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**WONDERS OF SCIENCE 6****Components of Food****A. Tick (3) the correct option.**

1. (a)      2. (d)      3. (c)      4. (a)      5. (c)

**B. Fill in the blanks with correct words.**

1. Fat                      2. Protein                      3. A  
4. K                      5. Kwashiorkor

**C. Match the Following.**

1. c      2. e      3. a      4. b      5. d

**D. Give examples of each of the following.**

1. Carrots, Tomatoes  
2. Peas, potatoes  
3. Vitamins:      (i) Sunlight      (ii) Milk.  
Minerals:      (i) Bread      (ii) Eggs.  
4. Iodine.  
5. Pulses, Green leaf vegetable.

**E. Short Answer Type Questions.**

1. (a) Carbohydrates, Fats, Proteins, vitamins, Minerals and Roughage.  
(b) Carbohydrates and fats.  
(c) Vitamins, Minerals, Carbohydrates, Proteins, Fats, and water.  
(d) Vitamins and Minerals  
(e) Calcium.      (f) Vitamin 'A'      (g) Roughage.  
2. Protein are required by our body for muscles building and reaping worn out tissues.

3. (a) Carrots, Tomatoes. (b) Peas, Potatoes. (c) Lemon, Orange.  
(d) Sunlight, Milk. (e) Milk, Cheese. (f) Meat, Pulses.  
(g) Seafood, Iodised Salt.
4. Minerals help our body to remain healthy.
5. A Diet containing all the nutrients in adequate quantities is known as balanced diet.
6. Diseases which occur due to the deficiency of one or more essential nutrients in the diet are called deficiency diseases. Deficiency diseases cannot be transmitted from one person to another. So they are considered as non-communicable diseases.

#### F. Long Answer Type Questions.

1. (a) **Carbohydrates** : They are energy-giving compounds needed by our body to carry out day-to-day activities.  
(b) **Fats** : They are also energy-giving compounds. They give more energy than carbohydrates.  
(c) **Proteins**: They are body building components that protect the body from various infections.  
(d) **Vitamins** : They are protective foods that prevent diseases and help in keeping our bones, teeth, gums and eyes healthy.

2.	Vitamins & Minrals	Symptoms	Vitamins & Minrals
	Vitamin A	Loss of vision in the dark.	Night Blindness
	Vitamin B	<ul style="list-style-type: none"> <li>• Very little energy to work.</li> <li>• Weak muscles.</li> </ul>	Beriberi
	Vitamin C	<ul style="list-style-type: none"> <li>• Swelling and bleeding of gums.</li> <li>• Weak muscles.</li> </ul>	Scurvy
	Vitamin D	Weak bones. Decaying teeth, bow legs and development of pigeon chest conditions.	Rickets
	Calcium	Brittle bones, Tooth decay, Excessive bleeding.	Bones and tooth decay
	Iron	Pale body colour, whitish mails, Body weakness.	Amaemia
	Iodine	Mental retardation in children, Enlargement of thyroid gland (in the neck)	Amaemia

3. A balanced diet is not the same for everyone. It varies with age, sex and the type of work that one does (Occupation).

- (i) Children need to eat more protein- rich food as the growth during early childhood is rapid.
  - (ii) Labourers doing hard work need more of carbohydrates and fats as they need more energy.
  - (iii) Pregnant women also need more protein. Extra protein is required by the baby growing inside the womb.
4. Deficiency of water or dehydration is caused due to excessive loss or less intake of water. To prevent dehydration, drink plenty of fluids and eat food high in water such as fruits and vegetables.
  5. Diseases which occur due to the deficiency of one or mor essential nutrients in the diet are called deficiency diseases. Deficiency diseases cannot be transmitted from one person to another. So they are considered as non-comanunicable diseases.

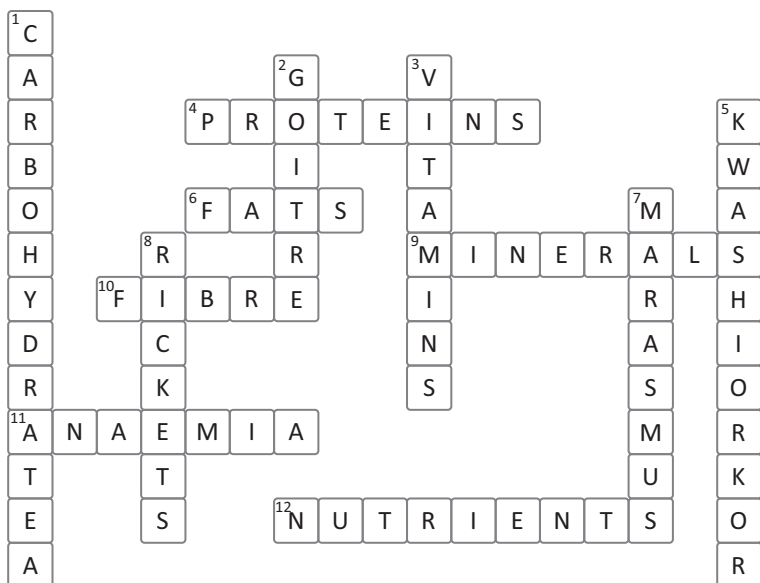


### Learn by Doing

#### A. ACTIVITY

Nutrient	Source of Nutrient	Deficiency Disease
1. Vitamin C	Citrus fruits, tomatoes	Scurvy
2. Iron	Cereals, Pulses, Meat	Amaemia
3. Iodine	Seafood and Iodised salt	Goitre
4. Vitamin D	Sunlight, Milk	Rickets

#### C. PUZZLE





# Separation Of Substances



## A. Tick (3) the correct option.

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

## B. Fill in the blanks with correct words.

1. Winnowing                      2. Sieving                      3. Decantation  
4. Solvent                      5. increasing

## C. Match the Following.

1. d      2. a      3. e      4. c      5. b

## D. Name the methods of separation used to separate these mixtures.

1. Decantation                      2. Hand-Picking                      3. Evaporation  
4. Filtration and Evaporation                      5. Threshing

## E. Short Answer Type Questions.

- By filtration method, tea leaves are separated from tea.
- Farmers cut stalks and make their bundles. Bundles are allowed to dry for a few days. When the stalks are dried, grains are separated from them either manually or with the help of a machine called thresher.
- The process by which two substances are separated by passing the mixture through a filtering device is called filtration.
- Condensation is the process by which water vapor in air is changed into liquid water.
- Salt is obtained by evaporating seawater trapped in salt pans. Heat of the sun gradually evaporates the water in the pans and the salt is then piled to dry.
- Solubility depends on many factors like :  
(a) Nature of solute (b) Nature of solvent (c) temperature.
- Sugar can be separated from wheat flour by sieving. Due to the difference in the size of particles, sugar will stay on a sieve and fine particles of wheat flour will pass through it.

## F. Long Answer Type Questions.

1. **Aim :** To separate components of a mixture by sieving.

**Materials required :** Flour, powdered chalk, old newspaper and a sieve.

**Procedure :**

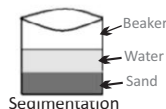
1. Sieve the flour on the newspaper to separate husk or any impurities.

2. Take a small amount of flour and mix it with fine chalk powder.
3. Sieve the mixture.

**Observation :** Husk and other impurities could be separated from the flour, but chalk powder could not be separated.

**Conclusion :** Husk particles are bigger than flour particles, so they are retained in the sieve. Particles of chalk powder and flour do not differ much in size, so chalk powder could not be retained in the sieve. Thus sieving can be used to separate particles of different sizes.

2. **Sedimentation :** Sedimentation is a method of separating insoluble solids from a liquid by allowing the solids to settle down. The insoluble substances which settle down are called sediments.



For example, in the process of cleaning rice grains and pulses, they are kept in a bowl of water. Being heavier than water, the pulses or grains settle down whereas dirt, insects and other undesirable things being lighter, float on top. This water is then thrown away to get the clean rice or pulses.

**Decantation :** The process of transferring the liquid (after sedimentation) without disturbing the sediment is called decantation. The liquid above the sediments is called supernatant.



A mixture of sand and water is separated by the process of sedimentation and decantation. On allowing a mixture of sand and water to stand still for sometime we find that sand being heavier, settles down at the bottom of the beaker. The settled sand is termed as the sediment. The clear water which gets collected on the top of the sediment can now be poured out and collected in other container by the process of decantation.

3. The process in which a liquid changes into its vapour is called evaporation. This method is used to separate solids dissolved in a liquid.  
When a solution is heated gently, the solvent evaporates from the surface of the liquid and the solid will be left behind.
4. It is easier to dissolve sugar in hot milk than in cold milk because solubility of sugar increases with temperature.
5. (i) **Evaporation :** The process in which a liquid changes into its vapour is called evaporation. This method is used to separate solids dissolved in a liquid.

**Condensation :** The process in which water vapour in air is changed into liquid water, is called condensation.

- (ii) **Distillation :** It is the process in which evaporation is followed by

condensation.

**Decantation** : The process of transferring the liquid (after sedimentation) without disturbing the sediment is called decantation.

(iii) **Filtration** : The process by which two substances (an insoluble solid and a liquid) are separated by passing the mixture through a filtering device is called filtration.

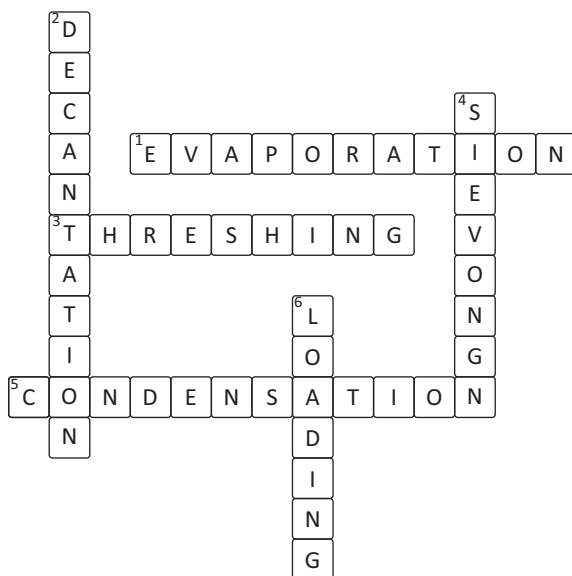
**Sieving** : The process by which the components of a mixture are separated by using sieve is called sieving.

6. Clear water can be obtained from a sample of muddy water by the method of filtration. In this method, the sample of muddy water is poured through a filter paper. Water will pass through the filtering medium, leaving behind the mud.



### Learn by Doing

#### C. PUZZLE



## Different Kinds of Materials



### EXERCISES

#### A. Tick (3) the correct option.

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

**B. Fill in the blanks with correct words.**

- |             |           |               |
|-------------|-----------|---------------|
| 1. grouping | 2. luster | 3. Solubility |
| 4. opaque   | 5. more   | 6. conductor  |

**C. Match the Following.**

- |      |      |      |      |      |      |
|------|------|------|------|------|------|
| 1. b | 2. c | 3. a | 4. f | 5. d | 6. e |
|------|------|------|------|------|------|

**D. Short Answer Type Questions.**

- The different properties of materials are solubility, magnetic property, elasticity, strength and hardness, thermal and electrical conductivity, transparency and diffusion.
- Steel spoon and gold jewellery.
- Depending on transparency, materials can be of three types:
  - Materials that allow all the light to pass through them are called transparent materials.
  - Materials that allow some light to pass through them are called translucent materials.
  - Material that do not allow light to pass through them are called opaque materials.
- Sugar and salt gets completely dissolved in water.
- Density of a material decides whether it will sink or float on a liquid.

6.	<b>Conductors</b>	<b>Insulators</b>
	Materials that allow heat or electricity to flow through them are called conductors.	Those materials which do not allow heat or electricity to flow through them are called insulators.

**E. Long Answer Type Questions.**

- Materials that allow some light to pass through them are called translucent materials. It is very difficult to know about each and every thing. However, there are certain similarities and differences between different things which help us to group similar things and distinguish them from other things. Grouping makes it easier for us to find things when we need them.
- On the basis of appearance :** All the materials can be classified into two groups:
  - Materials having lustre or shiny appearance, e.g., gold jewellery, steel spoon, etc,
  - Materials having no lustre or dull appearance, e.g., a plastic toy, woollen clothes, etc.

**On the basis of roughness :** Materials can be rough or smooth, Rough materials have bumps or ridges on their surface, which can be felt by

touching them. Smooth materials lack these bumps.

Examples of rough surface : Rocks, sandpaper, bark of a tree, etc.

Examples of smooth surface : A glass sheet, a flower petal, surface of apple, etc.

**On the basis of transparency :** Depending on transparency, materials can be of three types:

- (i) Materials that allow all the light to pass through them are called transparent materials.
  - (ii) Materials that allow some light to pass through them are called translucent materials.
  - (iii) Material that do not allow light to pass through them are called opaque materials.
3. On the basis of state of a material, they are grouped as follows:
- Solids :** They have a fixed shape and volume. Solids cannot be compressed as the particles are packed together closely.
- Liquids :** They do not have a fixed shape and take the shape of the container they are stored in. But they have definite volume. Liquids can be compressed to a small extent as particles are less tightly packed.
- Gases :** They have neither fixed shape nor a fixed volume. Gases are highly compressible as the particles are loosely packed.
4. Materials like salt and sand sink in water, while coconut oil and talcum powder float on the surface of water. This happens due to the differences in their density. Substances heavier than water sink in it, while substances lighter than water float on it. So, density of a material determines whether it will float or sink in water. Less dense materials like oil, feather, etc., float on water and more dense materials like stones, iron, etc., sink in water.

