.** Scavengers are the carnivores which eat dead animals. For example, vulture, jackal, etc. Decomposers are the organisms which feed on dead plants and animals. For example, bacteria and fungi. They are useful for our environment because they clear the dead animals and plants found on the earth.

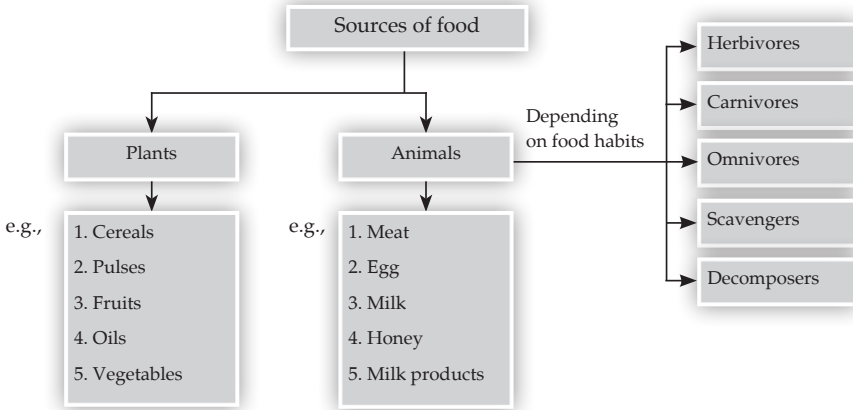
HOTS

- 1. On missing the breakfast, Ravi's body has not got energy to work and remain active. That is why he is feeling tired and exhausted.
- 2. Ritika is an omnivore because she eats both vegetarian and nonvegetarian foods.

Value-based Questions

- 1. We should not waste food because the left over food can be given to poor people.
- 2. Krishna is a sensitive and responsible person.

LET'S MEMORISE



2. Components of Food

Checkpoint 1

1. Carbohydrates and fats
2. Sugars, starch and cellulose
3. **Sources of sugar:** Fruits and honey;
Sources of starch: Wheat and rice
4. Glucose

Checkpoint 2

1. (a) Butter and *ghee* (b) Because eating excess of fats leads to obesity.
(c) Fats
2. (a) proteins (b) 65–75 g (c) amino acids (d) nitrogen

Checkpoint 3

1. Water 2. water-soluble 3. blood clotting 4. Roughage
5. dehydration

Let's Drill Our Skills

- A. 1. (b) 2. (c) 3. (c) 4. (b) 5. (c)
- B. 1. True 2. False 3. False 4. True 5. False
- C. 1. The diet which contains all the essential nutrients in right proportion is called a balanced diet.
2. Removal of water is called dehydration.
3. The fibre part of food which simply adds bulk to the food is called roughage.
4. Amino acids are basic units of proteins.
- D. 1. Food containing cellulose fibres is called roughage.
2. Goitre

3. Rickets
 4. Vitamins and minerals protect our body against diseases.
 5. Beriberi
- E.**
1. The major nutrients in our food are carbohydrates, fats, proteins, vitamins and minerals.
 2. Micronutrients are needed in small amount by our body, whereas macronutrients are required in large amount. Micronutrients are copper, zinc, iron, etc. and macronutrients are calcium, sodium, etc.
 3. Sodium and potassium maintain water balance in the body.
 4. Vitamins and minerals are called protective nutrients because they protect our body from diseases.
 5. The fibre part of food which simply adds bulk to the food is called roughage. The presence of fibres in food is essential because they help in easy movement of bowel and prevent constipation.
 6. PEM refers to protein-energy malnutrition. It is caused due to shortage of proteins, fats and carbohydrates in the diet.
- F.**
1. The three types of carbohydrates are sugars, starch and cellulose. They make the major part of our food.
 - (a) **Sugars:** They are simple carbohydrates which are sweet in taste and soluble in water. They are found in fruits, honey, table sugar, etc. The sugars are glucose, lactose, fructose and sucrose.
 - (b) **Starch:** It is a complex carbohydrate. It is tasteless and odourless white powder which is insoluble in water. It is found in wheat, rice, maize and potatoes.
 - (c) **Cellulose:** It is a complex carbohydrate made up of 1000–3000 glucose molecules joined together. It is tasteless and white powder. It is found in cell wall of plant cells, wood and fibres of cotton and jute.
 2. Fats are of two types:
 - (a) **Unsaturated fats:** They are obtained from plants and are liquid at room temperature. They are found in vegetable oils.
 - (b) **Saturated fats:** They are obtained from animals. They are solid at room temperature. They are found in butter and *ghee*.
 3. The fat-soluble vitamins are A, D, E and K.
 - (a) **Vitamin A:** It keeps the skin healthy and maintains normal night vision. It is found in fish oil, egg yolk, milk, carrot and leafy vegetables.
 - (b) **Vitamin D:** It helps in normal growth of bones in children. It is found in fish, eggs and milk. The sunlight helps our body to make vitamin D.
 - (c) **Vitamin E:** It helps in normal reproduction and keeps the skin healthy. It is found in cereals, cotton seed oil, milk, meat and egg yolk.

- (d) **Vitamin K:** It helps in blood clotting. It is found in spinach, cabbage and green leafy vegetables.
4. Five minerals are calcium, iron, iodine, phosphorus and fluorine.
- (a) **Calcium:** It helps in the formation of bones and teeth and in the clotting of blood. It is found in milk, cereals, green leafy vegetables, meat, fish, etc.
- (b) **Iron:** It helps in the formation of haemoglobin in blood for carrying oxygen. It is found in cereals, spinach, liver, red meat, etc.
- (c) **Iodine:** It helps in the production of thyroxine hormone by thyroid gland. It is found in iodised salt, onion and sea food.
- (d) **Phosphorus:** It helps in the formation of bones and teeth. It is found in milk, meat, fish, green leafy vegetables, etc.
- (e) **Fluorine:** It helps in keeping the bones and teeth healthy. It is found in milk and sea food.

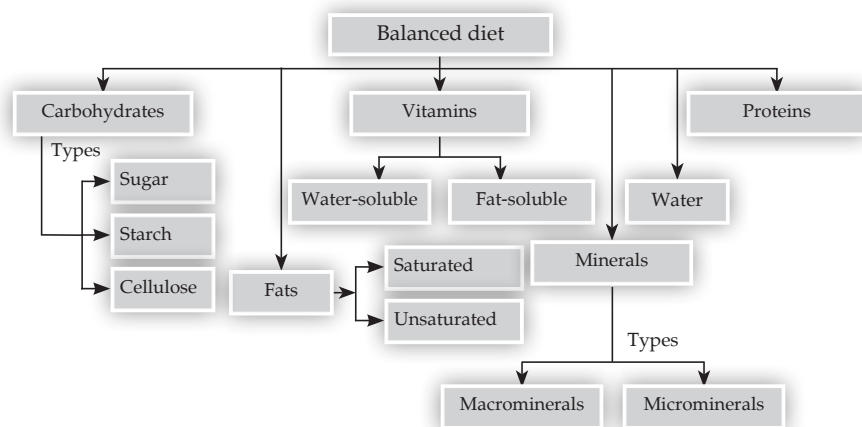
HOTS

- Doctors recommend refined oil instead of animal fats because refined oil contains unsaturated fats and does not contain cholesterol.
- Animal proteins are better than plant proteins because animal proteins contain all the 20 amino acids which are required for proper functioning of our body.
- Our body never suffers fat deficiency because excess of carbohydrates and proteins is converted into fats which are stored in the body.

Value-based Questions

- Green leafy vegetables and roughage.
- Roughage helps in easy bowel movement and prevents constipation.
- This extract inspires to take care of body by eating healthy food.

LET'S MEMORISE



3. Cloth Materials — Fibre to Fabric

Checkpoint 1

1. leaves
2. Clothes
3. linen
4. natural
5. Man-made

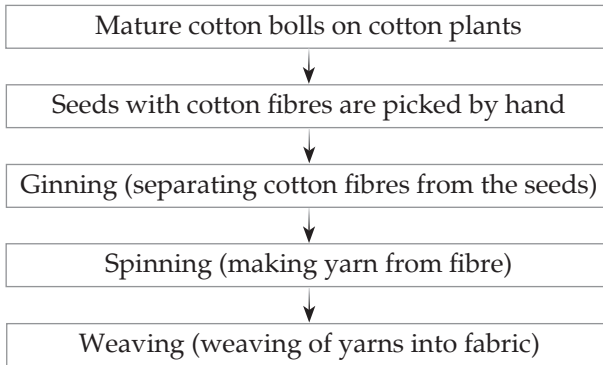
Checkpoint 2

1. Cotton fibre is good absorbent of water.
2. The process of separating cotton fibres from the seeds by combing is called ginning.
3. Jute is used to make gunny bags.
4. Bihar and Assam.
5. Wool.

Let's Drill Our Skills

- A.** 1. (b) 2. (b) 3. (c) 4. (d) 5. (d)
- B.** 1. natural; man-made 2. cotton bolls 3. flax 4. stem
5. cotton; nylon 6. air 7. silk
- C.** 1. (d) 2. (c) 3. (e) 4. (a) 5. (b)
- D.** 1. Natural fibres are obtained from the stem, bark, leaves or seeds of plants and hair of animals, whereas man-made fibres are manufactured in factories.
2. The process of making yarn from fibre is called spinning, whereas the process of separating cotton fibres from the seeds by combing is called ginning.
- E.** 1. The very thin strands that make up yarns are called fibres.
2. Nylon, rayon, acrylic and polyester are categorised into man-made fibres.
3. Ginning
4. Handpicking
5. Yarn is a loose thread which is used to make a fabric.
- F.** 1. The fibres obtained from the stem, bark, leaves or seeds of plants and hair of animals or cocoon of insect are called natural fibres. Cotton and wool are examples of natural fibres.
2. The fibres manufactured in factories are called man-made fibres. For example, nylon and rayon.
3. (a) Man-made fibres do not wrinkle easily.
(b) They are very strong.
(c) They catch fire easily.
4. Natural fibres are obtained from stem, bark, leaves, seeds, etc., of plants and hair of animals and cocoon of insect.
5. In India, cotton is grown in Maharashtra, Madhya Pradesh, Tamil Nadu, Karnataka, Gujarat, Uttar Pradesh, Andhra Pradesh, Haryana and Punjab while jute is grown in Meghalaya, Bihar, Assam, West Bengal and Odisha.

6. Cotton gins are machines which are used to separate cotton fibres from cotton seeds.
 7. (a) Silk fibre is a good absorbent of heat.
(b) It keeps our body warm in cold weather.
- G. 1. Obtaining cotton fabric involves following steps:



2. The fibres which are obtained from different parts of plants are called plant fibres. They are obtained from stem, bark, leaves, seeds, etc. of plants. Cotton, jute and flax are plant fibres.
 - (a) Cotton fibre is obtained from the seeds of cotton plant.
 - (b) Jute fibre is obtained from the stem of jute plant.
 - (c) Flax fibre is obtained from the stem of flax plant.
3. Jute is obtained from jute plant. The stems of plants are cut and kept in water till they rot. The fibres are then separated by hand.

Uses of jute: Jute is used for making ropes, mats, gunny bags, carpets, jute bags and decorative articles.

Jute growing areas: Jute is grown in Meghalaya, Bihar, Assam, West Bengal and Odisha.

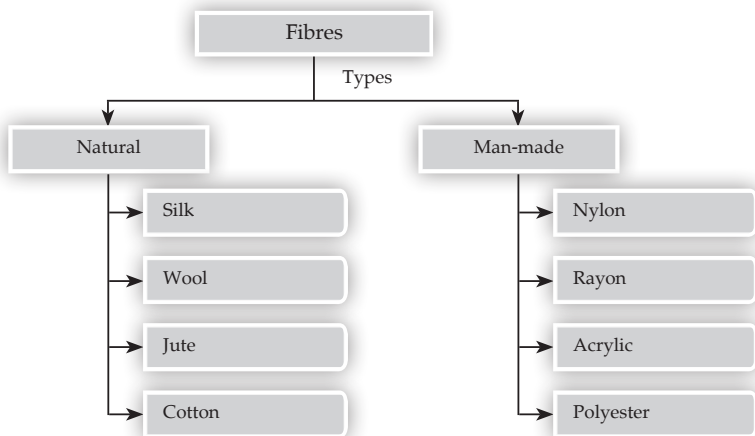
HOTS

1. We get wool from sheep, silk from silkworm and cotton and jute from cotton and jute plants. They all occur naturally and are not manufactured in factories. Therefore, they are called natural fibres.
2. Cotton clothes absorb sweat quickly and keep the body cool. Therefore, we prefer to wear cotton clothes in summer.
3. Wool is a good absorbent of heat and keeps the body warm. Therefore, we prefer to wear woollen clothes in winter.

Value-based Questions

1. Obtaining silk fibre involves killing of pupa of silkworm which is found inside the cocoon wrapped by silk fibre, whereas cotton fibres does not involve any such process. Therefore, cotton fibre is more environment friendly.
2. Ram is compassionate and nature lover.

LET'S MEMORISE



4. Kinds of Material

Checkpoint 1

- (a) Book
(b) a metal spoon
- Lustre, hardness, transparency
- (a) We can **categorise** the objects which are similar in all respects into different groups.
(b) A bulb is made from **glass and metal wires**.
(c) Materials having lustre are usually made of **metals**.

Checkpoint 2

- Solubility.
- The substances having more density than water will sink.
- Yes, notebook is an opaque object.
- Conductors or good conductors of heat.
- Butter paper.

Let's Drill Our Skills

- A. 1. (c) 2. (c) 3. (c) 4. (a) 5. (d) 6. (c)
- B. 1. (e) 2. (d) 3. (a) 4. (c) 5. (b)
- C. 1. The objects which shine are called lustrous objects, whereas those which do not shine are called nonlustrous objects.
2. Substances which are attracted by magnets are called magnetic substances, whereas those which are not attracted by magnets are called nonmagnetic substances.
- D. 1. The materials which cannot be compressed are called hard materials.

2. The materials through which objects cannot be seen are called opaque materials.
 3. Insulators or bad conductors of electricity do not allow electric current to pass through them.
 4. The materials which dissolve in water are called soluble materials.
 5. Iron.
- E.
1. The statement means that salt dissolves or mixes well in water, whereas sand does not dissolve and mix in water.
 2. Different properties of material are its appearance, texture, solubility in water, ability to float or sink in water, transparency, heat and electrical conductivities and its magnetic and nonmagnetic behaviours.
 3. Substances which allow electric current to pass through them are called conductors of electricity, whereas substances which do not allow electric current to pass through them are called insulators or bad conductors of electricity.
 4. **Sinking objects:** Iron nail, pebble, etc.
Floating objects: Dried leaves, paper, etc.
 5. Objects through which we are not able to see at all are called opaque objects. For example, wood, brick, etc.
 6. Some objects made of metal become dull after some time because metals combine with oxygen, carbon dioxide or moisture present in the air and form a layer on their surface which gives them dull appearance.
- F.
1. On the basis of transparency, different materials are grouped as:
 - (a) **Opaque materials:** Materials through which we are unable to see at all are called opaque materials. For example, wood, brick, etc.
 - (b) **Translucent materials:** Materials through which we are able to see, but not clearly are called translucent materials. For example, ground glass, butter paper, etc.
 - (c) **Transparent materials:** Materials through which we are able to see very clearly are called transparent materials. For example, air, water, glass, etc.
 2. Different properties on the basis of which materials can be classified are as follows:
 - (a) **Appearance:** It is the property by which materials look very different from each other. On the basis of appearance, materials may be lustrous (shiny) or nonlustrous (dull).
 - (b) **Texture:** On the basis of texture, materials can be hard (which cannot be compressed) or soft (which can be compressed).

- (c) **Solubility:** It is the property of dissolving a material in water. On the basis of solubility, materials can be soluble (dissolve in water) or insoluble (do not dissolve in water).
 - (d) **Ability to float or sink in water:** On the basis of floating or sinking in water, materials can be denser than water or less dense than water.
 - (e) **Transparency:** It is the property of material which tells whether we can see through it or not. On the basis of transparency materials can be opaque, translucent or transparent.
 - (f) **Heat and electrical conductivity:** These are the properties by which materials allow or do not allow passing of heat and electricity through them. On the basis of conductivity of heat and electricity, materials can be conductors or insulators.
 - (g) **Magnetic properties:** These are the properties by which materials attract or do not attract towards a magnet. On the basis of magnetic properties, materials may be magnetic or nonmagnetic.
3. (a) These objects can be grouped on the basis of floating or sinking in water because some are denser while others are less dense than water.
- (i) **Denser than water:** Sand, a metal key, an eraser, an iron nail. They will sink in water.
 - (ii) **Less dense than water:** Paper, sponge, leaf, cork. They will float on water.
- (b) On the basis of edibility, these objects can be grouped as:
- (i) **Edible objects:** Sugar, salt, apple, orange, biscuit.
 - (ii) **Nonedible objects:** Chair, table, flower vase, fan.

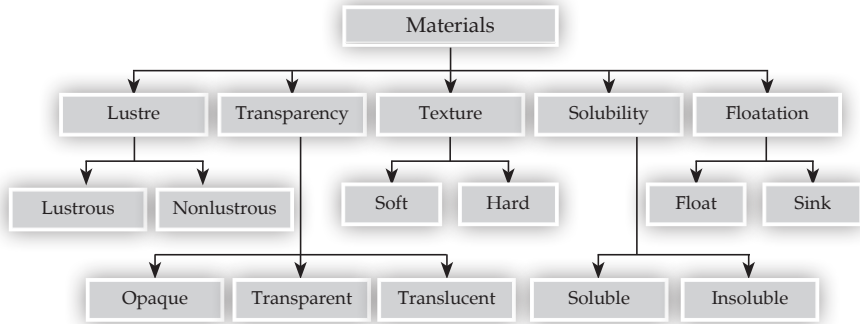
HOTS

1. Sponge being a solid can be compressed because it is made up of soft material and has air filled large spaces inside it.
2. Thin sheet of plastic is a translucent object because it allows light to pass through it partially.
3. Handles of most of the cooking utensils are made of plastic or wood because these materials are bad conductors of heat. Therefore, they do not allow heat to pass through them and hence, do not become hot.

Value-based Questions

1. Manav and Usha are responsible, kind and curious persons.
2. The salt and sugar molecules take the spaces between the water molecules.
3. Wood and oil do not dissolve in water.

LET'S MEMORISE



5. Separation of Substances

Checkpoint 1

1. components
2. handpicking
3. threshing
4. Sieving
5. Winnowing

Checkpoint 2

1. Sedimentation
2. Filtrate
3. Evaporation is the process of converting water into water vapour.
4. Water
5. A solution in which no more solute can be dissolved at a given temperature is called a saturated solution.

Let's Drill Our Skills

- A.** 1. (b) 2. (c) 3. (a) 4. (d) 5. (d)
- B.**
1. Decantation is the process of pouring out liquid after sedimentation to separate insoluble solid from a solid-liquid mixture.
 2. Filtration is a method of separating insoluble solid from a liquid in solid-liquid mixture by passing through a filter.
 3. The substance that settles at the bottom of a liquid is called sediment.
 4. Winnowing is the method of separating husk from grains with the help of wind.
- C.**
1. Salt is obtained from sea water by evaporation.
 2. In a saturated solution no more solute can be dissolved.
 3. The liquid which dissolves a solid in it is called solvent.
 4. Winnowing is used to separate lighter components of a mixture by wind.
 5. Filtration can be used to separate saw dust from a mixture of saw dust and water.

- D. 1. The method of separating a mixture into its components by hand is called handpicking. For example, stones are separated from rice by using the method of handpicking.
2. The process of separating grains from stalks is called threshing.
3. Common salt is obtained from sea water by evaporating sea water trapped in shallow pits in sunlight. It leaves behind a mixture of salts which is purified to obtain common salt.
4. Impurities and bran from flour are separated by sieving. This is because they have various sized particles which can be separated by passing them through a suitable sieve.
5. We need to separate the components of a mixture to remove harmful and useless components and to obtain useful components of the mixture.
- E. 1. Different methods of separation of components of mixtures are as follows:
- (a) **Handpicking:** It is a method of separating the components of a mixture by hand. **Example:** Separation of stones from rice.
- (b) **Threshing:** It is a method for separating grains from stalks. **Example:** Separation of rice from paddy stalks.
- (c) **Winnowing:** It is a method of separation of husk from grains with the help of wind. **Example:** Separation of wheat grains from husk.
- (d) **Sieving:** It is a method of separating mixture of various sized particles by passing them through a suitable sieve. **Example:** Separation of pebbles from sand.
- (e) **Sedimentation and decantation:** By this method, the insoluble solids are separated from solid-liquid mixtures. The solid part of mixture settles at the bottom by the process of sedimentation and the liquid part is poured by the process of decantation. **Example:** Separation of sand from water.
- (f) **Filtration:** By this method, insoluble solid part of a mixture is separated from liquid part by passing the mixture through a filter. **Example:** Separation of sand and water.
- (g) **Decantation:** This method is used to separate two liquids which do not mix with each other. **Example:** Separation of mustard oil from water.
- (h) **Evaporation:** This method is used to separate a solid from solid-liquid mixture by evaporation in which liquid part is converted into vapour. **Example:** Obtaining common salt from sea water.
2. A solution in which no more solute can be dissolved at a given temperature is called a saturated solution.

Saturated solution can be prepared by following activity:

Take 100 mL of water in a beaker. Add a teaspoonful of salt to it and stir well. Repeat the process till no more salt dissolves in water.

The solution so obtained is the saturated solution of salt in water.

- (a) **Sedimentation:** The process of settling of a solid at the bottom of a liquid in a solid-liquid mixture is called sedimentation.
 - (b) **Decantation:** This is the process of pouring out the liquid after sedimentation to separate insoluble solid from a solid-liquid mixture.
 - (c) **Filtration:** The process of separating insoluble solid from a liquid in solid-liquid mixtures by passing them through a filter is called filtration.
4. Salt can be separated from water by following activity:
Take the mixture of salt and water in a china dish. Heat the china dish till all the water boils away. The salt is left behind in china dish after evaporation of water.

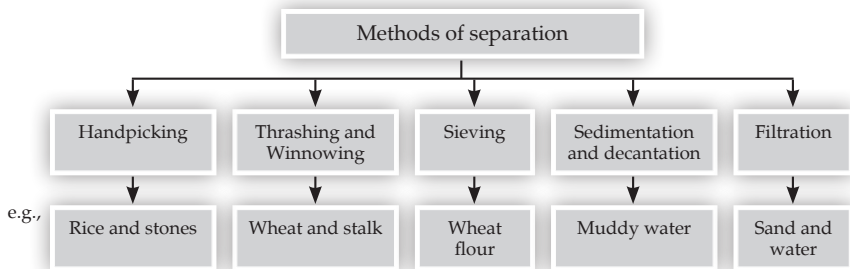
HOTS

1. Water is made to stand undisturbed in large water tanks in water treatment plants to allow the solid waste to settle at the bottom of tank by the process of sedimentation. This helps to make water free from solid waste.
2. Stones and husk are removed from rice before cooking because they are non-edible and hard. They may cause pain in stomach, if taken with food.
3. Water is called a universal solvent because it can dissolve many substances in it.

Value-based Questions

1. Suraj was sieving the tea because tea granules in tea are useless after making tea.
2. Separation of pebbles from sand.
3. Pooja is a caring and aware human being.

LET'S MEMORISE



6. Changes Around Us

Checkpoint 1

1. True 2. False 3. False 4. False 5. True

Checkpoint 2

1. No, physical change is usually reversible.
2. Yes, rusting of iron is a chemical change.
3. A new material is formed in a chemical change.
4. Yes, tearing a paper is a physical change.

Let's Drill Our Skills

- A.** 1. (d) 2. (a) 3. (d) 4. (c) 5. (a)
- B.** 1. chemical 2. chemical 3. physical; chemical 4. irreversible
5. physical; chemical
- C.** 1. A change which can be undone or reversed is called reversible change.
2. A change which cannot be undone or reversed is called irreversible change.
3. A change in which no new material is formed is called a physical change.
4. A change in which a new material is formed is called a chemical change.
- D.** 1. True 2. False 3. False 4. True 5. True
- E.** 1. Melting of an ice cream is a reversible change.
2. Breaking of a cup is a physical change.
3. Breaking of a glass is a physical change because no new substance is formed.
4. Ash and some gases are formed on burning wood.
5. Chemical change cannot be undone or reversed.
- F.** 1. When ice is heated, it melts into liquid water. It is a reversible change because when liquid water is frozen, it changes back into ice.
2. When lemon juice is mixed with baking powder, a gas is formed. It is a chemical change because on mixing these substances, a new substance which is a gas is formed.
3. Steaming of idli batter to get idlis is an irreversible change because we cannot get back idli batter from idlis.
4. (a) Melting of ice into liquid water – Reversible change
(b) Evaporation of water into water vapour – Reversible change
(c) Condensation of water vapour into liquid water – Reversible change
(d) Melting of wax into liquid wax – Reversible change
(e) Baking of cake batter – Irreversible change
(f) Curdling of milk – Irreversible change

5. On burning paper, ash and some gases are formed. We cannot get back paper from its ash. Therefore, burning of paper is an irreversible change.
- G. 1. Physical and chemical changes can occur simultaneously. For example, on burning a candle, solid wax melts which is a physical change, and at the same time, vapour of wax burns to produce a new substance, which is a chemical change.
2. Differences between reversible and irreversible changes

Reversible change	Irreversible change
<ul style="list-style-type: none"> ● A change which can be undone or reversed is called a reversible change. 	<ul style="list-style-type: none"> ● A change which cannot be undone or reversed is called an irreversible change.
<ul style="list-style-type: none"> ● A reversible change is a temporary change. 	<ul style="list-style-type: none"> ● An irreversible change is a permanent change.
<ul style="list-style-type: none"> ● Dissolving, melting, freezing and folding are examples of a reversible change. 	<ul style="list-style-type: none"> ● Burning, baking, cooking, etc., of any substance are examples of an irreversible change.