5.

S. No.	Material which added to water	Behaviour of Material on the basis of	
		Aquatic Plants	Aquatic Plants
(a)	Sugar	Sink	Soluble
(b)	Salt	Sink	Soluble
(c)	Milk	Sink	Soluble
(b)	Sand	Sink	Insoluble
(b)	Honey	Sink	Soluble
(b)	Cooking Oil	Float	Insoluble
(b)	Lime Juice	Sink	Insoluble



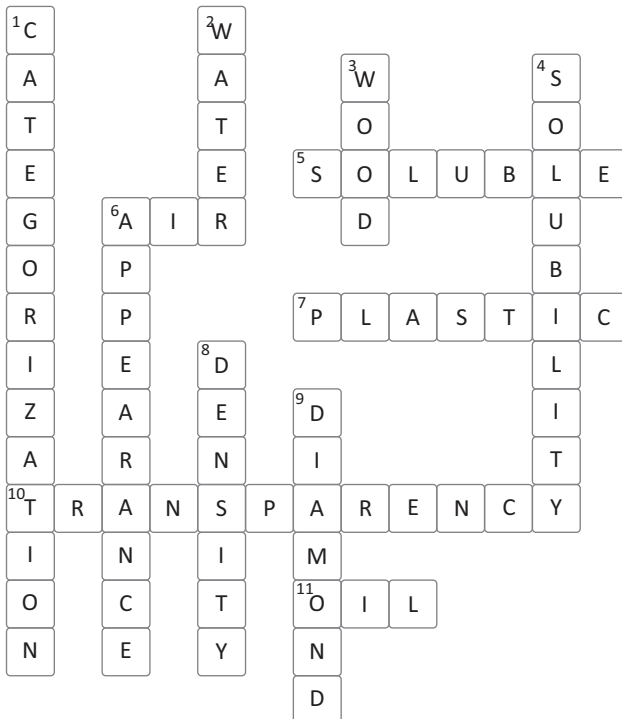


## Learn by Doing

### B. PROJECTS WORK

Object	Floats	Sinks
Leaf	Yes	No
Wooden cork	Yes	No
Pebble	No	Yes
COin	No	Yes
Pencil	Yes	No
Button	No	Yes
Straw	Yes	No
Feather	Yes	No
Iron Nail	No	Yes

### C. PUZZLE





## Things Around Us



### A. Tick (3) the correct option.

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

### B. Fill in the blanks with correct words.

1. Photosynthesis      2. Oxygen, Carbon dioxide      3. Stomata  
4. eggs      5. excretion      6. multicellular

### C. Match the Following.

1. c      2. b      3. a      4. e      5. d

### D. Name the methods of separation used to separate these mixtures.

1. Decantation      2. Hand-Picking      3. Evaporation  
4. Filtration and Evaporation      5. Threshing

### E. Short Answer Type Questions.

1. Those features which are common between living and non-living things are :
  - (i) All things, whether living or non-living, possess mass, shape and occupy space.
  - (ii) They are made up of basic structural units. In case of living things, cell is the structural unit. In a non-living thing, the molecule is the structural unit.
2. Leather, wool, wood, cooking oil, rubber.
3. Robots and vehicles.
4. (a) Gum and Later.  
(b) Urine, feces, sweat, carbon dioxide.  
(c) Carbon dioxide, water and energy.  
(d) Amoeba  
(e) cell
5. Animals and plants reproduce in different ways :
  - (i) Some animals produce their young over through eggs as you find in birds.
  - (ii) Some animals give birth to young ones, as seen in cow, cats and humans.
  - (iii) Some plants reproduce through seeds, e.g., pea, gram, mango.
  - (iv) Some plants reproduce through cutting e.g., henna and rose.

(v) Some plants reproduce through stem pieces containing a bud, e.g., potato.

6. **Dead things** : Fallen leaf, bone, fossil.

**Non-living things** : Wrist watch, water, wooden shelf, brick, glass, steel, mobile phone.

#### F. Long Answer Type Questions.

1. The process of removal of waste products from organisms is called excretion. The animal waste are excreted in the form of urine, faeces, sweat and carbon dioxide. Carbon dioxide gas is the by-product released in the process of respiration. In plants, carbon dioxide and water vapour are excreted through small pores called stomata present in the leaves. In some plants, waste products take the form of secretions. The secretion may be in the form of a sticky substance called gum or thick fluid called latex this fluid can be seen if you break the twig of a rubber plant or a madar plant.

2. Characteristics common to the living things :-

**Nutrition** : All living things need food. Food gives energy to the organisms, so that the processes of life can go on inside them.

**Respiration** : This is a chemical reaction in which food reacts with oxygen to release energy. Carbon dioxide and water are also produced.



**Excretion** : The body has a way of getting rid of its harmful wastes. The process of getting rid of waste by the living organisms is called excretion.

**Reproduction** : All living things have the ability to produce more of their own kind.

**Movement** : Animals move from one place to another place and also show other body movements. Most plants do not move. But they show movements of certain parts, such as leaves, stems, roots and flowers.

**Response to Stimuli** : Changes in the surroundings of an organism which makes it respond to the changes are called stimuli. The organism's reaction to the stimulus is called a response.

**Cellular Organization** : All living things are made of cells.

- 3.
- | S. No. | Characteristic | Living Things                                      | Non-living Things   |
|--------|----------------|--|---|
| 1      | Nutrition      | Required food                                      | Do not require food                                       |
| 2      | Respiration    | Show respiration                                   | No respiration  |
| 3      | Growth         | Growth is present; it is internal and irreversible | No growth; even if present, it is external and reversible |

4	Excretion	Excrete waste products	Waste products not formed
5	Reproduction	Reproduce	No reproduction
6	Movement	Show movements on their own	No movement on their own
7	Response to stimuli	Present	Absent
8	Cellular organization	Are made up of cells	No cells are found

4 (a)

Living Things	Non-living Things
(i) Required food.	(i) Do not require food.
(ii) Show respiration.	(ii) No respiration.
(iii) Growth is present.	(iii) No growth.
(iv) Excrete waste products.	(iv) Waste products not formed.
(v) Reproduce	(v) No reproduction.
(vi) Show movements	(vi) No movement.
(vii) Present	(vii) Absent
(viii) Are made up of cells.	(viii) No cells are found.

(b) **Unicellular organism:** Those living things consisting of a single cell. The single cell living things are amoeba, yeast, bacteria etc.

**Multicellular organism :** Most organisms are made of millions of cell. These are multicellular organisms. For example, human being, housefly, dog, horse, rose, mango, etc

(c) **Respiration :** This is a process in which energy is released from food. The released energy is used for carrying out life processes such as growth and movement.

**Breathing :** This is the process of air moving in and out the body. It involves exchange of gases (oxygen and Carbon dioxide).

(d)

S. No.	Characteristic	Plants	Animals
1	Nutrition	Can prepare their own food (autotrophic in nutrition)	Cannot make their own food; obtain food from plants or other animals (heterotrophic in nutrition)

2	Respiration	Fixed to the soil; do not show free movements	Show locomotion from one place to another
3	Growth	Localized to certain regions	Diffused in all parts of the body

5. A cell is the smallest unit of living things. Some living things are made up of only a single cell, like amoeba, yeast. Living things consisting of a single cell are called unicellular organisms.

Most organisms are made up of millions of cells. They are called multicellular organisms. For example human being, dog, horse, rose, mango, etc.



## The Living Habitat



### A. Tick (3) the correct option.

1. (b)    2. (c)    3. (a)    4. (c)    5. (c)    6. (c)    7. (c)

### B. Fill in the blanks with correct words.

1. spines, transpiration      2. xerophytes      3. frog  
4. Grassland      5. narrow, ribbon-like  
6. yak, polar bear      7. Arboreal

### C. Match the Following.

1. d      2. c      3. a      4. b      5. e

### D. Short Answer Type Questions.

- (i) **Camel** : A camel has long legs which help to keep the upper part of its body away from the heat of sand on the ground.
- (ii) **Yak** : A yak has a thick coat of fur which protects it from cold.
- (iii) **Cactus** : Its roots are long and reach the deep layers of the soil to absorb water.
- (iv) **Deer** : Its eyes are located on the side of the head, so that it can look in all directions. This helps it to escape danger.
- (v) **Snow leopard** : A snow leopard also has a thick layer of fur on its body including feet and toes to protect it from the cold.
- (vi) **Polar bear** : A polar bear has a thick layer of fur on the body and a layer of fat underneath its skin which protects the animal from cold.
- (vii) **Fish** : The body shape of a fish is streamlined and it has fins. These features help it in swimming.

- (viii) **Lion** : The light brown colour helps it to hide in dry grasslands which are also brownish in colour.
  - (ix) **Water lily** : Leaves are large and circular. A waxy coating is also present on the leaves that prevents them from decay.
  - (x) **Dolphin** : They breathe in air through their nostrils.
  - (xi) **Pine tree** : It has cone-shaped with sloping branches which makes the snow fall off easily.
  - (xii) **Frog** : It's strong hind legs help it in leaping and catching the prey.
  - (xiii) **Hydrilla** : Stem is long, hollow and thin it can bend along with the water movement.
2. Decomposers are microorganisms such as bacteria and fungi. They decompose the dead remains into nutrients in the soil which are used by plants for growth.
  3. In deserts, there is a scarcity of water and have hot and dry climate. They have a short rainy season followed by a long dry season. Living organisms have adapted to live in these environmental conditions. Two commonly found organisms in this habitat are camel and cactus.  
The weather is cold and windy in mountain. Also, the ground is mostly covered with snow. These conditions make it difficult for plants to grow and for animals to move around and find food there. Thus, they have certain adaptation to live in mountains.
  4. An animal that hunts other animals for its food is called a predator. The animal that gets hunted by the predator is called prey. A lion is a predator, while deer is its prey. A predator is usually bigger in size than the prey.
  5. Stem is long, hollow and thin, so that it can bend along with the water movement.  
Roots are very much reduced, as water is available in plenty. The main function of roots is to hold the plant in place.
  6. Leaves vary in size and shape in submerged and floating plants. In submerged plants, leaves are narrow, thin and ribbon-like. They can bend and move easily in the flowing water without being torn apart. In floating plants like water lily, leaves are large and circular. A waxy coating is also present on the leaves that prevents them from decay.
  7. Sea anemones have a sucker-like base which helps them to grip the sides of a rocky pool. This adaptation protects them from being swept away by water currents.

#### E. Long Answer Type Question.

1. (i) **Abiotic Components** : Abiotic components include non-living things such as soil, water, air, sunlight and temperature. Since, abiotic component is a non-living part of an ecosystem.

- (ii) **Habitat** : The natural surroundings where an organism lives is called its habitat or its home. It provides food, shelter, water and suitable climatic conditions to an organism. Examples of habitats include pond, river, forest, desert and tree.

Animals and plants that live together in a habitat form a community. For example, fish, lotus and water hyacinth live in a pond or a river forming a community. Similarly, squirrels, monkeys and birds live on trees.

- (iii) **Adaptation** : An adaptation may be defined as a modification or change in an organism's body or behaviour that helps it to survive in a particular habitat or environment. Different living organisms are adapted to their habitats/surroundings in different ways. Adaptation may be in the form of shape, size, colour, structure or behaviour. For example, the forelimbs of birds are modified into wings so that they can fly.

2. Biotic components include all living things of an environment such as plants, animals and decomposers. Each of these play an important role in the sustenance of the environment.

**Plants** : Green plants prepare their own food using water and carbon dioxide in the presence of sunlight. So, they are called producers or autotrophs. This process takes place in green leaves and green stems these have a pigment called chlorophyll which traps sunlight.

**Animals** : Animals cannot make their own food and depend on plants. They are called consumers or heterotrophs. On the basis of their feeding habits, animals can be categorized into herbivores, carnivores and omnivores. Herbivores eat plants and plant parts. Carnivores eat the flesh of animals. Omnivores eat both plants and animals.

Certain animals feed on the dead bodies of animals and are called scavengers. They help to clean the environment.

**Decomposers** : Decomposers are microorganisms such as bacteria and fungi. They decompose the dead remains into nutrients in the soil which are used by plants for growth.

3. Abiotic components affect the biotic components of environment as they are needed for the survival of latter. For example, soil and water are needed by the plants to grow, and sunlight, air and water are needed by them to prepare food. Animals require air, water, food, light and shelter to live. An environmental area that fulfils all these requirements for survival of the animals is known as their habitat.

4. Habitats are of the following types:

**Terrestrial habitats**: Such habitats include habitats on land like forests, grasslands, deserts and mountains. Organisms that live on land like tiger, cow, dog, horse, camel, elephant and polar bear are terrestrial organisms.

**Aquatic habitats:** These habitats include freshwater habitats like ponds, lakes, streams and rivers, and saline water habitats like seas and oceans. Organisms that live in water like fish, turtle, lotus, water lily, duckweed, water chestnut and water hyacinth are aquatic organisms.

**Arboreal habitats:** These habitats include habitat on trees. Arbor is a Latin word which means trees or its branches. Tree-dwelling organisms like monkey and squirrel are arboreal organisms.

5. (i)

S.No.	Terrestrial Plants	Aquatic Plants
1.	They are the living components of a habitat.	They are the non-living components of any habitat.
2.	They include plants, animals, etc.	They include light, water air, temperature etc.

(ii) **Terrestrial habitats:** Such habitats include habitats on land like forests, grasslands, deserts and mountains. Organisms that live on land like tiger, cow, dog, horse, camel, elephant and polar bear are terrestrial organisms.