3. Differences between physical and chemical changes

Physical change	Chemical change
<ul style="list-style-type: none"> ● A physical change is that in which no new material (substance) is formed. 	<ul style="list-style-type: none"> ● A chemical change is that in which new material (substance) is formed.
<ul style="list-style-type: none"> ● Most physical changes are reversible. 	<ul style="list-style-type: none"> ● Most chemical changes are irreversible.
<ul style="list-style-type: none"> ● Evaporation and condensation are examples of physical changes. 	<ul style="list-style-type: none"> ● Burning and cooking are examples of chemical changes.

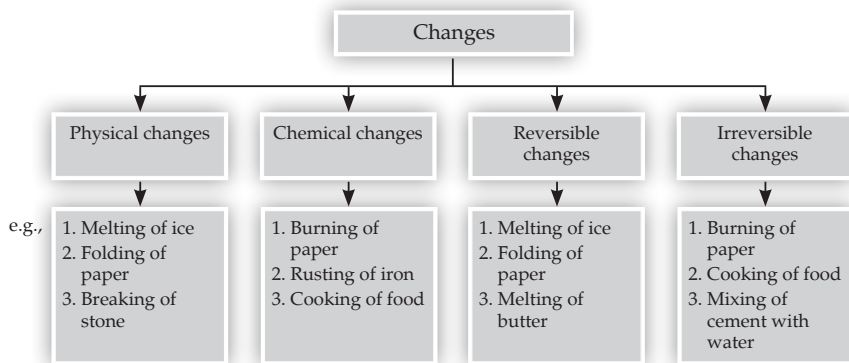
HOTS

1. Burning of a candle is considered physical as well as chemical changes because on burning the candle, solid wax melts which is a physical change, and at the same time, vapour of wax burns to produce a new substance, which is a chemical change.
2. Melting of butter is a physical change because during the melting no new substance is formed.

Value-based Questions

1. Cooking of food is a chemical change.
2. Curdling of milk and burning of paper.
3. Mamta is an aware and alert person.

LET'S MEMORISE



7. Living and Nonliving Things

Checkpoint 1

1. Living things are called organisms.
2. Cell is the basic unit of life.
3. The living substance of a cell is called protoplasm.
4. Sunflower moves its head towards the sun.
5. All animals and nongreen plants are heterotrophs.

Checkpoint 2

1. respire 2. waste 3. air tubes 4. water 5. response

Checkpoint 3

1. True 2. True 3. False 4. False 5. True

Let's Drill Our Skills

- A. 1. (c) 2. (a) 3. (b) 4. (c) 5. (a) 6. (b)
- B. 1. single 2. gills 3. photosynthesis 4. resin 5. seeds
- C. 1. (d) 2. (e) 3. (a) 4. (c) 5. (b)
- D. 1. The process of inhaling fresh air into lungs and exhaling used air from lungs through our nose is called breathing.
2. The process of burning or oxidation of food inside the body cells to release energy is called respiration.
3. The organisms which can make their food from carbon dioxide and water using solar energy are called autotrophs.
4. The organisms which cannot make their own food and eat plants or other organisms are called heterotrophs.

- E. 1. The change in the surroundings that makes us to react to it is called stimulus.
2. In respiration, oxidation of food releases energy.
 3. The period for which an organism lives is called lifespan.
 4. The emergence of a seedling from a seed is called germination.
 5. The single-celled organisms are called unicellular organisms.
 6. Fish and birds are egg-laying animals.
 7. Urea is the excretory product formed by the breakdown of proteins.
- F. 1. The movement of a whole organism from one place to another is called locomotion, whereas the change in the position of any body part of an organism is called movement.
2. Living organisms need food to get the energy stored in food. They get this energy by oxidation of food inside the body cells. They use this energy for various life processes.
 3. Animals reproduce by giving birth to young ones or by laying eggs. For example, animals like dogs, cats, cows, etc., give birth to young ones, whereas fishes, frogs, birds and lizards lay eggs which hatch into young ones.
 4. Plants grow throughout their life but animals stop growing after a particular age.
 5. Respiration is the process of burning or oxidation of food inside the body cells to release energy, whereas breathing is the process of inhaling fresh air into lungs and exhaling used air from the lungs.
 6. Stimulus is the change in the environment that evokes an organism to react to it, whereas the reaction to the stimulus is called response.
- G. 1. Living things have following characteristics:
- (a) **Living things are made up of cells:** The body of all living things is made up of tiny units called cells.
 - (b) **Living things show movement:** All living things show movement. Animals move in search of food and shelter, whereas plants move their shoot towards light and roots towards water.
 - (c) **Living things need food:** All living things need food to get energy for carrying out various life activities.
 - (d) **Living things respire:** All living things respire to get energy. They get his energy by burning food inside their body cells.
 - (e) **Living things excrete:** All living things excrete waste and other harmful substances formed inside the body.
 - (f) **Living things respond:** All living things respond to changes in their surroundings.
 - (g) **Living things reproduce:** All living things reproduce by producing their own kind.
 - (h) **Living things grow:** All living things grow in size by the addition of new cells.

(i) **Living things have a definite lifespan:** All living things start their life with birth and it ends with their death.

2. Differences between living and nonliving things

Living things	Nonliving things
● Living things are made up of cells.	● Nonliving things are not made up of cells.
● Living things can repair the damage caused to their body.	● Nonliving things cannot repair the damage.
● Living things change according to changes in their environment (adaptation).	● Nonliving things are unable to adapt.
● Living things show movements.	● Nonliving things do not move on their own.
● Living things need food for growth, repair and energy.	● Nonliving things do not take food.
● Living things respire to get energy.	● Nonliving things do not respire.
● Living things produce excretory waste.	● Nonliving things do not excrete.
● Living things respond to stimuli.	● Nonliving things do not respond to stimuli.
● Living things reproduce their own kind.	● Nonliving things do not reproduce.
● Living things grow. The growth is internal and irreversible.	● Nonliving things do not grow. The increase in size is external and reversible.
● Living things follow a definite life cycle.	● Nonliving things do not follow any life cycle.
● Living things have a definite lifespan.	● Nonliving things do not have a definite lifespan.

3. The different stimuli to which plants give response are changes in light, temperature, touch, moisture, etc. The roots of plants always grow downward towards water and the stem grows upward towards light. The leaves of some plants also respond to touch stimulus. For example, leaves of touch-me-not plant get folded when touched.

HOTS

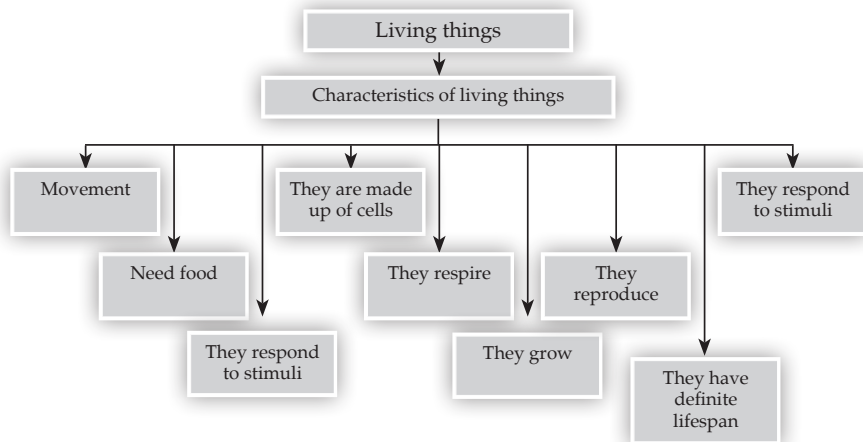
1. A car is called nonliving thing because it moves by some external force.

2. Touch-me-not plant folds its leaves when touched because it gives response to the stimulus of touch.
3. Green plants are called autotrophs because they can make their food themselves using raw materials.

Value-based Questions

1. Resin, gum and latex.
2. Sumit's mother is a nature lover and an aware person.

LET'S MEMORISE



8. Habitat of the Living Things

Checkpoint 1

1. Environment
2. habitat
3. aquatic
4. arboreal
5. tundra

Checkpoint 2

1. Xerophytes
2. Camouflaging
3. Caudal fin
4. Nocturnal
5. Carnivores

Checkpoint 3

1. True
2. True
3. False
4. True
5. False

Checkpoint 4

1. Humus is a decaying plant and animal matter which is found in the topmost layer of the soil. It makes the soil fertile.
2. Soil provides water and minerals to plants.
3. About 71 per cent of the earth is covered with water.
4. Oxygen gas is required by living organisms for respiration.
5. Sun is the ultimate source of energy.

Let's Drill Our Skills

- A. 1. (c) 2. (c) 3. (a) 4. (a) 5. (d) 6. (c)

- B.** 1. biotic 2. drip tips 3. 0 4. ozone 5. abiotic
- C.** 1. The living components of environment are called biotic components. They are plants, animals and microorganisms. On the other hand, the physical components of environment are called abiotic components. They are air, water, soil, temperature, etc.
2. Plants growing in deserts are called xerophytes, whereas plants growing in water are called hydrophytes.
3. The habitat of water is called aquatic habitat. It includes oceans, seas, rivers, ponds, lakes, pools, etc. On the other hand, the land habitat is called terrestrial habitat. They are forests, deserts, tundra and mountains.
4. Animals which eat plants are called primary consumers, whereas animals which eat primary consumers (herbivores like cow, deer, etc.) are called secondary consumers (lion, tiger, etc.).
- D.** 1. (d) 2. (a) 3. (b) 4. (c)
- E.** 1. The study of relationship among living beings and with their surroundings is called ecology.
2. Cacti, date palm, Acacia, etc. grow in desert.
3. Animals which eat plants are called herbivores.
4. The animals which feed on dead animals are called scavengers.
5. Caudal fin helps fish to change the direction while swimming.
- F.** 1. The biotic components of environment are plants, animals and microorganisms. They depend on each other. Animals depend on plants for oxygen, food, medicines, shade, shelter, wood, timber, etc. In return, animals help in pollination, dispersal of seeds and provide carbon dioxide to plants. The decomposers release nutrients from dead organisms and help in recycling of nutrients in the environment.
2. Soil is formed by the weathering of rocks by wind and water.
Uses of soil: (a) Soil provides water and minerals to plants.
 (b) It provides platform to plants for their growth.
 (c) It supports roots of the plants.
 (d) It is a living space for microorganisms, worms, slugs, snails, rats, snakes, etc.
3. Ozone layer acts as a blanket over the earth. It absorbs harmful ultraviolet rays of the sun and prevents them from reaching the earth's surface.
4. All living beings take in oxygen and give out carbon dioxide during respiration. On the other hand, green plants take in carbon dioxide and release oxygen during photosynthesis. In this way, balance of carbon dioxide and oxygen is maintained in nature.
5. Floating plants float freely on the surface of water. They have swollen and spongy stems and leaves. On the other hand, submerged plants

remain under water and their roots are embedded in the mud. They have narrow leaves with no stomata.

- G. 1.** Aquatic animals like fish have the following adaptations to live in water:
- (a) **Streamlined and spindle-shaped body:** This body shape reduces friction with water and helps aquatic animals to swim.
 - (b) **Gills:** Fish use gills to breathe in oxygen dissolved in water.
 - (c) **Fins:** Fins propel the fish in water and help in swimming.
 - (d) **Caudal fin:** It steers the body and helps in changing the direction while swimming.
 - (e) **Scaly and slippery skin:** The hard waterproof scales and slime on the body surface protect aquatic animals from rotting in water.
- 2.** Camels show a number of adaptations to survive in desert:
- (a) They have thick skin to prevent loss of water.
 - (b) Excrete concentrated urine.
 - (c) Store water by drinking large quantity of water at a time.
 - (d) Hump at the back stores fat which provides them energy and water.
 - (e) Large padded soles help in walking on loose sand.
- 3.** Desert plants have following adaptations to survive in deserts:
- (a) They have long roots to absorb water from deeper layers.
 - (b) They have fleshy stems to store water.
 - (c) To prevent loss of water by evaporation, the leaves are modified into spines, as in cactus.
 - (d) To carry out photosynthesis, the stems are green.
- 4.** Air is a mixture of gases. It contains 78% nitrogen, 21% oxygen, 0.03% carbon dioxide, 0.95% noble gases, 1% other gases, water vapour, dust particles and smoke.
- Uses of air:**
- (a) Air forms a blanket around the earth called atmosphere which prevents the escape of heat from the earth into the space.
 - (b) Oxygen in the air is essentially required for respiration by all organisms.
 - (c) Carbon dioxide in the air is used by plants for photosynthesis.
 - (d) Nitrogen of air is converted into nitrogenous salts which are used by plants for the synthesis of proteins.
 - (e) Air helps in the dispersal of seeds and fruits and also in the pollination of flowers.
- 5. (a) Adaptations in boreal plants**
- (i) The leaves of boreal plants are needle-like which allow snow to slide down easily and prevent loss of water by evaporation.

- (ii) Boreal plants get less sunlight. Therefore, they conserve energy by not shedding their leaves.
- (b) **Adaptations in animals of boreal forests**
 - (i) Animals of boreal forests have thick layer of fur or feathers to keep them warm.
 - (ii) They are usually white in colour which helps them in camouflaging with the snow.
 - (iii) Some animals of boreal forests hibernate during winter or move to warmer places.

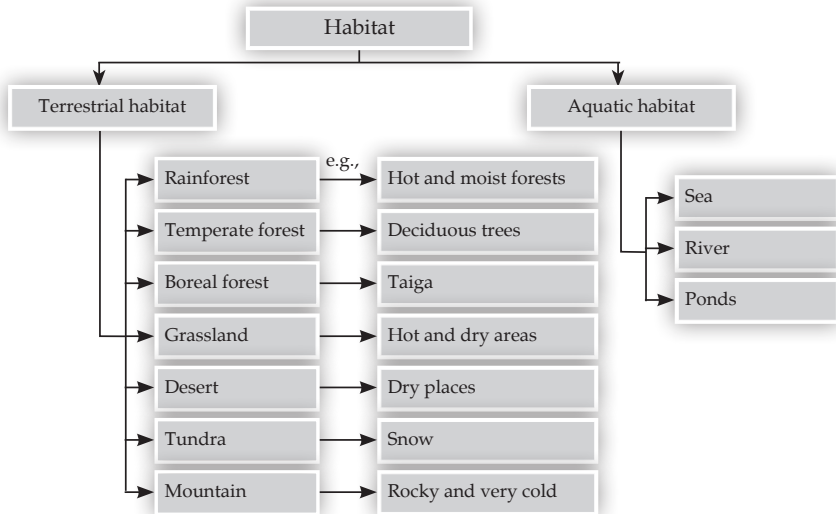
HOTS

1. The streamlined shape reduces friction with water. This helps fishes swim in water easily. Therefore, fishes have streamlined body.
2. The tadpole of frog lives in water. Therefore, it has gills for respiration, whereas frog lives on land, and therefore, it has lungs for respiration.
3. The cactus grows in deserts in the scarcity of water. Therefore, to prevent the evaporation of water from leaves, its leaves change into spines and to carry out the main function of leaves which is photosynthesis, its stem becomes green.
4. Green colour and leaf-like structure of some insects help them in blending with their surroundings that they cannot be identified by their enemies.

Value-based Questions

1. Yak, mountain goat, snow leopard, rabbit, etc.
2. Rahul is a kind, animal-lover, alert, aware and curious person.

LET'S MEMORISE



9. Plants — Form and Functions

Checkpoint 1

1. trunk
2. Creepers
3. climber
4. shoot system
5. Roots

Checkpoint 2

1. Stem
2. Flattened stem
3. Stem tendrils
4. Corm
5. Thorns

Checkpoint 3

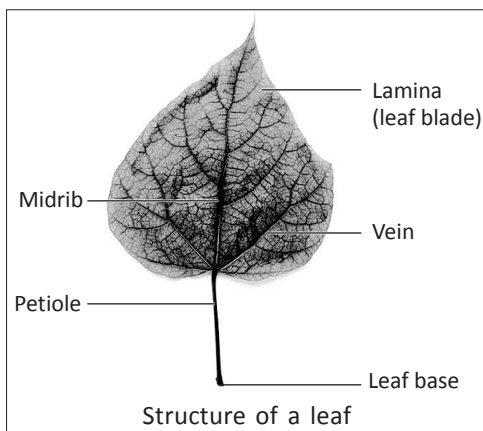
1. Leaves
2. reticulate
3. Thalamus
4. Calyx
5. petiole

Let's Drill Our Skills

- A.** 1. (c) 2. (b) 3. (a) 4. (b) 5. (a)
- B.** 1. (g) 2. (d) 3. (b) 4. (h) 5. (a) 6. (e) 7. (c) 8. (f)
- C.**
1. The leaves without a petiole are called sessile leaves.
 2. The main root of taproot system is called primary root.
 3. Perennation is the survival of some plants from one season to the next by means of stored food in their underground part.
 4. Transfer of pollen grain from anther to stigma is called pollination.
- D.**
1. Herbs are small plants with soft and green stem having a lifespan of few months to one year, whereas shrubs are medium-sized woody plants which survive for several years.
 2. The root which is formed of one main long root and its branches is called taproot, whereas the root which is formed of cluster of fibre-like roots at the base of the stem is called fibrous root.
 3. Monocot leaves are sessile and have parallel venation, whereas dicot leaves are stalked and have reticulate venation.
 4. Calyx is the outermost whorl of the flower formed of green leaf-like sepals, whereas corolla is a whorl just inside the calyx and is made up of brightly coloured or scented petals.
- E.**
1. Cacti and succulents are desert plants which grow in the scarcity of water. To save water, the leaves of cacti get modified into spines and to carry out the main function of leaves which is photosynthesis, its stem becomes green. The stem of succulents stores water and becomes fleshy.
 2. Petals are brightly coloured and sweet scented to attract insects for pollination.
 3. Some leaves in pea form thread-like structures called leaf tendrils to provide support to its weak stem to climb by coiling around some object.
 4. In some plants, stems stored food to be used during unfavourable season when their food preparing green aerial part does not survive.
- F.**
1. The network of veins and veinlets in the lamina of leaf is called venation.
 2. The modified stem of onion is called bulb.
 3. Stilt roots provide additional support to the plant.

4. The flowers having both stamens and carpels are called bisexual flowers.
- G.**
1. (a) Roots anchor the plant in the soil.
(b) Roots absorb water and minerals from the soil.
 2. The root which is formed of one main long root and its branches is called taproot, whereas the root which is formed of cluster of fibre-like roots at the base of the stem is called fibrous root.
Taproot is found in dicot plants like gram, bean, pea, mango, etc.
Fibrous root is found in monocot plants like maize, wheat, rice, grass, etc.
 3. Stem tendril provides support to weak stem by coiling around some object. Stem tendril is found in grapevine and passion flower.
 4. Androecium is the collection of stamens which form the male reproductive organs of a flower. Gynoecium is the female reproductive part of the flower. It is formed of one or many carpels.
 5. (a) Leaves manufacture food by the process of photosynthesis.
(b) Leaves expel excess of water through stomata by the process of transpiration.
(c) Leaves carry out respiration by breathing in oxygen and breathing out carbon dioxide through stomata.

- H. 1.** A leaf is attached to the stem with its **leaf base**. The stalk of the leaf is called **petiole**. It connects leaf base with leaf blade. The leaf blade is called **lamina**. It is the green, flat and expanded part of the leaf. The petiole of leaf extends in lamina as **midrib**. The midrib branches into **veins** which further branch into fine veins called **veinlets**.



2. (a) Stem supports branches, leaves, flowers and fruits.
(b) It keeps leaves spread out so that they can get enough sunlight.
(c) Stem conducts water and minerals absorbed by roots and food manufactured by leaves to other parts of the plant.
(d) In some plants, stem is modified to carry out following functions:
 - (i) It becomes green to manufacture food as in cactus.
 - (ii) It stores food by growing underground for perennation as in potato, ginger, etc.

(iii) Some branches of stem become thread-like structures called tendrils to support the weak stem as in grapevine and passion flower.

(iv) Stem modifies into thorns to protect the plants from grazing animals as in rose, lemon, etc.

3. A flower has following parts:

(a) **Pedicel:** It is the stalk of the flower with which it is attached to the plant.

(b) **Thalamus:** It is the upper swollen end of the pedicel to which all floral parts are attached.

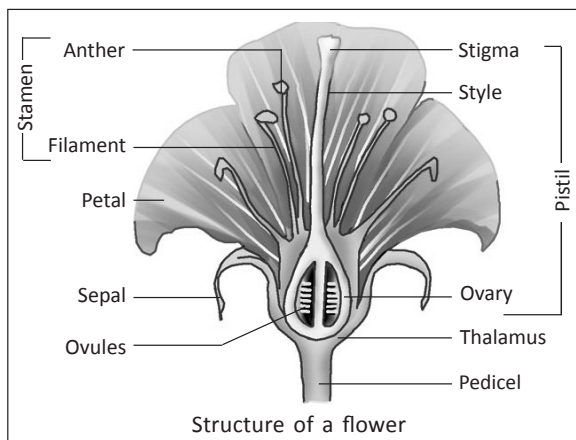
(c) **Sepals:** They are green leaf-like structures that form outermost whorl of the flower called calyx.

(d) **Petals:** They are brightly coloured and scented leafy structures that form the whorl called corolla.

(e) **Stamens:** They are male reproductive organs which form the third whorl of the flower called androecium.

(f) **Carpels or pistils:** They are the female reproductive organs which form the fourth whorl of the flower called gynoecium.

Each carpel is made of a terminal expanded part called stigma, a long, thread-like middle part called style and a basal swollen part called ovary. The ovary contains ovules.



4. The stem can have following modifications:

(a) The stem of cactus becomes green and flattened to carry out photosynthesis.

(b) Stems of potato, ginger, gladiolus and zimikand grow underground and store food for perennation.

(c) Some branches of the stem of grapevine and passion flower modify into thread-like structures called stem tendrils. They support the weak stem by coiling around some support.

(d) Stems of rose, lemon and *Bougainvillea* modify into thorns to protect the plant from grazing animals.

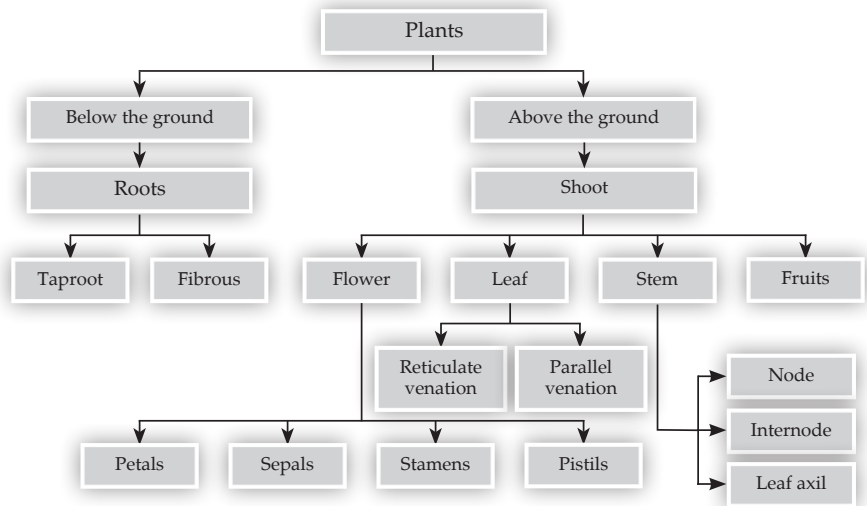
HOTS

1. Calyx and corolla are called accessory whorls because they do not take part directly in the process of reproduction.
2. Flowers that open at night are white in colour to attract insects for pollination as white colour is visible in dark.
3. Nectar is a sweet liquid. Some flowers produce nectar to attract insects which help in pollination.
4. The plant has fibrous roots which are found in monocot plants. Therefore, its leaves will have parallel venation.

Value-based Questions

1. Deforestation is done to clear land for making buildings, roads, houses, etc. and for growing crops.
2. Deforestation is bad for environment because it causes global warming, soil erosion, floods and drought.
3. Sumit and Vansh are responsible and aware citizens.