**Aquatic habitats:** These habitats include freshwater habitats like ponds, lakes, streams and rivers, and saline water habitats like seas and oceans. Organisms that live in water like fish, turtle, lotus, water lily, duckweed, water chestnut and water hyacinth are aquatic organisms.

6. (i) Yak, snow, leopard, polar bear (found in the Arctic areas) and penguin are some examples of animals living in mountains.

A yak has a thick coat of fur which protects it from cold. When the ground is covered with snow, yak uses its hooves and horns to break the ice and graze on the grass beneath.

A polar bear has a thick layer of fur on the body and a layer of fat underneath its skin which protects the animal from cold. Padded feet help it to walk on snow.

A snow leopard also has a thick layer of fur on its body including feet and toes to protect it from the cold.

(ii) **Adaptations in Animals :**

### **Fish**

- The body shape of a fish is streamlined and it has fins. These features help it in swimming.
- It has gills instead of lungs which help it to breathe underwater.
- Tail helps in movement and changing direction in water.

**Frog :** Animals that live both on land and in water are called amphibians.



A frog is an amphibian and has the following features :

- (a) Its strong hind legs help it in leaping and catching the prey.
- (b) It has webbed feet to help in swimming.
- (c) It has lungs for respiration on land and moist skin for respiration in water.

**Adaptations in Plants :** The following adaptations are found in the roots, stems and leaves of water plants :

- (a) Stem is long, hollow and thin, so that it can bend along with the water movement.
  - (b) Roots are very much reduced, as water is available in plenty. The main function of roots is to hold the plant in place.
  - (c) Leaves vary in size and shape in submerged and floating plants. In submerged plants, leaves are narrow, thin and ribbon-like. They can bend and move easily in the flowing water without being torn apart. In floating plants like water lily, leaves are large and circular. A waxy coating is also present on the leaves that prevents them from decay.
7. It can live for many days without water. To retain water in its body, a camel excretes a small amount of urine, its dung is dry and it does not sweat. A camel has long legs which help to keep the upper part of its body away from the heat of sand on the ground. Its feet have thick pads which protect it from the hot desert sand. It stores fat in its hump which acts as a food reserve.



## Plants : Form and Function



### A. Tick (3) the correct option.

- |        |        |        |        |        |
|--------|--------|--------|--------|--------|
| 1. (a) | 2. (a) | 3. (b) | 4. (b) | 5. (b) |
| 6. (c) | 7. (c) | 8. (b) | 9. (a) |        |

### B. Fill in the blanks with correct words.

- |                  |           |                   |         |           |
|------------------|-----------|-------------------|---------|-----------|
| 1. Roots         | 2. Roots  | 3. Lamina         | 4. Stem | 5. midrib |
| 6. Transpiration | 7. Flower | 8. anther, stigma |         |           |

### C. Match the Following.

- |      |      |      |      |      |      |      |
|------|------|------|------|------|------|------|
| 1. d | 2. c | 3. f | 4. a | 5. b | 6. e | 7. g |
|------|------|------|------|------|------|------|

### D. Write one word for the following.

- |                  |           |           |                  |
|------------------|-----------|-----------|------------------|
| 1. Fibrous roots | 2. Lamina | 3. Stamen | 4. Pollen Grains |
|------------------|-----------|-----------|------------------|

- |            |            |                   |                 |
|------------|------------|-------------------|-----------------|
| 5. Node    | 6. Sepal   | 7. petal          | 8. ovary        |
| 9. Stomata | 10. Pistil | 11. Transpiration | 12. Pollination |

### E. Short Answer Type Questions.

1. Different Parts of plants are:

(i) Root (ii) Stem (iii) Fruit (iv) Flower (v) leaf

2. (i) Mango, Neem (ii) Grass, Wheat  
(iii) Leaves of mango, Peepal (v) Leaves of banana, paddy.

3. **Roots:** (i) Roots help to anchor the plant firmly into the ground.  
(ii) They help plants to absorb water and nutrient from the soil, which are essential for their survival.

**Stem:** (i) Stem helps to keep the plant upright.

(ii) It holds leaves in position and helps them to spread out as the stem and its branches grow.

**Leaf:** (i) Leaves make their food for the plants by a process called photosynthesis.

(ii) Tiny pores called stomata are present on the leaf surface. There is an exchange of gases (carbon dioxide and oxygen).

**Flower:** (1) Flower is the reproductive organ of a plant, it leads to the formation of fruit and seeds. New plants arise after the germination of seeds.

(ii) The nectar of the flower is used as food by insects.

4. **Herbs:** Small plants with soft green stems are called herbs. They do not have any branches. They do not grow more than 3-4 feet in height.  
Example: wheat, grass etc.

**Shrubs:** Medium-sized plants with hard thin, woody stems are called shrubs. They have multiple stems and are shorter with height of usually 1-3 metres. Example: China rose, lemon, heena.

**Creeper:** Creepers are plants having weak stems that spread/creep on the ground. Example: pumpkin and Watermelon.

**Climbers:** Climbers have weak stems so in order to reach sunlight, they climb up some support. Example:- money plant and pea plant.

**Reticulate venation:** In reticulate venation, veins form a net-like pattern on both sides of the midrib. Example: Leaves of mango, peepal, neem etc.

**Parallel venation:** In parallel venation, veins are arranged in parallel lines on both sides of the midrib. Example: leaves of banana, grass, paddy etc.

**Stamens:** Stamens are long thin stalks with rounded swollen tips around the centre of the flower. Stamens are the male reproductive part of plants.

**Pistil** : The inner most part of a flower is called the pistil. It is a single elongated flask shaped Structure present in the centre of flower. Pistil is the female part of the flower.

5. **Reticulate venation** : Gram, Pea, Rose, Mango, Guava, Petunia,

**Parallel Venation** : Grass, banana, date palm.

#### F. Long Answer Type Questions.

1. Plants can be classified depending upon their heights and type of stems as follows :

##### TYPES OF PLANTS

**Herbs** : Small plants with soft green stems are called herbs. They do not have any branches. Herbs do not grow more than 3-4 feet in height. Examples : Wheat, paddy, grass, coriander, mustard, petunia and balsam.

**Shrubs** : Medium-sized plants with hard, thin, woody stems are called shrubs. They have multiple stems and are shorter with height of usually 1-3 metres.

Examples : Hibiscus, Lantana, china rose, lemon, pomegranate.

**Trees** : Tall plants with hard and woody stems are called trees. Branches are present in the upper part of the stem.

Examples : Neem, peepal, mango, jamun and amalbas.

There are two other categories of plants which need support to grow as they have weak stems and cannot stand straight on their own. These categories are given on next page.

**Climbers** : Climbers have weak stem so in order to reach sunlight, they climb up some support. Example : Money plant and peaplant.

**Creepers** : Creepers are plants having weak stems that spread/creep on the ground. Examples: pumpkin and watermelon.

- Roots help to anchor the plant firmly into the ground.
  - They help plants to absorb water and nutrients from the soil, which are essential for their survival.
2. • Roots help to anchor the plant firmly into the ground.
- They help plants to absorb water and nutrients from the soil, which are essential for their survival.
  - They help to bind the soil particles together, thereby preventing them from being carried away by water or wind.
  - In plants such as carrots, potato, radish and beetroot, the roots are swollen. These roots store food produced by the plants which the plants use when needed.
  - In plants like the banyan and bamboo, long rope like roots grow downwards from the main branches and go inside the ground to

provide additional support to heavy branches. They also help in transportation of additional nutrients and water to the stem. These roots are called prop roots.

3. **Roots :** (i) Roots help to anchor the plant firmly into the ground.  
(ii) They help plants to absorb water and nutrient from the soil, which are essential for their survival.

**Stem :** (i) Stem helps to keep the plant upright.

(ii) It holds leaves in position and helps them to spread out as the stem and its branches grow.

**Leaf :** (i) Leaves make their food for the plants by a process called photosynthesis.

(ii) Tiny pores called stomata are present on the leaf surface. There is an exchange of gases (carbon dioxide and oxygen).

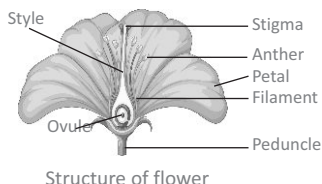
**Flower :** (1) Flower is the reproductive organ of a plant, It leads to the formation of fruit and seeds. New plants arise after the germination of seeds.

(ii) The nectar of the flower is used as food by insects.

#### 4. Structure of Flower

The basic parts of a flower are :

**Sepals :** The outermost green leafy structures at the base of the flower are called sepals. The sepals protect the flower in the bud.



Structure of flower

**Petals :** The coloured parts that surround the inner part of the flower are called petals. In most flowers petals impart fragrance and attract insects which help in the process of reproduction.

**Stamens :** Stamens are long thin stalks with rounded swollen tips around the centre of the flower. Stamens are the male reproductive part of plants.

Each stamen consists of two parts – Filament and anther.

(a) **Filament :** These are green stalks present at each stamen.

(b) **Anther :** A knob like structure present at the tip of filament is called anther.

If the anther is split open fine yellow particles are exposed out. These fine yellow particles are called pollen grains which take part in reproduction.

**Pistil or Carpel :** The inner most part of a flower is called the pistil or carpel. It is a single elongated flask shaped structure present in the centre of the flower. Pistil is the female part of the flower. It is broader at the base and tapers at the top. The lower broader portion of the pistil is

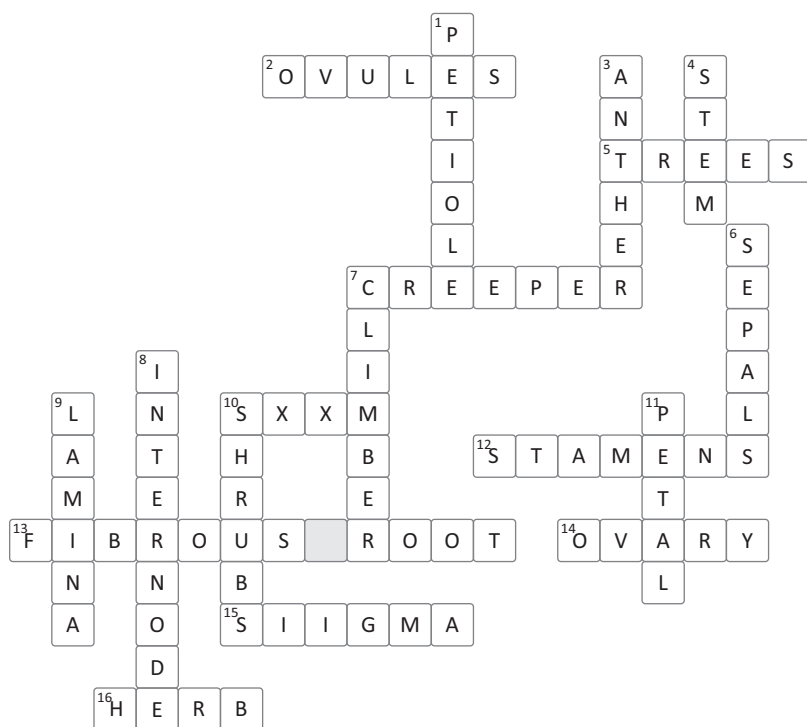
If the ovary is spilt lengthwise, some bead like structures are visible inside. These bead like structures are called the ovules. The ovules are attached along the walls of the ovary.

5. The Process of transfer of pollen grain from anther to stigma is called pollination. After pollination, the ovary change into a fruit and ovules change into seeds. Seed are sown in the ground. On getting favorable conditions for growth, seed develop into seedlings (baby plants).



## Learn by Doing

### C. PUZZLE





## Movement In Animals



### A. Tick (3) the correct option.

- |        |        |        |        |        |
|--------|--------|--------|--------|--------|
| 1. (b) | 2. (a) | 3. (a) | 4. (a) | 5. (b) |
| 6. (b) | 7. (b) | 8. (a) |        |        |

### B. Fill in the blanks with correct words.

- |               |                           |          |               |
|---------------|---------------------------|----------|---------------|
| 1. Locomotion | 2. three, two             | 3. shell | 4. earth worm |
| 5. snail      | 6. head                   | 7. hinge | 8. hinge      |
| 9. tendons    | 10. contracting, relaxing |          |               |

### C. Match the Following.

- |      |      |      |      |      |      |      |
|------|------|------|------|------|------|------|
| 1. c | 2. d | 3. a | 4. b | 5. g | 6. e | 7. f |
|------|------|------|------|------|------|------|

### D. Write one word for the following.

- |                     |                |             |                |
|---------------------|----------------|-------------|----------------|
| 1. Earthworm        | 2. Streamlined | 3. Tendons  | 4. Hinge Joint |
| 5. Immovable joints |                | 6. Backbone | 7. Foot        |
| 8. Exoskeleton      | 9. Heart       | 10. Joint   | 11. Lower Jaw  |

### E. Short Answer Type Questions.

1. (i) **Cockroach** : Cockroaches have two types of muscles :
  - (a) Muscles present near the legs help in walking.
  - (b) Breast muscles attached to the wings help in flying.Cockroaches have three pairs of jointed legs which help them in walking and two pairs of wings which help them to fly.
- (ii) **Earthworm** : An earthworm's body is made up of several parts called segments. It moves by lengthening and shortening these segments. It extends the front part of the body, keeping the rear end fixed to the ground. Then it fixed the front part and pulls the rear end. Its movement can be compared with that of a spring. Its body secretes a slimy substance to help in the movement on the soil.
- (iii) **Snail** : A snail creeps along on a strong muscular organ called a foot. The muscles of its foot move in backward, wave-like motion that propels the snail forward. The moving snail pours out a sticky slime, called mucus which helps the snail move by reducing the friction between body and ground.
- (iv) **Fish** : The body of a fish is streamlined which offers minimum resistance to the forward movement while swimming. The skeleton of the fish is made up of strong muscles. While swimming, the

muscles make the front part of the body curve to one side and the tail moves towards the opposite side. The fish forms a curve due to this movement. Then the body and tail quickly curve to the other side. This produces a thrust that helps the fish to move forward.