LET'S MEMORISE



10. Body Movements

Checkpoint 1

1. bristle-like
2. adhesive pads
3. boat-shaped
4. wings

Checkpoint 2

1. bony
2. 33
3. three
4. pelvis

Checkpoint 3

1. hinge
2. cartilage
3. muscles
4. shocks; friction
5. biceps

Let's Drill Our Skills

- A. 1. (b) 2. (b) 3. (a) 4. (c) 5. (c)
- B. 1. bones; cartilages 2. invertebrates 3. skull 4. zigzag
5. spinal cord 6. triceps
- C. 1. The movement of an animal as a whole from one place to another is called locomotion.
2. The joint where one bone moves freely on the other is called synovial joint.
- D. 1. The hard framework present within the body is called skeletal system.
2. Biceps and triceps muscles control the movement of arms.
3. Tendon attaches muscles to the bone.
4. The ring-shaped bony structures which protect the spinal cord are called vertebrae.
5. Ligament joins the two bones and keeps them in position.
- E. 1. In a pivot joint, one bone rotates on the rounded or conical end of the other bone in many planes, i.e., up and down and side-to-side. On the other hand, in a ball and socket joint, the end of one bone is rounded as a ball which fits into a socket in the other bone. The bone with ball-like head freely moves in all directions.
2. Ligaments are bands of flexible connective tissue which hold and keep two bones in position at a joint, whereas tendons are bands of tough and fibrous connective tissue which connect muscles to bones.
3. An earthworm moves by crawling movements produced by the alternate contraction and relaxation of muscles of the body wall. While moving, earthworm holds the rear part of the body to the surface and extends its front part. Then the extended front part holds the surface and rear part is released and is pulled forward. By repeating these movements, the earthworm crawls ahead on the ground.
4. A cockroach has three pairs of legs for walking and running. The first pair of legs pulls the body forwards and the third pair of legs pushes the body from behind. This movement is repeated. It also has two pairs of wings to fly.
5. Bones move at the joints by the contraction and relaxation of muscles attached to them. As muscles work in pairs, when one muscle of the pair contracts, the other one relaxes. For example, we raise our arm by the relaxation of triceps and contraction of biceps muscles which pull the arm up.
- F. 1. The point where two bones are joined together is called a joint. Joints are of following types:
(a) **Immovable or fixed joints:** These joints are found between the

skull bones where bones join together to form a single protective covering.

- (b) **Partially movable joints:** These joints allow partial movement of bones. For example, joint between ribs and breastbone.
 - (c) **Freely moveable joints or synovial joints:** These are the joints where one bone moves freely on the other. These joints are of following types:
 - (i) **Ball and socket joint:** In this joint, the rounded end of one bone fits and moves freely in the socket of other bone. For example, joint between the upper arm and shoulder bone.
 - (ii) **Hinge joint:** This joint allows movement of one of the two bones in one direction and only up to 180° . For example, elbow joint and knee joint.
 - (iii) **Pivot joint:** In this joint, one bone rotates on the rounded or conical end of the other bone in many planes. For example, joint between skull and first vertebra.
 - (iv) **Gliding joint:** This joint allows the two bones to slide upon each other. For example, joints between wrist bones.
 - (v) **Saddle joint:** In this joint, one bone is movable on the other fixed bone. The movable bone can move in many directions. For example, the thumb joint.
2. Human backbone is a bony tube which is made up of 33 small ring-like structures called vertebrae. It protects the spinal cord. It has following five regions:
- (a) **Neck region:** This region is made up of 7 cervical vertebrae.
 - (b) **Chest region:** This region has 12 thoracic vertebrae.
 - (c) **Belly region:** This region has 5 lumbar vertebrae.
 - (d) **Hip region:** This region has 5 sacral vertebrae.
 - (e) **Tail region:** This region has 4 caudal vertebrae.
3. Birds have following characteristics that help them to fly:
- (a) Body is spindle-shaped or streamlined to make the way through air.
 - (b) Bones are hollow but strong. They are filled with air. This makes the body of a bird light for flying in air.
 - (c) Their forelimbs are modified into wings.
 - (d) Their shoulder bones are strong.
 - (e) The breastbone is broad for the attachment of breast muscles.
 - (f) Powerful breast muscles move the wings up and down.
4. A fish has following features for swimming:
- (a) Body is boat-shaped and streamlined. This body shape offers least resistance while swimming.
 - (b) Body muscles create wave-like movements of the body to push the fish forward.

- (c) Tail is muscular having a tail fin. Its side-to-side movements push the water downwards and backwards which in turn push the fish upwards and forwards.
- (d) Tail also helps in changing the direction of movement while swimming.
- (e) The paired fins and the median dorsal fins keep the balance of body while swimming.
- (f) During swimming, muscles in the front part of the fish body make it to curve to one side. The tail curves in the opposite side. This creates a jerk and pushes the body forward.

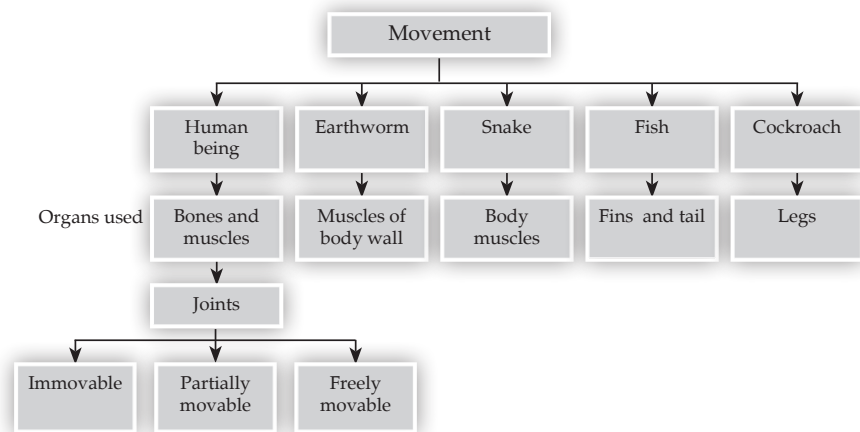
HOTS

1. Some long bones have red bone marrow for the formation of red blood cells.
2. The cartilage cap on the head of long bones protects them from friction when one bone moves over the other.
3. The setae in earthworm provide grip on the surface while crawling and thus, help the earthworm in movement.

Value-based Questions

1. X-ray machine.
2. Rishab is a responsible and aware person.

LET'S MEMORISE



11. Measurement and Motion

Checkpoint 1

1. Measurement is the comparison of an unknown quantity with a fixed known quantity of the same kind.
2. The width of a finger was called one angul.

3. A cubit cannot be taken as a standard unit because it does not give exact measurement, since the size of arms varies from person-to-person.
4. Foot is a personal unit of measurement which is the length of the foot of a person.
5. A unit of measurement which is accepted universally is called a standard unit.

Checkpoint 2

1. The SI unit of length is metre.
2. (a) 1000 (b) $1/1000$ (c) $1/100$
3. $\therefore 1000 \text{ m} = 1 \text{ km}$
 $\therefore 7000 \text{ m} = \frac{7000}{1000} \text{ km} = 7 \text{ km}$
4. $\therefore 1 \text{ km} = 1000 \times 100 \text{ cm}$
 $= 100000 \text{ cm}$
 $\therefore 1.5 \text{ km} = 1.5 \times 100000$
 $= 150000 \text{ cm}$
5. $\therefore 1 \text{ cm} = 10 \text{ mm}$
 $\therefore 39 \text{ cm} = 39 \times 10 \text{ mm}$
 $= 390 \text{ mm}$

Checkpoint 3

1. Curvilinear motion
2. Circular motion
3. Rotatory motion
4. Oscillatory motion
5. Periodic motion
6. Simultaneous motion

Let's Drill Our Skills

- A.** 1. (c) 2. (c) 3. (d) 4. (c) 5. (a)
- B.** 1. rotatory 2. angular 3. periodic 4. curvilinear 5. rest
- C.** 1. A car moving on a hilly road and a car taking a turn on a curved road.
 2. Pendulum of a clock and swinging of leaves on the branch of a tree.
 3. Movement of our legs while walking and beating of drum.
 4. A bus moving on a straight road, a bus moving on a hill slope.
- D.** 1. Anything which can be measured is known as a physical quantity.
 2. A unit in international system is called SI unit.
 3. When an object moves on a circular path around a fixed point, its motion is called circular motion.
 4. The motion which repeats itself after a fixed period of time is called periodic motion.
- E.** 1. The SI unit of length is metre.
 2. We should not measure the length with handspan because it does not give exact measurement, since the size of palm varies from person-to-person.
 3. Measurement is the comparison of an unknown quantity with a fixed known quantity of the same kind.

4. The earth undergoes rotation and revolution when it moves around the sun.
 5. The fixed known amount of a quantity which is universally accepted is called the SI unit.
- F.
1. An object is said to be in motion when it changes its position with respect to a fixed object with time. On the other hand, an object is said to be at rest when it does not change its position with respect to a fixed object with time.
 2. There is need of standard units of measurement as contrary to personal units, standard units do not vary. They are fixed, universally accepted, give exact measurement of objects and make day-to-day life easy.
 3. (a) A rolling ball has rotatory motion due to rolling around its axis and translatory motion as it moves from one position to other.
(b) A motorcycle moving on a road undergoes translatory motion and rotatory motion due to rotation of its wheels.
 4. (a) In rectilinear motion, an object moves along a straight path, whereas in circular motion, an object moves on a circular path around a fixed point.
(b) In rectilinear motion, the starting and the end positions are at different points but in circular motion they are at the same point.
 5. The motion which repeats itself after a fixed period of time is called periodic motion. The rotation of earth is an example of periodic motion.
- G. 1. Different types of motion are as follows:
- (a) **Translatory motion:** If a body moves on the whole, from one place to another such that all its body parts move the same distance in a given time, it is said to be in translatory motion. It is of two types:
 - This motion is called rectilinear motion when a body moves along a straight path. For example, when a vehicle moves along a straight path.
 - When a body moves on a curved path, the translatory motion is called curvilinear motion. For example, a vehicle moving on a hilly road.
 - (b) **Circular motion:** When an object moves on a circular path around a fixed point, it is said to be in circular motion. For example, the motion of earth around the sun called revolution is a circular motion.
 - (c) **Rotatory motion:** When an object moves on a fixed axis without changing its position, it is said to be in rotatory motion. For example, the rotation of the earth on its axis is a rotatory motion.
 - (d) **Oscillatory motion:** When an object moves to and fro about a

fixed point, it is said to be in oscillatory motion. For example, the motion of pendulum in a wall clock is oscillatory motion.

- (e) **Periodic motion:** The motion which repeats itself after a fixed period of time is called periodic motion. For example, rotation of the earth on its axis.
- (f) **Nonperiodic motion:** The motion which repeats itself at irregular intervals of time is called nonperiodic motion. For example, the heartbeat of a sick person is a nonperiodic motion.
- (g) **Simultaneous motion:** When an object undergoes two motions simultaneously, it is said to be in simultaneous motion. For example, a ball rolling on a floor undergoes rotatory as well as translatory motions.
2. The length of a curved line can be measured by using a thread as follows:
Take a thread and tie a knot at its one end. Place the knot at starting point of the curved line. Carefully move the thread along the length of the curved line, holding the thread at small distances between thumb and first finger. On reaching the end point of the curved line, put a mark on the thread using a pen.
Now, stretch the thread along a metre scale and measure the length between the knot and the pen mark. This is the length of the curved line.

$$\begin{aligned} 3. \therefore & 100 \text{ cm} = 1 \text{ m} \\ \therefore & 1 \text{ cm} = \frac{1}{100} \text{ m} \\ \therefore & 500 \text{ cm} = \frac{1}{100} \times 500 \text{ m} \\ & = 5 \text{ m} \end{aligned}$$

4. The length can be measured by using a scale as follows:
Step 1: Place the scale along the length to be measured such that the zero mark of the scale is at one end of the length.
Step 2: Keep the eye just vertically above the marking on the scale coinciding the other end of the length and note down the reading.

HOTS

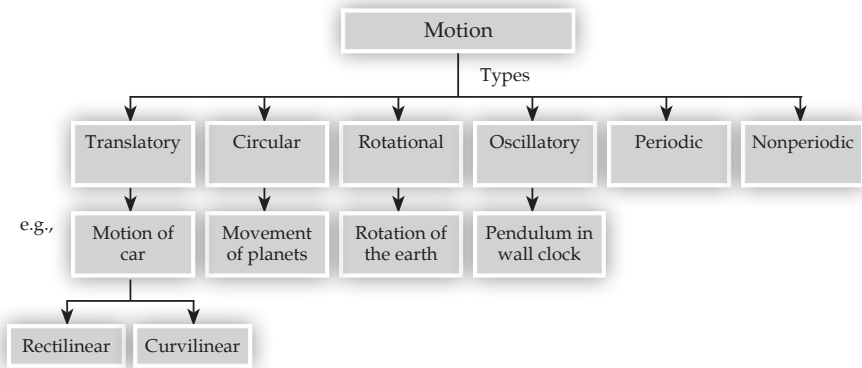
1. The thickness of book includes thickness of 200 pages and thickness of cover pages, i.e.,
Thickness of book = thickness of 200 pages + thickness of cover pages
- $$\therefore \text{Thickness of one sheet} = 0.005 \text{ cm}$$
- $$\text{No. of sheets in 200 pages} = \frac{200}{2} = 100 \text{ sheets}$$

- ∴ Thickness of 100 sheets = 0.005×100
 = 0.5 cm
 Thickness of cover pages at 2 sides = $0.05 \times 2 = 0.10$ cm
 The thickness of book = 0.5 cm + 0.1 cm
 = 0.6 cm
2. The length of thread around a circular ball = 1 rotation
 i.e., 2 m = 1 rotation
 Length of thread required for 3 rotations = $3 \times 2 \text{ m} = 6 \text{ m}$

Value-based Questions

- The SI unit of length is metre.
- Pragun is an aware, kind and helpful person.

LET'S MEMORISE



12. Light, Shadow and Images

Checkpoint 1

- (a) light
 (b) transparent
 (c) natural luminous
- Transparent:** Glass window
Translucent: Oil, greased paper, ground glass
Opaque: Wooden door, talcum powder, mirror, mouse pad

Checkpoint 2

- blocking
- reflection
- rectilinear propagation
- reflection
- incident

Let's Drill Our Skills

- A.** 1. (b) 2. (c) 3. (d) 4. (b) 5. (d)
B. 1. luminous 2. transparent 3. smooth; shiny 4. translucent
 5. images 6. shadow

- C.**
1. A shadow is the darkness that an object causes when it prevents light from falling on another object.
 2. Bouncing back of light on striking a highly polished surface is called reflection.
 3. A mirror is a smooth and polished surface from where reflection can take place.
 4. Light is a form of energy that helps us to see things around us.
 5. The figure of an object formed by reflected rays of light is called the image.
- D.**
1. Objects which emit light are called luminous objects, e.g., the sun, the stars, firefly, etc. On the other hand, objects which do not emit light are called nonluminous objects, e.g., chair, tree, stone, etc.
 2. Materials that do not allow light to pass through them are called opaque materials, e.g., wood, plastic, rubber, etc. On the other hand, materials that allow light to pass through them are called transparent materials, e.g., glass, water, etc.
- E.**
1. (e) 2. (c) 3. (a) 4. (b) 5. (d)
- F.**
1. An object which does not emit light of its own is called a nonluminous object.
 2. Image shows details and colours of the object.
 3. The ray of light travelling from an object to the mirror is called incident ray.
 4. A translucent material allows light to pass through it partially.
 5. The speed of light in vacuum is 3,00,000 km/s (or 3×10^8 m/s).
- G.**
1. The shadow of an object is formed when the light is blocked by it. We can obtain the shadow of an object by performing the following activity:
Hold a torch and let its light fall on a wall. Now, suspend an opaque object like ball between the wall and the torch. A dark region whose outline resembles that of the ball is formed on the wall. This dark region is the shadow of the ball.
 2. Following are the features of an image:
 - (a) The image of an object is formed by the reflected rays of light.
 - (b) Different shapes of reflecting surfaces form images of different shapes and sizes.
 - (c) The image can be erect or inverted depending upon the shape of the reflecting surface.
 - (d) The image shows the exact details and true colours of the object.
 3. The rectilinear propagation property of light is used in the working of a pinhole camera.
If we keep a lighted candle in front of the hole of the camera and look into camera through its opposite end with one eye, we can see an inverted picture of the candle on the screen of camera.

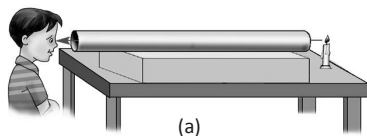
4. Differences between an image and a shadow

Image	Shadow
An image shows the exact details of the object.	A shadow does not show the details of the object.
The image is formed due to reflection from an opaque, smooth and shiny surface.	A shadow is formed due to the blocking of light by an opaque object.
The image shows true colours of the object.	A shadow is always dark.

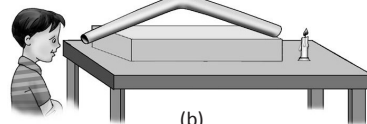
5. Only opaque objects form shadow because they do not allow light to pass through them. They block the path of light falling on them and hence, their shadow is formed.

H. 1. We can prove that light travels in straight line by performing the following activity:

Take a thin aluminium tube approximately 30 cm long. Light a candle, place it on a table and see it through the tube. The candle is visible. Now, give a small bend to the tube. Place it in between the candle and one of your eyes, keeping the other eye closed. The candle is not visible this time.



(a)



(b)

This shows that light travels in a straight line.

2. A shadow has following characteristics:

- A shadow is formed only when the light is blocked by an opaque object.
- A shadow is only a dark region, which does not show any colour or the details of the object.
- A shadow may or may not resemble the actual shape of the object.
- A shadow can be formed only on a screen.
- The size of a shadow is relative to the position of the light source with respect to object.

3. A pinhole camera is based on the rectilinear propagation of light.

Construction: Take a piece of tracing paper, a piece of black chart paper, thin needle, two tubes of about 30 cm long having widths such that one fits into another and can slide one over the other with no gap left between them.

- Cover one end of the wider tube with a piece of black chart paper and make a small hole in its centre with the help of a needle.

- Cover one end of the smaller tube with a piece of tracing paper.
- Carefully slide the smaller tube into the wider tube.

Working: Keep a lighted candle in front of the hole of the camera and look into camera through its opposite end with one eye closed. An inverted picture of the candle is seen on the screen of camera.

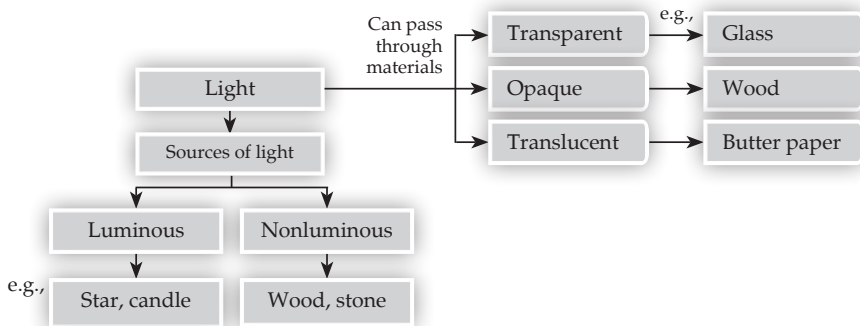
HOTS

1. Birds, kites, and aeroplanes flying high in the sky do not cast their shadows because the source of light, which is the sun, is million times larger than these objects and the screen, which is the earth's surface, is far away from them. Hence, their shadows do not reach the surface of the earth.
2. The moon is a nonluminous body but it appears bright as it reflects the light of the sun falling on it.
3. The earth shines as a bright, blue ball when viewed from the space because it reflects the light of the sun falling on it.

Value-based Questions

1. **Transparent:** Air, water, glass, etc.
2. **Opaque:** Wood, brick, cardboard, etc.
3. Mayank is an aware and helpful person.

LET'S MEMORISE



13. Electricity and Circuits

Checkpoint 1

1. positive
2. filament
3. electrolyte
4. electric charge
5. battery

Checkpoint 2

1. True
2. True
3. False
4. True
5. False

Checkpoint 3

1. Materials which allow the flow of electric current through them are called electric conductors.

2. Yes, rubber is an insulator because it does not allow the flow of electric current through it.
3. Electric conductor such as metal wires are used for making electric circuits.
4. Never touch an electric switch, plug or electric device with wet hands.

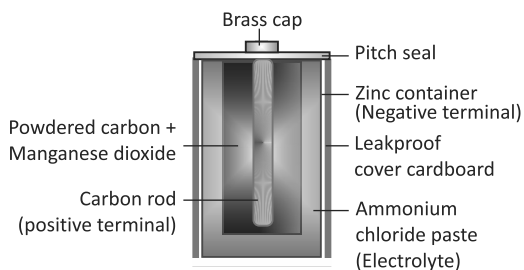
Let's Drill Our Skills

- A.** 1. (c) 2. (d) 3. (b) 4. (a) 5. (a) 6. (b)
- B.** 1. two 2. insulator 3. closed path 4. metals; rubber 5. fused
- C.** 1. An electric switch is a device which can start or discontinue the working of an electrical device, without disturbing its connections.
2. The flow of electric charge in an electric circuit is the electric current.
 3. A material which does not allow the flow of electric current through it is called insulator.
 4. A material which allows the flow of electric current through it is called conductor.
- D.** 1. A closed path for the flow of electric current is called an electric circuit.
2. Bad conductors of electricity or insulators do not allow electric current to flow through them.
 3. A key or switch is used to put a circuit on or off.
 4. The first source of electric current is cell.
 5. The paste of ammonium chloride is used as electrolyte in dry cell.
 6. At large scale, electricity is generated at hydropower plants, nuclear power plants and thermal power plants.
- E.** 1. When the two ends of the switch are disconnected, it is called an open switch, whereas when the two ends of the switch are connected to each other, it is called a closed switch.
2. The electrical appliances and tools have their handles covered with insulating materials, so that the user may not get electric shock while working with them.
 3. If the connecting wire of an electric circuit breaks down, the flow of electric current will stop in the circuit and this will put the device off.
 4. An electric circuit is a closed path for the flow of electric current from one terminal of the cell to its other terminal via electric components. Electric circuit is of two types:
 - (a) **Open circuit:** A circuit with an open switch.
 - (b) **Closed circuit:** A circuit with a closed switch.
 5. Anode is the negative terminal of a cell, whereas cathode is the positive terminal of the cell.
In a closed electric circuit, the electric current flows from cathode to anode of the cell.
- F.** 1. **Structure of a dry cell:** A dry cell has following components:
Anode (negative terminal): Zinc

Cathode (positive terminal): Carbon coated with MnO_2

Electrolyte: Ammonium chloride

The zinc container in a dry cell itself acts as negative electrode (terminal). The carbon rod forms the positive electrode (terminal). It is coated with MnO_2 and powdered carbon. Ammonium



chloride acts as an electrolyte. The zinc container is placed in a leakproof cover made of cardboard and its top is sealed with pitch. Usually, a brass cap is mounted on the carbon rod.

- Materials which do not allow the flow of electric current through them are called insulators or bad conductors of electricity. They are paper, plastic, cotton, rubber, dry air, pure water, dry wood, glass, dry clothes, etc. On the other hand, materials which allow the flow of electric current through them are called good conductors or conductors of electricity. They are metals like gold, silver, copper, aluminium, etc., salt solutions, moist air, impure water, graphite, etc.
- Following precautions should be taken while handling electricity:
 - Never play with sockets or electric wires.
 - Never touch an electric switch, plug or device with wet hands or barefoot.
 - Always wear dry rubber slippers or stand on a dry wooden or plastic base while using an electrical appliance.
 - In case of a short circuit or a spark in a switch, put it off immediately with the help of a plastic or wooden stick.
 - In case of a fire in electric wires, never use water to extinguish it. In such a situation, first switch off the mains, then use dry sand to extinguish the fire.
- Application of conductors:** Conductors of electricity are used for making electric wires, switches, plugs, sockets and inner parts of electrical devices.

Applications of insulators:

- Insulators like rubber and plastics are used to cover electric wires, handles of metal tools, electrical appliances, etc., to save the user from electric shocks.
- Electricians use rubber gloves for safeguard while working with electric devices and circuits.
- The workers in industries and factories who operate heavy electrical machines are provided with rubber footmats to stand upon and rubber gloves for safe working.

5. When the two ends of a switch are disconnected, it is called an open switch, whereas when the two ends of a switch are connected to each other, it is called a closed switch.

Diagrams of open and closed switches are as follows:



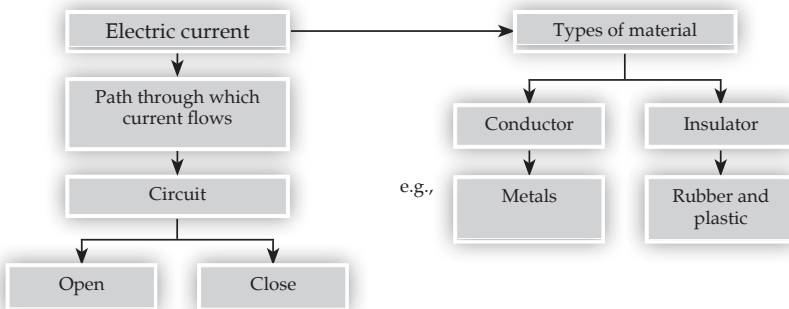
HOTS

1. An electrician always uses insulated shoes, gloves and pliers. Due to insulated shoes, his body is not earthed and the electric current through the body is not complete. Hence, electric current does not flow through his body. On the other hand, insulated gloves and pliers do not allow electric current to pass through his body. In both the cases, he is not harmed.
2. When a human body receives an electric shock, the electric current starts flowing through the body. The resistance of the body causes the tissues to heat up and hence, tissue damage is caused.