- (v) **Bird** : Birds have hollow and light bones which makes their body light. Bones of the forelimbs are modified into wings. The bones of the hind limbs are mostly used for walking and perching. The strong breast muscles which are attached to the forelimb bones help in pushing or pulling the wings as well as flapping of the wings and hence help in flying.
  - (vi) **Snake** : The snake's body curves into many loops. Each loop gives the snake a forward push by pressing against the ground. The thrust given by all the loops together allows the snake to move forward very fast in a wave-like manner.
2. (i) Fish have fins on their body which help to keep the balances of the body and to keep direction while swimming.
    - (ii) Scales and muscles in a snake : Snakes have special elongated scales on their belly to help them crawl and climb. A snake has many thin muscles which are loosely packed but are connected to each other. These muscles are also connected to the backbone, ribs and skin. Snakes use these muscles to move about.
  3. The shape of the body of a fish is streamlined which offers minimum resistance to the forward movement while swimming.
  4. Birds have hollow and light bones which makes their body light. The strong breast muscles which are attached to the forelimb bones help in pushing or pulling the wings as well as flapping of the wings and hence help in flying.
  5. A ribcage is a bony structure which is attached to the vertebral column and sternum in humans. The rib cage provides protection to heart and lungs. Human beings have 12 pairs of ribs. You can feel your ribs by running your fingers across your chest.
  6. Joints are places where two or more bones meet. The bones are held together at the joints by strong structures called ligaments.
  7. Muscles that are attached to the bones are called skeletal muscles. These muscles allow the movement of bones. These are connected to bones by a strong fibrous tissue called tendon. Skeletal muscles work in pairs by contracting and relaxing. These properties are responsible for their movement. When one muscle contracts, it pulls the bone and moves it, meanwhile the other muscle relaxes. To move back the bone, the other muscle contracts while the former relaxes.
  8. Skeletal muscles are responsible for movement of bones.

9. (i) **Ball and socket Joint** : In this type of joint, the ball-like surface of one bone fits into a cup-like hollow in the other. A ball and socket joint allows maximum movement in all directions.

Examples : Joints at the hip and the shoulder.

**Hinge Joint** : This kind of joint provides back and forth movement similar to the hinges of a door.

Examples : Joints at the knee and the elbow.

- (ii) **Bones and Cartilage** : Bones are hard structures while cartilages are soft and elastic and can be easily bent.

- (iii) **Movable Joints** : These joints allow free movements of bones in various directions.

Examples :

- |                             |                         |
|-----------------------------|-------------------------|
| (a) Joints in the elbow.    | (b) Joints in the knee. |
| (c) Joints in the shoulder. | (d) Joints in the neck. |

**Immovable Joints** : These joints do not allow any movement.

Examples :

- (a) Joints between the bones of the skull
- (b) Joints between the upper jaw and the rest of the head
- (c) Joints between the tooth sockets

#### F. Long Answer Type Questions.

1. Animals need to locomote because they need to:
  - (i) Search for food, water and shelter.
  - (ii) Escape from danger
  - (iii) Avoid unfavorable conditions
  - (iv) Reproduces or to find a mate.
2. **Snail** : A snail creeps along on a strong muscular organ called a foot. The muscles of its foot move in backward, wave-like motion that propels the snail forward. The moving snail pours out a sticky slime, called mucus which helps the snail move by reducing the friction between body and ground.
3. Cockroaches have three pairs of jointed legs which help them in walking and two pairs of wings which help them to fly.
  - (i) Muscles present near the legs help in walking.
  - (ii) Breast muscles attached to the wings help in flying.
4. The snake's body curves into many loops. Each loop gives the snake a forward push by pressing against the ground. The thrust given by all the loops together allows the snake to move forward very fast in a wave-like manner.



5. **Joints** : Joints are places where two or more bones meet. The bones are held together at the joints by strong structures called ligaments.

**Type of Joints** : There are three main types of joints in human body :

- (i) **Immovable Joints** : These joints do not allow any movement.

Examples :

- (a) Joints between the bones of the skull
- (b) Joints between the upper jaw and the rest of the head
- (c) Joints between the tooth sockets

- (ii) **Slightly Movable Joints** : These joints allow very little movement.

Examples :

- (a) Joints between adjacent vertebrae in the backbone
- (b) Joints between the ribs and the breastbone

- (iii) **Movable Joints** : These joints allow free movements of bones in various directions.

Examples :

- (a) Joints in the elbow
- (b) Joints in the knee
- (c) Joints in the shoulder
- (d) Joints in the neck

The four major movable joints in our body are :

- (i) **Ball and socket Joint** : In this type of joint, the ball-like surface of one bone fits into a cup-like hollow in the other. A ball and socket joint allows maximum movement in all directions.

Examples : Joints at the hip and the shoulder.

- (ii) **Pivot Joint** : In this joint, the rounded surface of one bone fits into a ring formed by the other, such that one bone is able to rotate over the other.

Example : Joint where the neck joins the head.

- (iii) **Hinge Joint** : This kind of joint provides back and forth movement similar to the hinges of a door.

Examples : Joints at the knee and the elbow.

- (iv) **Gliding Joint** : This kind of joint allows bones to glide over each other, providing little movement in all directions.

Example : Joints at the ankle and the wrist.

6. The skeletal system performs the following functions:

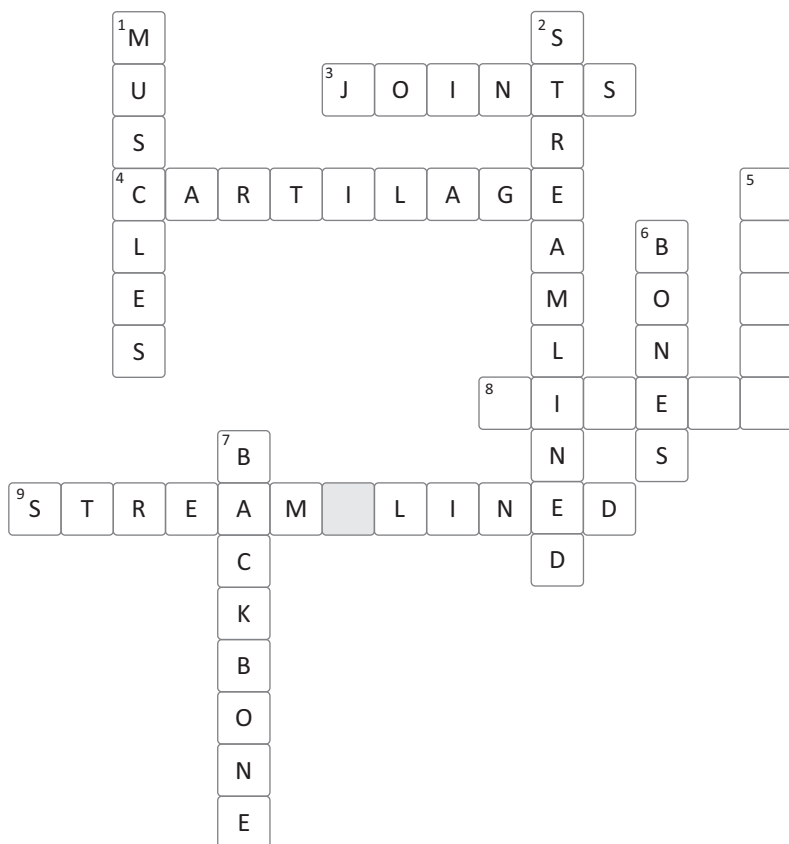
- It provides shape and support to the body.
- It protects the soft internal organs like heart, stomach and liver.
- Bones are filled with a substance called bone-marrow, which produces the blood cells.

- It helps in the movement of various body parts.
7. Our body has three types of muscles :
- Skeletal muscles • Smooth muscles • Cardiac muscles
8. When one muscle contracts, it pulls the bone and moves it, meanwhile the other muscle relaxes. To move back the bone, the other muscle contracts while the former relaxes. For example, biceps and triceps work together to bend and extend the arm. Biceps contracts when we pull our forearm towards the shoulder meanwhile triceps relaxes. When the later contracts to extend the arm, the former relaxes.



### Learn by Doing

#### C. PUZZLE





## Measurement and Motion



### A. Tick (3) the correct option.

1. (c)    2. (c)    3. (a)    4. (b)    5. (d)    6. (b)    7. (d)

### B. Fill in the blanks with correct words.

1. non-standard    2. metre    3. eye    4. thread  
5. periodic    6. rotatory    7. Periodic

### C. Match the Following.

1. c    2. d    3. b    4. a    5. e

### D. Short Answer Type Questions.

1. Ancient people used several method to measure length and distances. People used to their body parts to designate a particular unit for measurement of length, e.g. hand span, cubit and fathom.
2. (a) **Handspan** : It is the distance between the tip of the thumb and the tip of the smallest finger when the had is stretched fully.  
(b) **Cubit** : It is the distance between the tip of the middle finger of the outstretched hand and the elbow.  
(c) **Arm Length** : The length between the shoulder and tip of the middle finger is called arm length.  
(d) **Footstep** : The length between the tip of the great toe and the heal of the foot is known as footstep.  
(e) **Translatory Motion** : If one object moves in a line, straight or curved, its motion is said to translatory.  
(f) **Circulatory Motion** : Some objects move in a circle. Their motion is called circulatory motion.

3. **Solution** : We know that  $1000 \text{ m} = 1 \text{ km}$   
Therefore  $5000 \text{ m} = 5 \text{ km}$

Thus, the distance between the two houses in 5 km.

4. In order to measure the length of a straight line, keep the scale in such away that the graduated edge should be placed closed to the line and the zero mark of the scale coincides with one end of the line. Keeping the exactly above the point where the measurement is to be taken. Note down the reading on scale coincides with the other end.
5. (a) Curvilinear Motion    (b) Rotatory Motion  
(c) Rectilinear Motion    (d) Rotatory Motion

(e) Periodic Motion    (f) Circular Motion    (g) Periodic Motion

6. **Periodic Motion** : Those motions which repeats them selves at regular intervals of time are called periodic motion.

Examples :

The motion of a clock pendulum.                      The rotation of earth on its axis.

**Non-periodic Motion** : Any type of motion that does not repeat is self after equal intervals of time is called non-periodic motion.

Examples :

A car moving on a road.

A bird gliding across the sky.

### E. Long Answer Type Question.

1. **Measurement** : Measurement can be defined as an act of determining an unknown quantity such as length, distance, weight or time.

We need a standard unit for measurement to make our judgment more reliable and accurate.

2. (i) **Fins in Fish** : They help to keep the balance of the body and to keep direction while swimming.

(ii) **Scales and muscles in a snake** : Scales on snake helps them to crawl and climb. And the muscles help snake to move.

3. We should take the following precautions while using devices for measuring lengths.

- Place a scale in contact with the object along its length.
- The eye must be positioned in front of and in line where the measurement is to be taken.
- The ends of the scale (or rod) must not be worn out. If the ends of the scale are broken and the zero mark cannot be read clearly, then use some other digit (say mark 1) can be taken as the initial reading. Subtract the initial reading from the reading at the other end to get an accurate measurement of the length.
- The scale should be placed correctly along the length to be measured.

4. (i) **Rotatory Motion** : When an object moves round without changing its position, the object is said to be in rotatory motion. In rotatory motion the object spins about an axis, staying at the position.

(ii) **Circulatory Motion** : Circular motion is describe as a movement of an object while rotation along a circular path.

5. An oscillatory motion is always periodic bu a periodic motion is not always oscillatory because in oscillatory motion the body rackets its path in equal intervals of time but any body in periodic motion may not do to and formation about their mean position.



# Electricity And Circuits



## A. Tick (3) the correct option.

1. (d)      2. (c)      3. (d)      4. (b)      5. (b)      6. (b)

## B. Fill in the blanks with correct words.

1. charges                      2. battery                      3. sunlight  
4. circuit                      5. Insulators                      6. plastic

## C. Match the Following.

1. e                      2. a                      3. d                      4. c                      5. b

## D. Short Answer Type Questions.

- (a) **Electric Cell**: An electric cell is the simplest unit for generating electric current.  
(b) **Battery**: A battery is a combination of two or more cells in series.  
(c) **Conductors**: Materials which allow the electric current to flow through them are called conductors.  
(d) **Insulators**: Materials which do not allow electric current to flow through them are called insulators.
- Electric current is a type of energy. It is caused due to the flow of electrons.
- The complete path of flow of electricity from one terminal of an electric cell through the bulb and other electrical components to the other terminal of the electric cell is called an electric circuit.
- An electric cell is the simplest unit for generating electric current while a battery is a combination of two or more cells in series.
- A switch is a device that completes or breaks a circuit. Electric switches are used at home to switch ON or OFF the bulb, tube, light, fan and other electrical equipment.
- When the switch is pushed to the ON position, the circuit is Complete (closed) and the bulb glows. When the switch is pushed to the OFF position, the circuit is incomplete (open). Now, the current cannot flow through the circuit and the light goes out.
- On observing an electric bulb carefully, you will find that wire inside the glass case is made of tungsten. It is either coiled or straight. It serves as a filament of the bulb. The electricity passes through the filament. As a result it gets heated up and gives out light.

8. **Conductors** : Human body, metallic wire, in pure water pencil lead.

**Insulators** : Air, distilled water, wood, silk, wood, plastic box, polythene bag, rubber; eraser and plastic scale.

### E. Long Answer Type Questions.

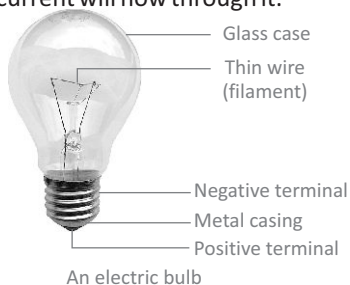
1. A switch is a device that completes or breaks a circuit. Electric switches are used at home to switch ON or OFF the bulb, tube, light, fan and other electrical equipment.
2. Materials which allow the electric current to flow through them are called conductors. Examples of good conductors are metals like silver, copper, iron, aluminium, etc. Non-metals like graphite and gas carbon are also good conductors.

Materials which do not allow electric current to flow through them are called insulators. Examples of insulators are rubber, plastic, dry wood, asbestos, wax, mica, etc.

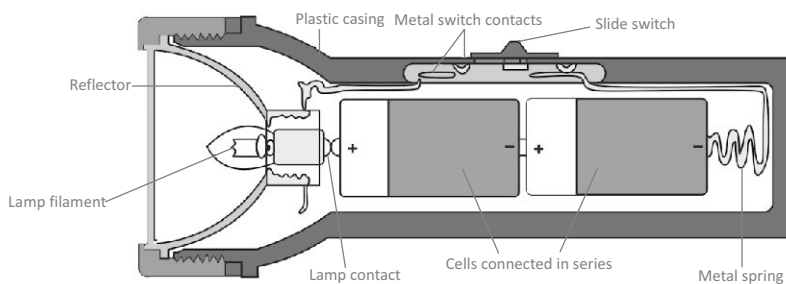
3. The dry cell contains a paste of ammonium chloride inside a zinc container. Inside the paste, a cardboard container containing powdered manganese dioxide and carbon is placed. The cardboard container has microscopic holes in it (such materials are called porous materials) through which a chemical reaction takes place between ammonium chloride paste and powdered manganese dioxide. A rod usually carbon, with a metal cap is dipped into the manganese dioxide. The whole thing is then sealed (with only the metal cap sticking out). So that the contents do not spill out. The zinc can is also wrapped so that only the base is exposed. Every source of electric current has two ends where conducting wires are connected to draw electric current. These two ends are called terminals of a cell. The tip of the metal cap and the base of the zinc can are called the positive and negative terminals of the dry cell respectively.

Electric current can be thought of as 'flowing in' from one terminal and 'flowing out' from the other. If the tip of the metal cap and the base of the zinc can are connected by a metal wire, current will flow through it.

4. On observing an electric bulb carefully, you will find that wire inside the glass case is made of tungsten. It is either coiled or straight. It serves as a filament of the bulb. The electricity passes through the filament. As a result it gets heated up and gives out light.



5. An electric torch has one or more dry cells inside, which act as the 'source'. These cells are connected through a switch to a small bulb.



Schematic diagram of an electric torch

When the switch is pushed to the ON position, the circuit is complete (closed) and the bulb glows. When the switch is pushed to the OFF position, the circuit is incomplete (open). Now, the current cannot flow through the circuit and the light goes out.

6. (i) Metals are good conductor of heat and electricity. Therefore, electrical wires are made up of metals.
- (ii) The outer covering of electric wires is made of plastic because plastic is an insulator of electricity. The plastic outer covering does not allow the electric current to pass through it and reach us.
7. **Aim :** To make an electric switch and a torch.

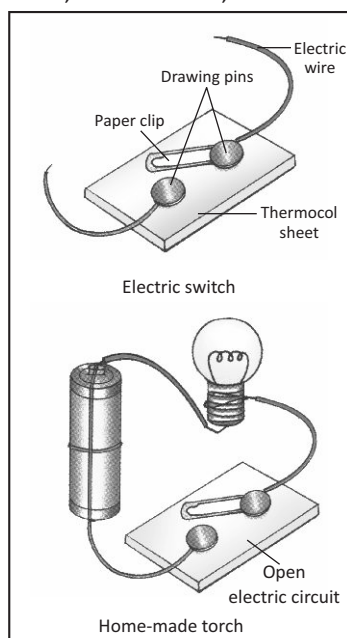
**Materials Required :** A paper clip or a safety pin, two drawing pins, a small sheet of thermocol or a wooden board, electric wires, an electric bulb and an electric cell.

**Procedure :**

1. Insert a drawing pin at one end of the paper clip.
2. Insert the drawing pin along with the paper clip in the thermocol sheet ensuring that it rotates freely.
3. Insert the other drawing pin in the thermocol sheet in such a way that the free end of the paper clip can touch the pin easily.

The electric switch is now ready.

4. Join one electric wire each to the two drawing pins.
5. Now, connect the electric bulb, the electric cell and the electric switch as shown in the figure given alongside.



6. Touch the free end of the paper clip with the other drawing pin.

**Observation :** You will observe that the electric bulb starts glowing. The paper clip and the drawing pins are made of metal. On touching these two, the electric circuit completes. In this condition, the switch is said to be ON and the electric bulb glows. When the paper clip and the drawing pins are not touching each other, then the switch is said to be OFF and the electric bulb does not glow.

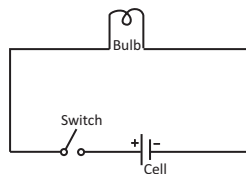
8. **Aim :** To classify some common materials as insulators and conductors.

**Materials Required :** Copper coin, eraser, iron nail, piece of wood, plastic.

**Procedure :**

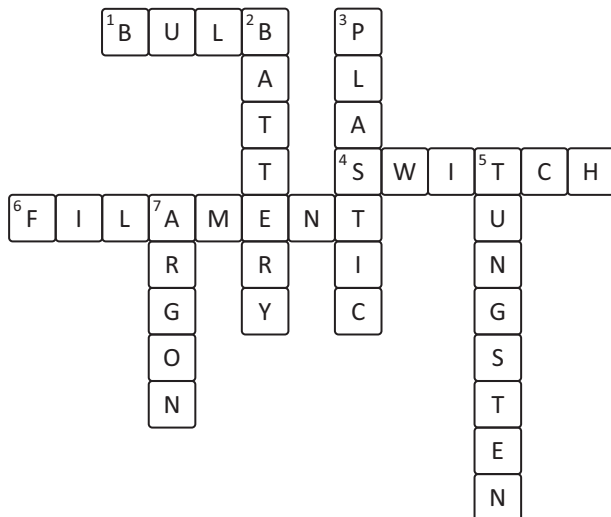
1. Make the connections according to the circuit diagram.
2. Now, place the above objects one by one in the switch such that the two ends of the wire touch the two ends of the object.
3. Note down your observations in the given table.

Material	Does the bulb glow or not?	Whether insulator (I) or conductor (C)
Copper Coin	Yes	(C)
Eraser	No	(I)
Iron nail	Yes	(C)
Wood	No	(I)
Plastic	No	(I)



### Learn by Doing

### C. PUZZLE







## Fun With Magnets



### A. Tick (3) the correct option.

1. (d)    2. (b)    3. (d)    4. (c)    5. (d)    6. (d)    7. (a)

### B. Fill in the blanks with correct words.

- |            |                  |              |
|------------|------------------|--------------|
| 1. natural | 2. repel, unlike | 3. magnetic  |
| 4. compass | 5. pairs         | 6. Magnetism |

### C. Match the Following.

1. d            2. b            3. e            4. c            5. a

### D. Short Answer Type Questions.

1. Iron and Cobalt
2. If we break a magnet in the middle, we would get two pieces, each having a North Pole and South Pole.
3. **Magnetic Material** : Substances which are strongly attracted by a magnet are called magnetic substances, e.g., iron, cobalt, nickel and alloys of carbon and iron.

**Non-magnetic Material** : Substances which are not attracted by a magnet are called non-magnetic substances, e.g., brass, paper, stone, gold, silver, etc.

4. An instrument that is used to find the direction is called Compass. Compass is used to navigate on land, at sea or in the air.
5. The Property of attraction exhibited by a magnet, to a magnetic material is known as magnetism.
6. **Magnetic** : Iron almirah, an iron lamp shade, iron clips, needle car, iron gate.

**Non-magnetic** : A wooden table, plastic geometry box, paper, rubber wool, cloth, curtains, book.

7. Two properties of magnets :—

- (i) Magnet attracts magnetic materials like iron, cobalt, nickel.
- (ii) Like poles of a magnet repel each other and opposite: poles of a magnet attract each other.

Two uses of magnets :

- (i) Magnets are used in electric motors, generators, speakers etc.
- (ii) Television and computer monitors have magnetic strips in their circuits.

#### D. Short Answer Type Questions.

1. Around 4000 years ago, a shepherd boy named magnes lived in an ancient Greek town called Magnesia. He would carry a stick which had a small piece of iron attached at one end to control his herd. One day while his cattle were grazing in the mountains, his stick touched a rock. As he tried to remove it did not come off easily. This rock was the first magnet discovered by man. The rock was named magnetite after magnes and it was found that its main constituent was iron. The word magnet comes from the name of the town magnesia where the first magnet was discovered.

2. When magnetic materials (such as iron fillings) are brought close to a magnet, they stick mostly at the two ends of the magnet. These are called the poles of the magnet. Magnetic forces are the strongest at the poles.

There are two types of poles in every magnet, irrespective of its shape. These are by convention, called the North Pole (N) and the South Pole (S).

3. When two magnets are brought near each other, they are either pulled towards each other or pushed away from each other. This pulling of magnets is called attraction of magnets and the pushing away from each other is called repulsion of magnets. The repulsion or attraction of magnets depends on the fact that which poles of magnets are facing each other. Like poles of magnets (N-N or S-S) repel each other, while unlike poles (N-S or S-N) attract each other. Let's understand this property of magnets through the following activity.

4. (a) The magnets will repel each other.

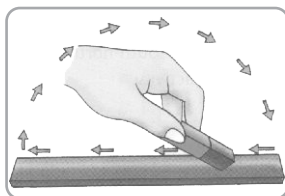
(b) The magnets will attract each other.

5. The following cautions must be taken to keep the magnets safe.

- They should not be heated, hammered or dropped from a height.
- Bar magnets should be kept in pairs with opposite poles on the same side. They must be separated by a piece of wood as shown in the figure given alongside.
- For keeping safe a horseshoe-shaped magnet, a piece of iron should be kept across its poles.
- Magnets should be kept away from all the electronic devices like television, music system, loud speakers and computer printers.

6. Take a piece of iron and place it on a table. Now take a bar magnet and place its one pole near one of the ends of the iron piece. Without lifting the bar magnet, move it along the length of the iron piece till you reach

the other end. Now lift the bar magnet and bring the same pole to the same point of the iron piece from which you began. Move the bar magnet again along the iron piece in the same manner as you did before. Repeat this process about 30-40 times. Bring an iron object near the iron piece to check whether it has magnetised or not. If not, repeat this process for few more times.



Making your own magnet

7. **Aim :** To show that the power of a magnet is the strongest at its poles.

**Materials Required :** A bar magnet, iron filings and a sheet of paper.

**Procedure :**

1. Take some iron filings and spread them on a sheet of paper.
2. Roll the bar magnet over them and lift it up.
3. Now remove the iron filings and repeat these steps.



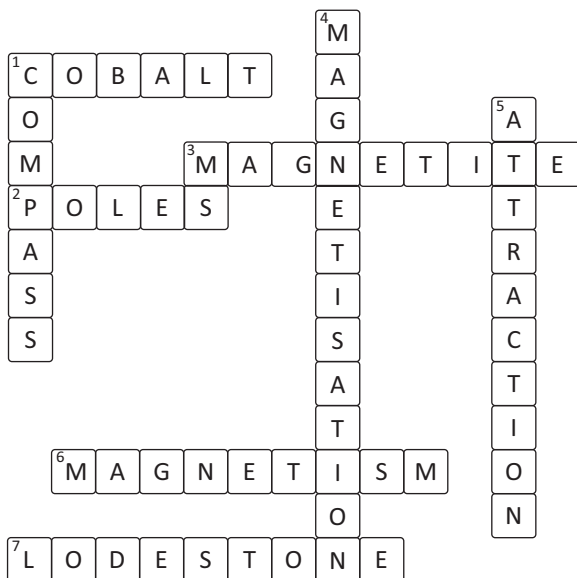
Iron pins sticking to the magnet

**Observation :** You will observe that the iron filings or clips mostly stick near the two ends of the magnet every time you repeat the steps. This proves that the power of a magnet is the strongest at its poles.



**Learn by Doing**

**C. PUZZLE**





# Light



## A. Tick (3) the correct option.

1. (d)    2. (b)    3. (d)    4. (d)    5. (d)    6. (c)    7. (d)

## B. Fill in the blanks with correct words.

1. Primary    2. bean    3. opaque    4. eclipse  
5. rectilinear or motion    6. Reflection    7. Shadow

## C. Match the Following.

1. b    2. c    3. a    4. e    5. d

## D. Short Answer Type Questions.

1. Light is a form of energy that produces sensation of light.  
2. Luminous Bodies : Those bodies which have light of their own are called luminous bodies.

Examples : the sun, the stars, the incandescent lamps and candle flame.