Value-based Questions

1. We should turn off devices or appliances when they are not in use to save electricity.
2. Bhavuk is doing right as his habit of switching off the light and fans before leaving the room is helpful in saving electricity and hence, natural resources.
3. Bhavuk is an aware and disciplined person.

LET'S MEMORISE



14. Introduction to Magnetism

Checkpoint 1

1. (a) Iron, nickel (b) Copper, plastic
2. (a) Magnet (b) Man-made or artificial magnet
(c) Magnetite or lodestone

Checkpoint 2

1. poles 2. north-south 3. Similar 4. Dissimilar 5. Repulsion

Checkpoint 3

1. When a magnet loses its power, it is called demagnetised.
2. Do not hit or beat a magnet with anything.
3. Keepers are pieces of soft iron which are used to store magnets.
4. Magnets are used in electric generators to generate electricity.
5. Magnets should be kept away from television.

Let's Drill Our Skills

- A. 1. (d) 2. (a) 3. (b) 4. (a) 5. (c)
- B. 1. nonmagnetic 2. permanent 3. poles 4. Magnetic compass
5. earth
- C. 1. The magnet found in nature is called natural magnet. It is formed of oxides of iron. The natural magnet cannot be given the desired shape. On the other hand, the magnet prepared by scientists from pieces of iron is called artificial magnet. An artificial magnet can be given a desired shape as may be required for a particular use.
2. Materials which are attracted by magnets are called magnetic materials, e.g., iron, nickel, cobalt and their alloys. On the other hand, materials which are not attracted by magnets are called nonmagnetic materials, e.g., wood, plastic, paper, cotton, glass, copper, aluminium, etc.
- D. 1. Magnetite or lodestone is natural magnet.
2. Alnico is used to make good permanent magnets.
3. Nickel is a magnetic material.
4. Copper is a nonmagnetic material.
5. The power of a magnet becomes negligible at its centre.
- E. 1. Magnet was discovered 4,000 years ago at Magnesia in Greece by-chance by a shepherd named Magnes. One day, he was herding his sheep and found the nails in his shoes and the metal tip of his stick stuck to a large black rock on which he was standing. Later, this type of rocks was named as magnetite.
2. **Activity to show that magnets can be helpful in finding directions:**
Tie a bar magnet at one end of a 25–30 cm long thread and suspend it from a wooden stand. Allow the magnet to come at rest. Meanwhile, mark the directions on a piece of paper and place it on the base of stand, with its centre just below the magnet. Note the direction in which the magnet comes to rest. Now, disturb the magnet and allow it to come to rest again. Again, note the direction in which it aligns itself. Repeat this step many times. Each time, the bar magnet comes to rest with its poles pointing in the north-south direction. Therefore, magnets can be useful in finding directions.

3. When bar magnets are not in use, they should be stored in pairs with their poles opposite to each other using magnetic keepers.
4. The functioning of electrical and electronic devices gets affected in the presence of magnets. Therefore, magnets should be kept away from things like television, radio, etc.
5. Magnets should be handled carefully because if they are dropped frequently, hammered, heated or brought into contact with other magnets repeatedly, they lose their magnetism and become demagnetised.

F. 1. Activity to show that freely suspended magnet always aligns itself in a particular direction:

Tie a bar magnet at one end of a 25–30 cm long thread and suspend it from a wooden stand. Allow the magnet to come at rest. Meanwhile, mark the directions on a piece of paper and place it on the base of stand, with its centre just below the magnet. Note the direction in which the magnet comes to rest. Now, disturb the magnet and allow it to come to rest again. Again, note the direction in which it aligns itself. Repeat this step many times. The magnet always comes to rest with its poles pointing in the north-south direction.

2. An iron bar can be magnetised by following method:

Make the iron bar lie on a table. Hold a bar magnet vertically at one end of the iron bar, so that one of the poles of the magnet (say N-pole) touches the iron bar. Rub the magnet along the length of the iron bar, till you reach its other end. Lift the magnet vertically and bring it back to the previous end such that the same pole touches the iron bar again.

Repeat the process at least 40–50 times. The iron bar gets magnetised. It can be tested by bringing small iron pins near it.

3. Following precautions should be taken while handling a magnet:

- (a) Never hit or beat a magnet with anything.
- (b) Do not throw a magnet or let it fall on the floor.
- (c) Do not heat a magnet.

4. Uses of magnets:

- (a) Magnets are used in pencil boxes, drawers, etc., to ensure proper closing.
- (b) They are used in fancy stickers and decorations to be fixed on refrigerators and steel almirahs.
- (c) They are used to separate iron or magnetic substances from nonmagnetic substances in industries.
- (d) They are used in electric motors, generators, speakers, microphones, etc.
- (e) Credit, debit and ATM cards have a magnetic strip which contains the necessary information to connect with the account.

5. Activity to show that repulsion is the sure test of magnetism:

Suspend a bar magnet from a wooden stand. Bring any end of the object to be tested for magnetism, close to both the poles of the suspended magnet, one by one and observe,

- If the end of the object is attracted by both the poles, the object is a magnetic substance.
- If the end of the object is repelled by one of the poles of the magnet, the object is a magnet.

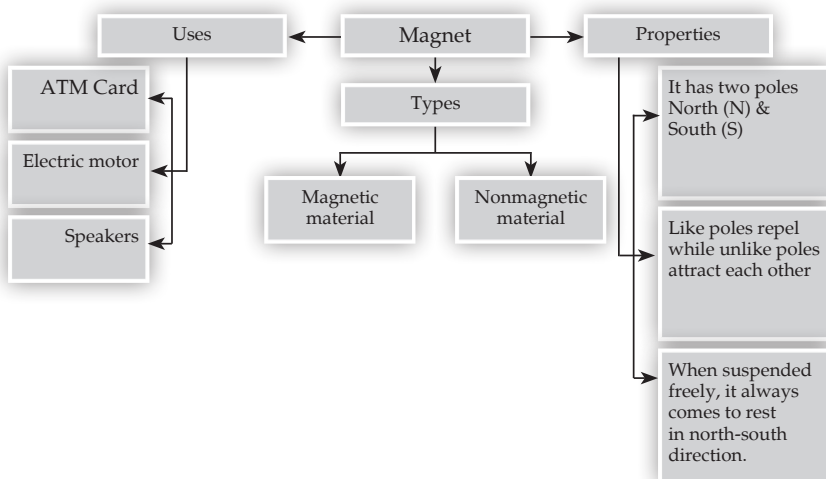
HOTS

- Iron, cobalt and nickel are called main magnetic substances because all magnets are made from them or their alloys.
- Gold is called a nonmagnetic substance because it is not attracted by a magnet.
- If a magnet is broken into pieces, its each piece will behave as an individual magnet having a north pole and a south pole.

Value-based Questions

- The substances which are attracted by a magnet are called magnetic substances. They are iron, nickel and cobalt.
- The same poles of magnets always repel each other while different poles attract each other.
 - A freely suspended bar magnet always comes to rest with its poles pointing in the north-south direction.
- Mehak is a curious and aware person. Her teacher is a aware and a kind person.

LET'S MEMORISE



15. Water — A Natural Resource

Checkpoint 1

1. About 70% of the earth's surface is covered with water.
2. Plants need water to grow, to make their food and to carry out all their life activities.
3. Water present on the surface of the earth in the form of oceans, rivers, lakes, ponds and streams is called surface water.
4. Yes, hail is a solid form of water.
5. Yes, water obtained from springs is underground water which sometimes, due to high pressure, spurts in the form of springs.

Checkpoint 2

1. True 2. True 3. False 4. True 5. False

Let's Drill Our Skills

- A. 1. (c) 2. (b) 3. (b) 4. (d) 5. (d)
- B. 1. Evaporation
2. transpiration
3. evaporation; transpiration; respiration
4. flood
5. conserve
- C. 1. A long period of low or no rainfall is called drought, whereas submerging of land due to heavy rains causing the water level of lakes, ponds and rivers to rise is called flood.
2. The change of water into water vapour is called evaporation, whereas the change of water vapour into tiny droplets of water is called condensation.
3. The process of losing water by plants in the form of water vapour is called transpiration, while oxidation of food by living beings for the energy with the release of water vapour is called respiration.
- D. 1. This continuous circulation of water is called water cycle.
2. Plants and animals release water vapour during respiration.
3. The process of changing water vapour into tiny droplets is called condensation.
4. Drought occurs when it does not rain for a long time in a region.
5. The practice of collecting and storing rainwater for future use is called rainwater harvesting.
- E. 1. Rainwater harvesting is done by collecting and storing rainwater in tanks for future use or by allowing rainwater to seep into the ground directly for recharging groundwater which can be used later through wells and tubewells.
2. We need to conserve water so as to fulfil the demand of water of increasing population of the world.

3. Uses of water:

- (a) We use water for drinking, cooking, cleaning, washing, etc.
- (b) Water is used in agriculture for irrigating crops.
- (c) In industries, water is used for cleaning, heating, cooling, generating electricity, etc.

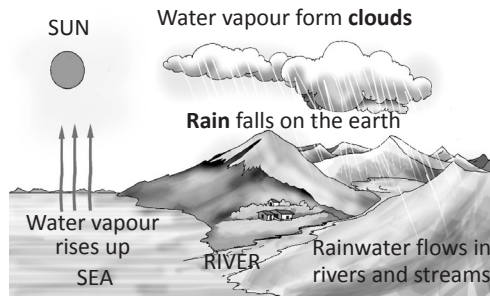
4. Effects of drought:

- (a) Water shortage leading to death of people and livestock.
- (b) Food and fodder become scarce which leads to malnutrition.
- (c) Dehydration and other related diseases breakout in the drought-hit area.

F. 1. The continuous circulation of water from the earth's surface to the air and from the air back to the earth's surface is called water cycle. The water cycle takes place in following way:

- (a) The water from the waterbodies evaporates by the heat of the sun.
- (b) The evaporated water as water vapour mixes with air and rises high in the atmosphere.
- (c) On reaching high in the atmosphere, the water vapour condenses into tiny droplets of water which form clouds.
- (d) The tiny droplets in clouds join together to form larger drops which fall down on the earth as rain.
- (e) The rainwater fills back the waterbodies and some of the rainwater seeps under the ground.

In this way, water cycle in nature keeps on going.



2. The harmful effects of floods are as follows:

- (a) Floods cause great damage to crops, animals, human life and buildings.
- (b) Flood can lead to landslides.
- (c) People and animals may drown in flood water and die.
- (d) Flood can cause shortage of food as crops get destroyed.
- (e) Unhygienic conditions caused due to flood can lead to spread of waterborne diseases like cholera and typhoid.

(f) Scarcity of drinking water may occur as the water can get contaminated.

3. Ways to conserve water:

(a) Use minimum amount of water for bathing. Use a bucket instead of a shower.

(b) Never drain the water when there may be another use for it. You can reuse the water used for washing vegetables, etc. for watering plants.

(c) Do not let water run while brushing, shaving or washing your hands or face.

(d) Make sure that your house has no leaky taps.

(e) Avoid flushing the toilets unnecessarily. A lot of water is wasted in this process.

(f) Turn off the taps immediately after use.

(g) Adopt rainwater harvesting.

4. Rainwater harvesting is carried out by the following two methods:

(a) **Groundwater recharging:** The rainwater is allowed to seep into the ground directly for recharging groundwater which can be used later through wells and tubewells.

(b) **Storing rainwater in tanks:** The rainwater is collected from rooftops with the help of pipes and drained into a tight covered tank. In the tank, water is stored for later use.

HOTS

1. The rainwater can be used for the growth of plants and for drinking because it is the purest form of water.

2. The rate of evaporation increases with increases in temperature. Therefore, puddles on roads and playgrounds soon dry up due to the heat of the sun.

3. In water cycle, the water continuously circulates between earth's surface and atmosphere by evaporation and condensation. In this way, the amount of water is kept constant on the earth's surface.

Value-based Questions

1. Increasing population, large-scale deforestation, etc., are the reasons for scarcity of water.

2. The problem of water scarcity can be overcome by conserving water by:

(a) Avoiding wastage of water.

(b) Using water judiciously.

(c) Adopting practice of rainwater harvesting.

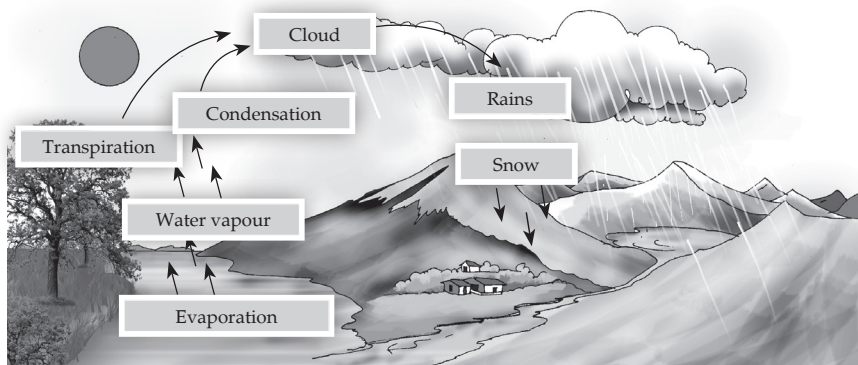
3. 'No Water, No Life'

'Water is Life'

'Save Water, Save Life'

4. Jyoti is a kind and aware person.

LET'S MEMORISE



16. Air Around Us

Checkpoint 1

1. Swaying away of clothes and ruffling of our hair make us feel the presence of air.
2. Nitrogen gas, which is 78%, is the largest component of air.
3. Oxygen is 21% of the air.
4. 0.03% carbon dioxide is present in air.

Checkpoint 2

1. burning
2. burning
3. 0.03%
4. water vapour
5. oxygen

Checkpoint 3

1. True
2. True
3. False
4. True
5. False

Let's Drill Our Skills

A. 1. (b) 2. (d) 3. (b) 4. (c) 5. (b)

B. 1. nitrogen

2. atmosphere

3. water vapour

4. carbon dioxide

5. dust

6. respiration; burning

C. 1. Respiration is the process of taking in oxygen by living organisms and combining it with food to release energy and carbon dioxide.

2. Photosynthesis is the process by which green plants make their food in the presence of sunlight using carbon dioxide and water.
 3. The moving air is called wind.
- D.**
1. Oxygen is the second most abundant gas present in air.
 2. Nitrogen gas is used in food packaging to keep the food fresh.
 3. Aquatic animals take in oxygen gas dissolved in water for respiration.
 4. Air helps birds to fly.
 5. Oxygen gas is released into air during the process of photosynthesis.
- E.**
1. The air consists of 78% nitrogen, 21% oxygen, 0.03% carbon dioxide, 0.95% noble gases, water vapour, dust particles and smoke.
 2. **Uses of air:**
 - (a) Air helps birds to fly.
 - (b) Air helps aeroplanes, helicopters, etc., to move.
 - (c) Air helps to separate husk from grains by winnowing.
 3. The percentage of oxygen is 21% and that of nitrogen is 78%.
 4. We should breathe through our nose as the fine hair and sticky mucus present inside the nose filter the air we breathe in by trapping dust particles present in it and do not allow them to enter our body.
 5. Photosynthesis is the process by which green plants make their food in the presence of sunlight using carbon dioxide and water. Photosynthesis is important because it provides oxygen gas for respiration and food to all organisms.
- F.**
1. **Activity to show that oxygen gas is required for burning:**
 Take a deep bowl and fix a small candle in its centre. Add some coloured water to the bowl. Lit the candle. Invert a glass jar over it. Observe the burning candle and level of water inside the glass jar. The candle extinguishes after burning for some time and the water level rises in the glass jar. This is due to the presence of limited amount of oxygen inside the glass jar which keeps the candle burning till it is used up. The space occupied by oxygen is taken by the water. This is indicated by rise in water level inside the glass jar. This activity shows that oxygen gas is required for burning.
 2. The presence of air in soil can be shown by adding water to dry soil. When water is added to dry soil, air comes out in the form of bubbles. The microorganisms, worms, etc., living in soil take this air for respiration. This shows that soil contains air.
 3. (a) Oxygen.
 - (b) All living organisms use oxygen for respiration.
 - (c) No, the candle will not continue burning for long as there is limited amount of oxygen inside the glass jar.
 - (d) The space occupied by oxygen is taken up by the water as the oxygen is used up in burning. This raises the water in the jar.
 - (e) Nitrogen.

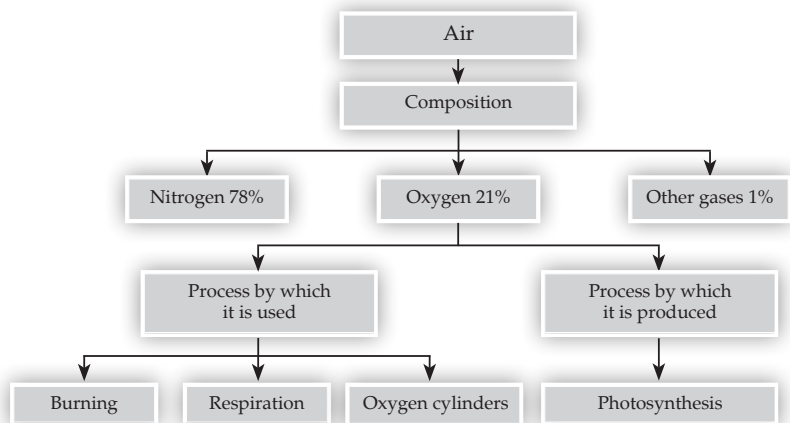
HOTS

1. Oxygen gas is filled in the cylinder. The diver uses this oxygen for respiration inside the water.
2. Oxygen gas is filled in the cylinder an astronaut carries with him.
3. We do not run out of oxygen because the oxygen taken for respiration by living beings is continuously replenished by plants by the process of photosynthesis.

Value-based Questions

1. Difficulty in breathing can occur due to deficiency of oxygen on mountains.
2. Mountaineers carry oxygen cylinder with them because as we go high on mountains, the amount of oxygen in air decreases and we feel difficulty in breathing. The divers carry oxygen cylinders with them for respiration because we cannot use oxygen dissolved in water for respiration as our lungs are meant only to take oxygen from air.

LET'S MEMORISE



17. Dealing With Wastes

Checkpoint 1

1. biodegradable
2. composting
3. nonbiodegradable
4. biodegradable; nonbiodegradable
5. Gaseous

Checkpoint 2

- C. 1. Waste disposal means getting rid of waste in such a way that it causes no or minimum damage to the surroundings and environment.

2. Compostable or biodegradable waste is collected in green bins.
3. Incineration is a waste treatment technology which involves the combustion of waste for recovering energy.
4. The solid waste that is separated from the liquid waste is called sludge.
5. The 3 Rs are Reduce, Reuse and Recycle.

Let's Drill Our Skills

- A.** 1. (d) 2. (c) 3. (c) 4. (d) 5. (b)
- B.** 1. Compost
2. Septic
3. water
4. Chlorofluorocarbons (CFCs)
5. soil
- C.** 1. The solid waste in urban areas managed by municipal authorities is called municipal solid waste.
2. The waste in solid form which includes animal and plant waste, discarded metals, plastics, etc., is called solid waste.
3. A biological process by which microorganisms decay the organic matter under controlled conditions and convert it into humus is called composting.
4. The solid waste separated from the liquid waste during the waste water treatment is called sludge.
- D.** 1. The waste which is decomposed by microorganisms into simpler compounds is called biodegradable waste, e.g., animal and plant waste, paper, peels of fruits and vegetables, old clothes, etc. On the other hand, the waste which is not decomposed by microorganisms is called nonbiodegradable waste, e.g., metals, detergents, paints, chemical waste, polythene bags, plastics, etc.
2. Dumping of solid waste or garbage in an open uncovered area is called open dumping, whereas dumping of waste outside the city on a piece of land or in a huge ditch which is later compressed, levelled and covered with a layer of soil is called landfilling.
- E.** 1. The process in which the waste material is used again and again is called reuse.
2. Earthworms are used for decomposing domestic waste.
3. Yes, fallen leaves are biodegradable waste.
4. The liquid waste obtained from kitchen and toilets is called sewage.
5. The solid waste obtained from the treatment of liquid waste is called sludge.
- F.** 1. The waste obtained from various sources in liquid form is called liquid waste. It includes effluents from various industries such as tanneries, distilleries, textiles, chemical and pharmaceutical industries; waste water from kitchens, toilets, etc. The liquid waste is disposed off systematically. It is taken to treatment plant before

disposal. In treatment plants, its impurities are removed and the rest part is purified to be used again.

2. Plastic is a nonbiodegradable waste, therefore, it accumulates and pollutes the surroundings. It remains unaffected in the soil and causes soil pollution by releasing harmful chemicals into the soil.
3. Chlorofluorocarbons are responsible for the depletion of ozone layer in the atmosphere due to which harmful ultraviolet rays from the sun reach on the earth's surface. These rays cause various skin diseases and cancer.

Chlorofluorocarbons are released from refrigerators and air-conditioners.

4. By composting, organic waste is converted into manure which is used for growing plants. In this way, composting helps to manage waste and provides useful product out of it.
5. The three Rs are Reduce, Reuse and Recycle. By practising three Rs, we can manage our waste with minimum damage to our surroundings and the environment.
6. **Biodegradable waste:** Wood pieces, newspapers, rotten fruits, cotton cloth

Nonbiodegradable waste: Empty ink bottles, broken ceramics, earthen pots, rusted iron nails

Recyclable waste: Empty ink bottles, newspapers

Reusable waste: Empty ink bottles, cotton cloth, newspapers

- G. 1. The three Rs are Reduce, Reuse and Recycle. By practising three Rs, we can manage our waste with minimum damage to our surroundings and the environment.

Reduce: We can reduce the amount of waste generated by reducing our level of consumption.

Reuse: We can use some objects again and again and minimise the generation of waste. These objects are metallic utensils, glass vessels, plastic bags, etc.

Recycle: We can make some useful products from waste materials by recycling them. For example, by recycling paper, we get recycled paper which is used for making bags, greeting cards, etc.

2. Individuals can take following steps to manage the waste:
 - (a) Create less waste by using cloth or jute bag to carry things, and stop using plastic bags.
 - (b) Reuse things as much as possible.
 - (c) Keep separate garbage bins for the segregation of biodegradable and nonbiodegradable wastes.
 - (d) Ensure that the garbage generated in your neighbourhood is collected in the community bins.

- (e) Never litter the public places.
 - (f) Excreta of pets should be disposed off properly.
 - (g) Set up a central compost pit for composting biodegradable waste.
3. Solid waste is disposed off by following methods:
- (a) **Open dumping:** It is the dumping of waste in an open uncovered area.
 - (b) **Landfilling:** It is the dumping of waste outside the city on a piece of land or in a huge ditch, which is compressed, levelled and covered with a layer of soil.
 - (c) **Composting:** In this method, the organic waste is decomposed by microorganisms and is converted into manure. Composting can be carried out in the presence of air (aerobic method), in the absence of air (anaerobic method) or by using special earthworms (vermicomposting).
 - (d) **Incineration:** In this method, waste is burnt to ash in controlled conditions.
4. The waste water is converted into reusable form by passing it through various stages at water treatment plant as follows:
- (a) In the first stage, the solid waste is removed from the waste water. This separated solid waste is called sludge which is decomposed by microorganisms.
 - (b) In the second stage, the liquid part of waste water is aerated and treated with chlorine (chlorination) to make it free from harmful bacteria, toxic chemicals, etc.
The purified water, thus obtained, is supplied to the public distribution system.

HOTS

1. The burning of dried leaves causes smoke which pollutes the environment. Therefore, Ratan's father avoids to burn the dried leaves of plants.
2. Rehana got the message to learn the principle of Reuse from 3 Rs by which waste material can also be utilised for decorative purpose or for making other useful items.
3. Nonbiodegradable waste is more hazardous because it is not decomposed by microorganisms. Therefore, it gets accumulated and remains unaffected for years in the soil. It spoils the surroundings and causes pollution in the environment.
4. The ozone layer in the atmosphere acts as a blanket around the earth saving it from harmful ultraviolet rays coming from the sun. Its depletion will allow ultraviolet rays to come on the earth directly which can cause cancer and many skin diseases to man.

Value-based Questions

1. The Rock Garden is located in Chandigarh. It was founded by Nekchand.
2. Yes, because making useful things from waste materials can reduce the generation of waste. It also saves energy and other resources.
3. Mithun can advise his classmates to reuse the discarded items of daily life by making them into useful items.

LET'S MEMORISE