Non-luminous Bodies : Those bodies which have no light of their own, but they can reflect light.

Examples : the plants, moon, wood, stone, etc.

### 3. Characteristics of a Shadow:

- (i) A shadow is always black irrespective of the colour of the object used to make the shadow.  
(ii) It only shows the outline or the shape of the object but not the details of the object.  
(iii) The size of a shadow varies depending on the distance between the :  
• object and the screen, and    • object and the source of light.
4. Reflection is the phenomenon of bouncing back of light from the surface of an object. This gives rise to image formation.
5.  
(i) No shadow is formed in case of a transparent object.  
(ii) Light shadow is formed in case of a translucent object.  
(iii) Dark shadow is formed in case
6. An inverted image is formed in a pinhole camera because the light rays coming from the top and bottom of the object Cross-over (or intersect) at the pinhole.

7. **Transparent:** Clean water, air, clear plastic scale, polythene sheet, plane glass, spectacles.

**Translucent :** Brown paper, waxed paper, thin muslin cloth, dense, smoke, fog.

**Opaque :** Rock, aluminum sheet, wooden box, a CD (compact disc), milk, carbon paper, a wall.

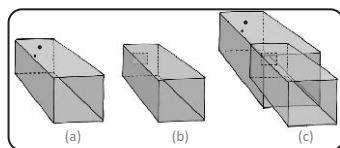
### E. Long Answer Type Questions.

1. **Aim :** To make a pinhole camera.

**Materials Required :** Two empty boxes that can slide into one another (one box slightly bigger than the another), paper cutter, tracing paper, a lamp or a candle and a black cloth.

#### **Procedure :**

- (i) Take two boxes and remove their lids (or any one side).
- (ii) On the side opposite to the open side of the larger box, make a small pinhole in the centre. [Fig. (a)].
- (iii) On the same side of the small box, cut out a square in the centre with a side of about 5 to 6 cm.
- (iv) Cover the open square with the tracing paper (translucent screen) and secure it in position by using some suitable tape [Fig. (b)].
- (v) Slide the smaller box inside the larger box such that the side with tracing paper is inside [Fig. (c)].



A pinhole camera

The pinhole camera is now ready for use.

- Try to look at a well-illuminated object say a lamp, through the pinhole camera from the open face of the smaller box.
- Cover the pinhole camera and your head with a piece of black cloth.
- Adjust the position of the pinhole camera forward or backward to get an image of the object on the tracing paper.

What kind of image is formed on the tracing paper?

**Observation :** You will observe that the image formed on the tracing paper is upside down. This is because light travels in a straight line. The light from the top of the object travels in a straight line through the pinhole and continues until it hits the bottom of the tracing paper. Similarly, the light from the bottom of the object hits the top of the tracing paper. The image thus formed is upside down.

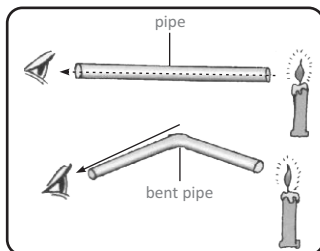
2. **Aim :** To show that light travels in a straight line.

**Materials Required :** A narrow long hollow tube, a curved hollow tube and a lighted candle.

**Observation :**

- (i) Take a lighted candle and try to observe the candle through the straight hollow tube.
- (ii) Now, observe the candle through the curved (bent) tube.

**Observation :** The candle becomes clearly visible when seen through the straight hollow tube but when seen through the curved hollow tube, it cannot be seen.



Light travels in a straight line

**Result and Conclusion :** Thus we can infer that light travels in a straight line.

3. The differences between opaque, translucent, and transparent are :
  - Materials that allow all the light pass through them are called transparent materials. We will be able to see through these materials very clearly.  
Examples of transparent materials are clear air, clear glass, clean water, same kinds of plastic and cellophane paper.
  - Materials that transmit some amount of light are called translucent materials. We will not be able to see through these materials clearly. Examples of translucent materials are butter paper, a sheet of paper smeared with oil and smoked glass.
  - Materials that completely block light are called opaque materials. We will not be able to see through these materials at all.  
Examples of opaque materials are metals, mud, cement, coal and wood.
4. An area of darkness formed by an opaque object obstructing light is called a shadow.

If an opaque substance is kept between the source of light and a screen, the light does not pass through it. We can say that the shadow of the substance on the screen remains unlighted. The unlighted portion is the shadow.

**Characteristics of a Shadow:**

- (i) A shadow is always black irrespective of the colour of the object used to make the shadow.
- (ii) It only shows the outline or the shape of the object but not the details of the object.
- (iii) The size of a shadow varies depending on the distance between the :
  - object and the screen, and
  - object and the source of light.

5. The difference between the shadow and the image of an object in a mirror are:

- The length of a shadow changes with the change in the position of object with respect to the source of light.

The length of the image in a mirror always remains the same, i.e., equal to the size of object at all positions.



Lateral inversion

- The shadow is always black in colour irrespective of the colour of object and the colour of light. The details of the object cannot be seen in its shadow.

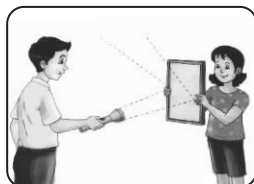
The image in a mirror is of the same colour as the object. The details of the object can be seen in its image.

- The shadow has no lateral inversion.

The image formed in a mirror is laterally inverted.

7. **Aim :** To observe and understand the reflection of light.

Go to a dark room with your friend. Take a mirror and a torch along with you. Switch off the lights of the room. Ask your friend to hold a mirror and stand in front of you at a distance. Directs the torch light onto the mirror.



What do you observe?

You will observe a patch of light on the other side (wall) of the room. This shows that mirror reflects the light rays. Now either change the direction of the torch or the direction of the mirror. What do you observe now?

You will now observe a patch of light but on some other side (wall) of the room. This shows that a mirror changes the direction of light that falls on it.



## Light

### EXERCISES

**A. Tick (3) the correct option.**

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

**B. Fill in the blanks with correct words.**

1. atmosphere      2. oxygen      3. Oxygen      4. Air      5. crops

**C. Match the Following.**

1. e                      2. a                      3. d                      4. b                      5. c

**D. Short Answer Type Questions.**

1. Thick blanked of air surrounding the eat the surface in called the atmosphere.
2. Human beings take in oxygen from air and breathe out carbon-dioxide. Oxygen is necessary for them to get energy. Whenever we breathe, our body gets oxygen it needs from air. It breaks down the food we eat in our body and provides energy. Thus, without oxygen (air) our body cannot use the food we eat.
3. The animals living in soil breathe in air trapped the particles of soil.
4. The amount of water vapour present in the air is called humidity.
5. (i) Planting more and more trees.                      (ii) Recycling plastics.

**E. Long Answer Type Question.**

1. Air contains mainly nitrogen, oxygen and remaining includes carbon dioxide, noble gases, water vapour, dust particles and traces of other gases.

**Nitrogen**

Air contains about 78% nitrogen. Nitrogen does not support burning or combustion. Plants need nitrogen to grow.

**Oxygen**

Around 21% of the air is made up of oxygen. Oxygen is life-supporting gas and is essential for all living organisms. It is necessary for all the life processes and for processes like combustion or burning. Oxygen supports combustion.

**Carbon Dioxide**

Air contains about 0.03% of carbon dioxide. Plants and animals take in oxygen and give out carbon dioxide during respiration. During burning, carbon dioxide is also produced.

**Water Vapour**

Water is present in the form of vapour in the atmosphere. This vapour is released due to evaporation of water from water bodies on the earth as a part of the water cycle.

**Dust and Smoke**

Air around us also contains suspended dust particles and smoke. Smoke is released when fuels are burnt. It consists of gases and find dust particles. These are harmful for the living organisms.

6. As we go higher and higher in the atmosphere, the availability of air goes on decreasing. One feels difficulty in breathing at a high altitude. This is



the reason why mountaineers, astronauts and miners carry oxygen cylinders with them for respiration.

3. **Aim :** To show that oxygen is necessary for combustion.

**Materials Required :** Glass bowls, glass tumbler, candle

**Procedure :**

Take a wide glass bowl and place a candle in the middle of it. Fill the bowl with water. Light the candle and cover it with an inverted glass tumbler. Observe what happens to the burning candle and level of water.

**Observation :** It is observed that the candle continues to burn for some time and then stops. This happens because the oxygen present in the tumbler is used up. As the space occupied by the oxygen in the glass tumbler is used up, the water rises to occupy the space. Hence, the level of water increases.

4. **Aim :** To observe the air dissolved in water

**Materials Required :** Beaker, tripod stand, burner and water

**Procedure :**

- Take some water in the beaker.
- Heat it slowly on the tripod stand over the burner.
- Look at the inner surface of the glass vessel or beaker.

**Observation :**

You will notice tiny bubbles on the inner surface of the beaker. These are bubbles of air dissolved in water. On heating, the air dissolved in water escapes.

5. Air pollution is the addition of contaminated substances in the environment in quantities that are harmful to living beings. These unwanted substances are called pollutants.

Burning of fuels such as coal and petroleum, excessive burning of fuels such as wood and coal, smoke and harmful gases released from industries, smoke released by vehicles and machines releasing gases are the major causes of air pollution.



## Nutrition in Plants



### A. Tick (3) the correct option.

- |        |        |        |        |        |
|--------|--------|--------|--------|--------|
| 1. (b) | 2. (a) | 3. (d) | 4. (b) | 5. (c) |
| 6. (a) | 7. (c) | 8. (b) |        |        |

### B. Fill in the blanks with correct words.

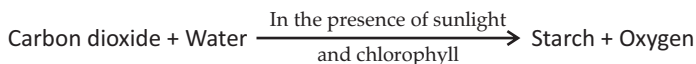
- |                |                |               |
|----------------|----------------|---------------|
| 1. Cactus      | 2. Nitrogenous | 3. Pitcher    |
| 4. Saprophytes | 5. symbiosis   | 6. higustoria |

### C. Match the Following.

- |      |      |      |      |      |      |
|------|------|------|------|------|------|
| 1. c | 2. f | 3. e | 4. b | 5. d | 6. a |
|------|------|------|------|------|------|

### D. Short Answer Type Questions.

- The process of taking food and utilizing it for various activities by body is called nutrition.
- Rhizobium
- Sun is the ultimate source of all the energy needs of our body.
- Cuscuta is a parasitic plant.
- Saprophtes
- The reaction that takes place can be written as :



- Sundew plants have sticky hairs on their leaves because insects get stuck in this substance and become entangled. This helps plant to digest the insect.

### E. Long Answer Type Questions.

- The process of taking food and utilizing it for various activities by body is called nutrition.

Nutrition is divided into two main types in plants:

- (i) Autotrophic Nutrition                      (ii) Heterotrophic Nutrition

**Autotrophic nutrition** : Autotrophic nutrition is found in green plants. They make their own food and hence green plants are called autotrophs (auto-self, troph-food). They have the unique ability of trapping solar

energy and covering it into chemical energy which is stored in the food. The process is called photosynthesis (photo-light, synthesis-to make). This mode of nutrition is called autotrophic nutrition.

**Heterotrophic Nutrition :** All non-green plants do not have the green pigment chlorophyll in their leaves. Such plants cannot make their own food as they are not capable of doing photosynthesis. These plants are called heterotrophic plants. The mode of nutrition of these plants is called heterotrophic nutrition. Animals too have heterotrophic mode of nutrition.

2. Some non-green plants live on dead and decaying plants and animals and derive their food from them. Examples are mushrooms and other fungi and bacteria. They secrete digestive juices on the dead and decaying matter. This converts the solid matter into a liquid. They then absorb the nutrients from this liquid. This method of getting nutrients from dead and decaying matter in the form of a liquid is known as saprophytic nutrition.
3. The general conditions necessary for photosynthesis are :
  - the presence of a green pigment called chlorophyll.
  - the presence of sunlight.
  - the availability of carbon dioxide.

**Chlorophyll :** It is a green pigment and is usually present in the leaves in structures called chloroplasts.

**Sunlight :** It is the source of light energy. Chlorophyll traps the light energy to make energy carrying particles.

**Carbon dioxide :** It is obtained from the atmosphere through small openings called stomata (singular–stoma) in the underside of the leaves.

**Water :** This is another important requirement for photosynthesis. The root system of plants enables them to obtain water from the soil. The root system consists of a main or primary root, rootless or secondary roots, and root hair. Root hair increase the surface area of roots and are found in great numbers near the tips of roots. Water and soluble nutrients enter the root hair, pass through the secondary roots and travels through the main root into the stems and reaches the leaves through xylem. Once photosynthesis taken place, starch is formed. This starch is carried to various parts of the plants through phloem.

4. **Autotrophic nutrition :** Autotrophic nutrition is found in green plants. They make their own food and hence green plants are called autotrophs (auto-self, troph-food). They have the unique ability of trapping solar energy and covering it into chemical energy which is stored in the food. The process is called photosynthesis (photo-light, synthesis-to make). This mode of nutrition is called autotrophic nutrition.

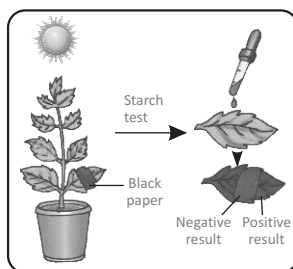
**Heterotrophic Nutrition :** All non-green plants do not have the green pigment chlorophyll in their leaves. Such plants cannot make their own food as they are not capable of doing photosynthesis. These plants are called heterotrophic plants. The mode of nutrition of these plants is called heterotrophic nutrition. Animals too have heterotrophic mode of nutrition.

5. **Aim :** To show that sunlight is necessary for photosynthesis.

**Materials Required :** A potted plant, black paper, paper clip, iodine solution, dropper

**Method :**

- (i) Take a potted plant and destarch its leaves by keeping it in dark for 2 days.
- (ii) Take a black paper and cut a simple 'L' shape in it by using a stencil.
- (iii) Cover one leaf with this paper.
- (iv) Leave the setup in sunlight for 4-6 hours.
- (v) Test the leaf for formation of starch in both the covered and uncovered portions by using the iodine solution.



Sunlight is necessary for photosynthesis.

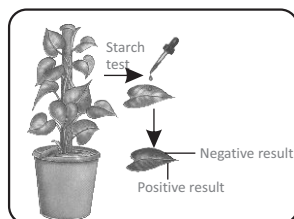
**Observation :** Detach the leaf and test if for presence of starch. You will observe that only the part of the leaf that could get sunlight through the cut out design as well as the other exposed parts of the leaf turns blue-black showing the presence of starch.

6. **Aim :** To show that green pigment (chlorophyll) is necessary for photosynthesis.

This activity can be performed using a variegated leaf of coleus or money plant. Perform steps 2 and 3 given in previous activity.

**Observations :** The green portion of the leaf develops blue-black colour, when tested with iodine for the presence of starch. The non-green portion turns brown in colour.

**Inference :** Only those portions of the leaf that contained chlorophyll could perform photosynthesis. This shows that chlorophyll is necessary for photosynthesis.

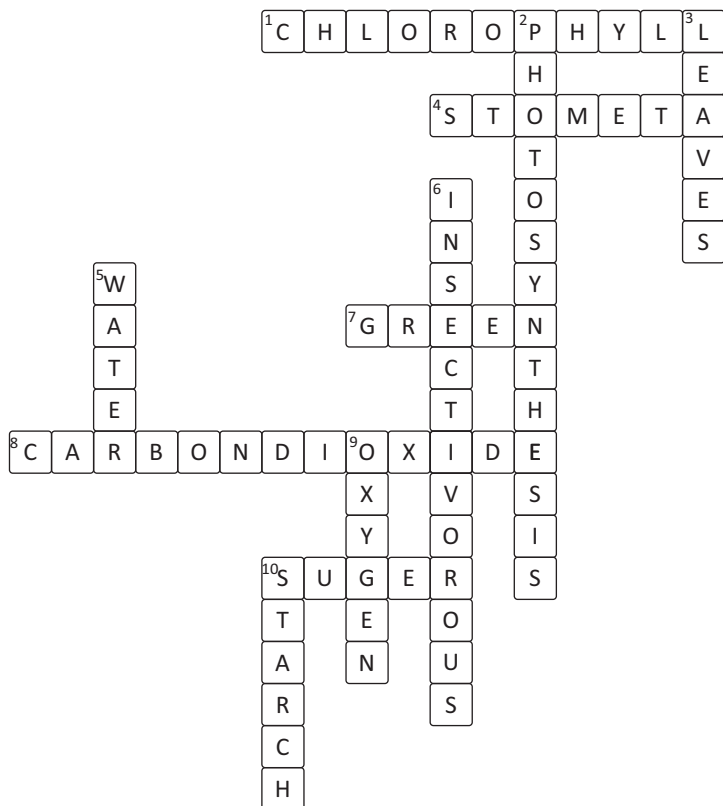


Chlorophyll is necessary for photosynthesis.



## Learn by Doing

### PUZZLE



## Nutrition in Animals



### EXERCISES

#### A. Tick (3) the correct option.

1. (d)    2. (d)    3. (b)    4. (b)    5. (b)    6. (c)    7. (b)

#### B. Fill in the blanks with correct words.

1. amylase    2. mouth    3. Long sticky    4. vacuole  
5. salivary    6. bile juice    7. proboscis    8. small

#### C. Match the Following.

1. f    2. c    3. e    4. b    5. a    6. d

#### D. Short Answer Type Questions.

1. (a) **Saliva** : It helps in digestion chewing and swallowing.  
(b) **Tongue**
    - (i) It helps in the process of chewing by pushing the food towards the teeth.
    - (ii) It helps to mix the food with saliva and make a ball out of it and finally to swallow it.
    - (iii) Tongue helps us to speak.
  - (c) **Liver**
    - (i) It secretes bile juice which is stored in the gall bladder.
    - (ii) The bile juice secreted by gall bladder breaks up fats into tiny droplets that can be digested and absorbed more easily.
  - (d) **Pancreas** : It secretes the pancreatic juice that changes starch into simple sugars and proteins into simpler compounds called amino acids.
  - (e) **Pseudo podia** : when ameoba comes in contact with its food, the pseudopodia completely enclose the food forming. small cavities called food vacuoles.
2. The process of breaking down of food into simpler form is called digestion.
  3. The first set of only 20 teeth appear in children by the age of 2 years. These are called milk teeth. milk teeth start getting replaced by permanent teeth at around the age of 7 years and are replaced by set of 32 permanent teeth.
  4. Saliva is the a mixture that helps in digestion. It is produced by salivary glands in mouth.
  5. Molars are large back teeth having a wide grinding surface and core used primarily to chew food.
  6. The semi-digested food that is chewed again by ruminants is called cud.
  7. Water is absorbed from undigested food in small intestine.
  8. The rumen is a part of the stomach of the herbivores e.g., cud.

#### E. Long Answer Type Questions.

1. The food eaten by animals undergoes five steps :
  - (i) **Ingestion** : It is the process of taking in food into the body through an opening.
  - (ii) **Digestion** : It is the process of the breaking down of food-physically and chemically into simple and soluble form.

- (iii) Absorption : It is the process of absorption of simple food in the blood.
- (iv) Assimilation : It is the process of utilization of simple food by the body.
- (v) Egestion : It is the process of throwing undigested food out of the body.

2. There are four distinct type of teeth in our mouth. These are:

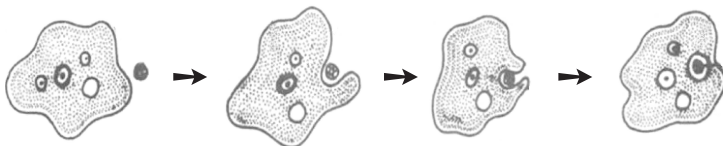
**Incisors** : They are also called biting teeth. They are flat, blade like teeth. The incisors are the front teeth and are so called because they help to incise (cut) food.

**Canines** : They are also called tearing teeth. They have very sharp edges and help in tearing the food.

**Premolars** : They have broader grinding surfaces and therefore help in chewing and grinding of food.

**Molars** : Molars are large back teeth having a wide grinding surface and are used primarily to chew food.

3. When amoeba comes in contact with its food, it throws out finger-like projections from its body. These projections are called pseudopodia (pseudo—false, podium—feet). The pseudopodia completely enclose the food forming small cavities called food vacuoles. The food is digested in the food vacuole with the help of digestive juices which are secreted into the food vacuole. This digested food is now ready to be absorbed and assimilated. The undigested food is pushed out of the body.



*An Amoeba Feeding*

4. The tiny stomach glands in the walls of the stomach give out digestive juices also called gastric juices. These juices contain enzymes and hydrochloric acid.

The enzyme pepsin acts on the complex molecules, proteins and digests most of them by turning them into simpler molecules, peptides. Renin is an enzyme secreted by the stomach wall in infants. It helps in the digestion of milk.

Hydrochloric acid kills bacteria present in food and also helps in activation of enzymes.

The gastric juices pour over the food and the food is thoroughly mixed by

the action of muscular walls of the stomach which contract and relax slowly and repeatedly. The food gets completely crushed in the stomach and gets converted into a semi fluid called chyme. It then passes into the small intestine.

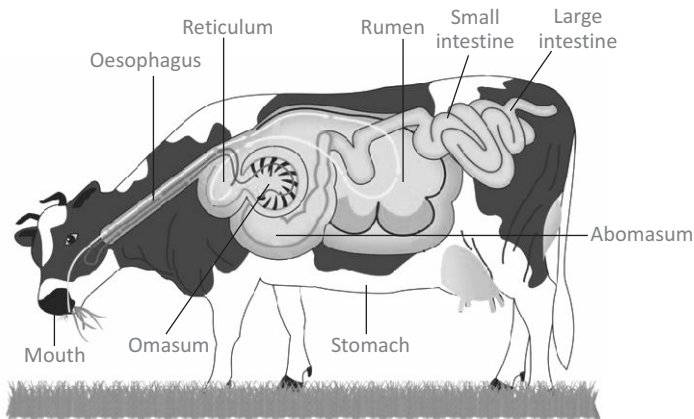
5. The simple and soluble molecules formed after digestion are transported to the blood vessels and assimilated in the blood. The absorbed substances are then transported to the various parts of the body through the blood. When the simple food reaches each cells of the body it is called assimilation.
6. After the initial chewing the food passes down the 2 to 3 feet long oesophagus. The oesophagus leads into the stomach which in ruminants is four chambered. Thus you see that ruminants have a unique stomach.

**Rumen :** The rumen helps in storing the large quantities of food that has been quickly consumed. The food is partially digested here and is now called the cud. The cud is then brought back into the mouth, re-chewed and re-swallowed in a process called cud-chewing. The rumen also has billions of bacteria and protozoa which breakdown the fibre called cellulose found in hay and grass.

**Reticulum :** The reticulum helps in moving the swallowed food back into the mouth for thorough chewing. The reticulum opens into the omasum.

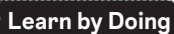
**Omasum :** Its main function is to absorb excess water and reduce the particle size further.

**Abomasum :** The walls of the abomasum secrete digestive juices that help in digestion.

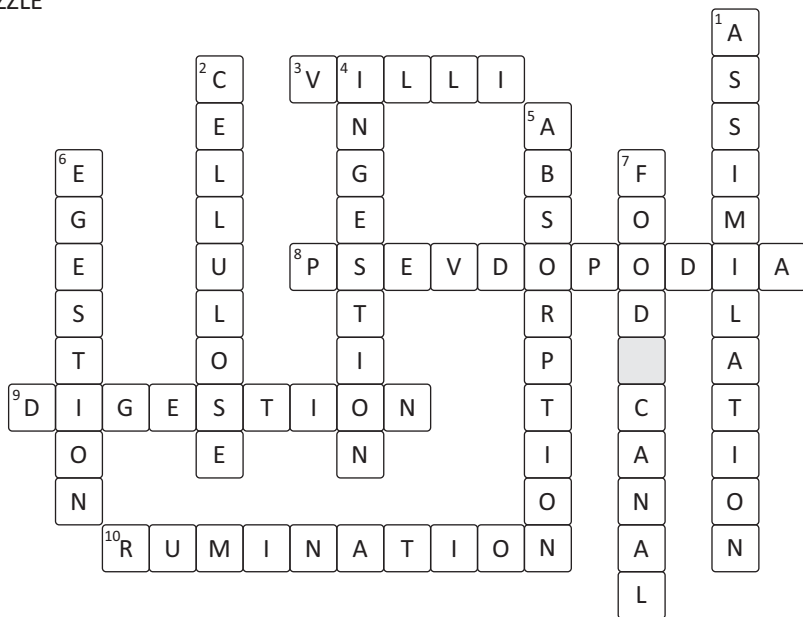


Digestive System in Ruminants





## PUZZLE



## Changes Around Us



**A. Tick (3) the correct option.**

1. (a)    2. (a)    3. (d)    4. (c)    5. (d)    6. (c)    7. (d)

**B. Fill in the blanks with correct words.**

1. chemical                      2. physical                      3. zinc  
4. chemical                      5. iron, water, oxygen        6. CO<sub>2</sub>

**C. Match the Following.**

1. d      2. a      3. e      4. f      5. c      6. b

**D. Complete the following equations :**

1.  $\text{CaO} + \text{H}_2\text{O} \longrightarrow \text{Ca(OH)}_2 + \text{Heat}$
2.  $\text{CaSO}_4 + \text{Fe} \longrightarrow \text{FeSO}_4 + \text{Ca}$
3.  $\text{CO}_2 + \text{Ca(OH)}_2 \longrightarrow \text{CaCO}_3 + \text{H}_2\text{O}$
4.  $\text{MgO} + \text{H}_2\text{O} \longrightarrow \text{Mg(OH)}_2$

### E. Short Answer Type Questions.

1. Those changes in which a substance undergoes a total change and transforms into new substance are called chemical changes.  
For example: burning of paper, germination of seeds, digestion of food etc.
2. The process of obtaining from hot super saturated solution is called crystallization.
3. Irreversible change.

S.No.	Physical Change	Chemical Change
1.	A physical change is temporary.	A chemical change is permanent.
2.	A physical change is reversible.	A chemical change is irreversible.

5. 
$$\begin{array}{ccccccc} 2\text{Mg} & + & \text{O}_2 & \longrightarrow & 2\text{MgO} \\ \text{magnesium} & & \text{oxygen} & & \text{magnesium oxide} \end{array}$$
6. Salt and alum
7. When carbon dioxide is passed through lime water, calcium carbonate and water are obtained.
8. A common example of physical change, and chemical change happening together is the burning of a candle. The melting of wax and the solidification of molten wax are physical changes while burning of molten wax is a chemical change.

### F. Long Answer Type Questions.

1. **Crystallization** : Crystallization is the process of separating solid compounds from the solution in the form of crystals.

**Obtaining Sugar Crystals** : The sugar is dissolved in minimum amount of a solvent, preferably water at a high temperature. Then the impurities are removed by filtration and the solution is concentrated by vaporising the solvent. When the concentrated solution is cooled, it forms crystals of the pure substance, that is sugar.

2. **Absorption or Evolution of Heat, Light or any other Radiation** : Nearly all chemical reactions are accompanied by change in energy, usually in the form of heat or light. The heat may be released (evolved) or absorbed. Accordingly, the reactions are classified into exothermic reactions and endothermic reactions.

**Exothermic Reaction** : A reaction during which the heat is released or evolved is known as exothermic reaction. Let's perform an activity to understand evolution of heat.

**Exothermic Reaction** : A reaction during which the heat is absorbed is known as an endothermic reaction. Let's perform an activity to understand this.

**Change in Colour and Formation of Precipitate :** During a chemical reaction, the product formation may be accompanied by a change in colour. Also, there is a possibility of deposition or settling down of certain insoluble substances known as precipitates which are formed as a result of chemical reaction. Precipitate is denoted by a downward ( $\downarrow$ ) arrow.

**Evolution of Gas and Production of Sound :** Generally, gas is evolved when one of the reactants is already in a solution form. The gas bubbles (effervescence) are mostly accompanied by a bubbling sound. The evolution of gas is denoted by an upward ( $\uparrow$ ) arrow next to the formula in a reaction.

3. In tearing of a paper, no new substance is formed. So, it is a physical Change. Whereas in burning of a paper, a new substance i.e., ash is formed, So it is also a chemical change,
4. When Iron reacts with oxygen of the air in the presence of moisture to form a substance called iron oxide which we call rust.

The chemical equation for this reaction can be represented as :



Oxygen and water are two essential conditions for rusting of iron, absence of either or both of them can prevent rusting.

This is a chemical change because this change is permanent. You cannot get back the iron from iron oxide.

**Prevention of Rusting :** Rusting can be prevented by not allowing the surface of the iron to come in direct contact with moisture/water and air. This can be done in the following ways.

**Painting :** A layer of paint prevents iron articles from coming in direct contact with the moisture and air, hence preventing rusting.

**Oiling/Greasing :** When oil or grease is applied, iron does not come in direct contact with moisture, as water and oil do not mix.

**Galvanisation :** Iron can be coated with another metal like chromium or zinc. This process of coating iron with zinc is called galvanisation. Galvanisation protects iron and other metals from rusting.

**Electroplating :** This is the process of coating iron objects with shiny metals like chromium electrically.

**Alloying :** In this process, iron is mixed with other corrosion-resistant metals or non-metals. For example, stainless steel is an alloy of iron, nickel and chromium. It does not rust at all.

5. **Aim :** To observe chemical change in magnesium.

[Perform this activity only under the supervision of the teacher.]

**Materials Required :** Magnesium, ribbon, sand paper, a pair of tongs and burner

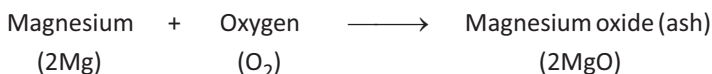
**Method :**

- (i) Take a small piece of a magnesium ribbon. Clean its tip with sandpaper.
- (ii) Hold it with a pair of tongs over the flame of a burner.
- (iii) It burns with a brilliant white light and a powdery ash [magnesium oxide (MgO)] is formed. It is different from magnesium ribbon.
- (iv) Dissolve this ash in water in a test tube. Stir it properly.
- (v) Test its chemical nature with the help of blue and red litmus paper.
- (vi) Discuss your results in the class.



Burning of magnesium

The reactions can be represented as follows.



**Caution :** Do not stare at the burning ribbon for long. It is harmful to the eyes. Use glasses to look at it.

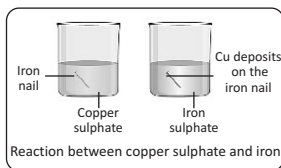
**Observation :** On burning magnesium ribbon, a new substance MgO is formed. MgO when mixed with water forms another new substance  $\text{Mg}(\text{OH})_2$ . This is a chemical change.

6. **Aim :** To demonstrate a chemical reaction during which a change in colour is accompanied by the formation of precipitate.

**Materials Required :** Crystals of copper sulphate, dilute sulphuric acid, beaker, iron nail and water.

**Method:**

- (i) Dissolve a few crystals of copper sulphate in water in a beaker.
- (ii) Add a few drops of dilute sulphuric acid to it. You will get a blue-coloured solution.
- (iii) Divide this solution into two equal parts. Drop a clean iron nail in one part.
- (iv) Leave it for half an hour and observe.



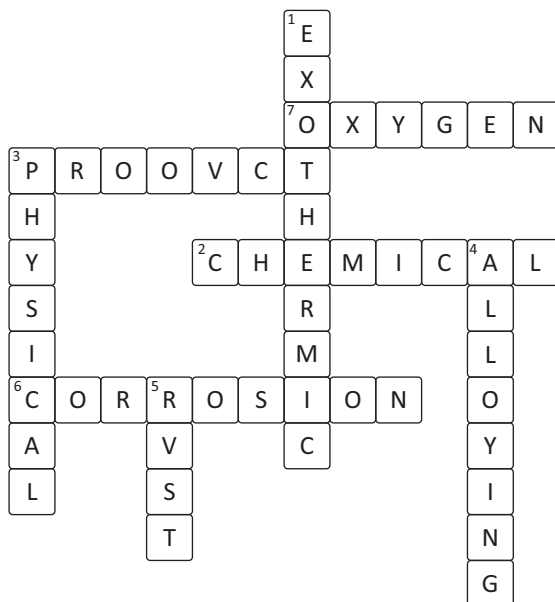
**Observation :** You will notice that the solution turns green and there is a brownish deposit or precipitate on the iron nail. This is due to the formation of new substances—iron sulphate and copper crystals. This is a chemical change. The change is represented as following :





## Learn by Doing

### PUZZLE



## Acids, Bases and Salts



### EXERCISES

#### A. Tick (3) the correct option.

1. (d)    2. (b)    3. (d)    4. (b)    5. (a)    6. (d)    7. (b)

#### B. Fill in the blanks with correct words.

1. Cactus    2. acetic    3. magnesia    4. alkalis  
5. acidic    6. Base    7. acidity    8. salt + water

#### C. Match the Following.

1. b    2. a    3. e    4. d    5. f    6. g    7. c

#### D. Give one or few word of the following:

1. Tartaric acid    2. Litmus  
3. Sodium chloride (NaCl)    4. formic acid  
5. Calcium hydroxide    6. water, table salt  
7. Red litmus turn into blue.

### E. Short Answer Type Questions.

- (a) **Acid** : The chemical substances which are sour in taste.  
(b) **Base** : The chemical substances bitter in taste and soapy to touch.  
(c) **Salt** : A salt is a neutral compound formed when an acid reach with a base.  
(d) **Indicator** : Substance that helps to find out a substance is acidic, basic or neutral.
- Litmus and Turmeric.**
- Strong acid** : Hydrochloric acid, nitric acid  
**Weak acid** : Formic acid, acetic acid.
- Acidic substance** : Lemon juice  
**Basic substance** : Lime water  
**Neutral substance** : Water
- Bases are bitter in taste. A bitter taste is characteristic of all bases.  
Solutions of the bases are soapy to touch. If you rub a drop or two of a very dilute solution of sodium hydroxide or potassium hydroxide between your fingers, they will feel slippery.
- Sodium hydroxide, Potassium hydroxide
- Hydrochloric acid.
- Antacids in your are medicine that counteract (neutralise) the acid in your stomach to relive indigestion and heartburn.
- Baking soda.

### F. Long Answer Type Questions.

1.	<table><tr><th>S.No.</th><th>Acids</th><th>Bases</th></tr><tr><td>1.</td><td>Sour in taste.</td><td>Bitter in taste</td></tr><tr><td>2.</td><td>Turn blue litmus red. Acids do not give soapy touch.</td><td>Turn red litmus blue Soapy touch</td></tr></table>	S.No.	Acids	Bases	1.	Sour in taste.	Bitter in taste	2.	Turn blue litmus red. Acids do not give soapy touch.	Turn red litmus blue Soapy touch
S.No.	Acids	Bases								
1.	Sour in taste.	Bitter in taste								
2.	Turn blue litmus red. Acids do not give soapy touch.	Turn red litmus blue Soapy touch								

- Soaking china rose petals into hot water for half an hour it creates a solution that can be used as an acid-base indicator and this is how we make china rose indicator.
- The rain that contains unusually higher levels of acid than is normal is called acid rain. The fumes of harmful gases like sulphur dioxide, nitrogen dioxide and carbon dioxide released from the industries mix with rainwater and form sulphuric acid, nitric acid and carbonic acid, respectively. The presence of these acids make rainwater acidic and causes great damage to aquatic life, crops, stone buildings and historical monuments. Acid rain is one of the reasons for the Tajmahal to turn yellow.

4. Some food particles get stuck among the teeth. Bacteria grow on these food particles. These bacteria decompose the food particles and release acids in the process. This acid causes the corrosion of tooth enamel and decay of tooth.
5. When acid and base react with each other to produce salt and water then such reaction is known as neutralisation reaction.

**Example :** When Sodium hydroxide is added to hydrochloric acid. Sodium chloride and water are formed.



6. Indicators are those substance that show change in colour when brought in contact with acids and bases.

Indicators substances used to test acid and bases.

**Example :**

**Neutral indicators :** Turmeric, grape juice.

**Synthetic indicators :** Phenolphthalein, litmus paper.

7. **Properties of Acids :** Some of the characteristic properties of acids are :

- Acids have a sour taste and are corrosive in nature.
- Acids also have the ability to corrode metals such as iron and aluminium. For this reason, acids are generally stored in glassware.
- Mineral acids such as nitric acid and sulphuric acid can destroy human tissues, clothes, paper etc. Thus, one should handle acids with care as they can cause burns upon contact with skin.
- Acids are soluble in water. Most acids dissolve in water either at room temperature or on heating to form a clear solution.

For example : Vinegar is 3-5% solution of acetic acid in water.

- Depending on the amount of water, acids can be either diluted or concentrated. If the amount of water is more in an acid, it is called dilute acid and if the amount of water is less, it is called concentrated acid.
- Acids can be strong or weak. A strong acid can cause severe burns. Nitric acid and sulphuric acids are a few examples of strong acids. Weak acids on the other hand are not as destructive as strong acids. Organic acids are generally weak acids.
- Acids conduct electricity.

### **Properties of Bases**

Some of the characteristic properties of bases are :

- Bases are bitter in taste. A bitter taste is characteristic of all bases.
- Solutions of the bases are soapy to touch. If you rub a drop or two of a

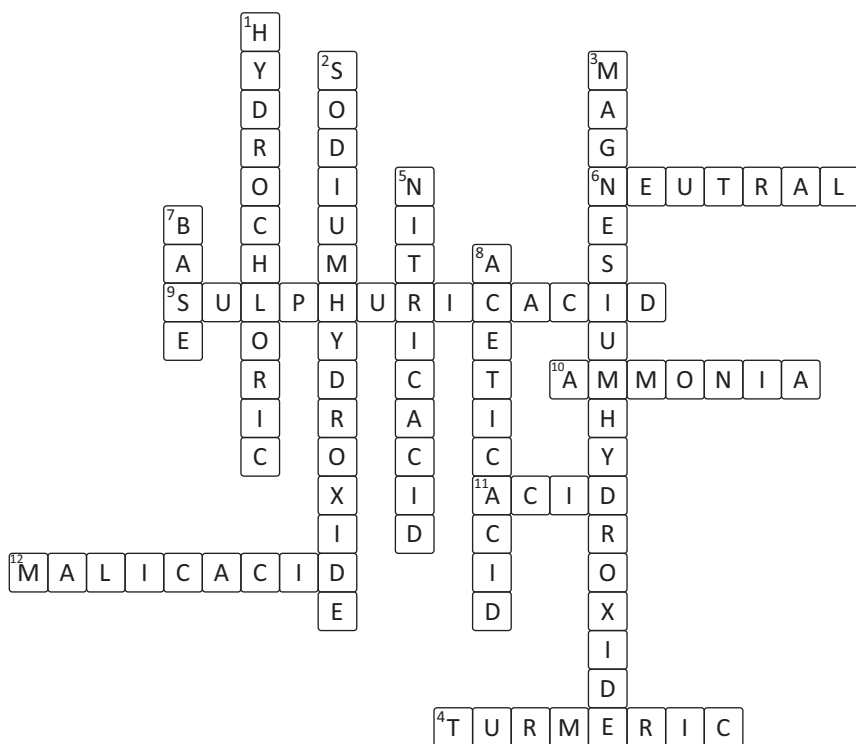
very dilute solution of sodium hydroxide or potassium hydroxide between your fingers, they will feel slippery.

- Bases may or may not be soluble in water. Bases that can dissolve in water are called alkalis.
8. Neutralization is used in the manufacturing of antacid tablets. Neutralization reaction helps in the prevention of tooth decay, neutralizing soil, in the treatment of ants and bee & bite etc.



### Learn by Doing

#### PUZZLE







# Heat

## EXERCISES

### A. Tick (3) the correct option.

1. (d)                      2. (c)                      3. (c)                      4. (b)                      5. (b)
6. (c)                      7. (c)                      8. (d)                      9. (a)

### B. Fill in the blanks with correct words.

1. energy                      2.  $98.6^{\circ}\text{F}$ ,  $36.9^{\circ}\text{C}$                       3.  $95^{\circ}\text{F}$ ,  $110^{\circ}\text{F}$
4. Clinical                      5. radiation                      6. bitter
7. convection                      8. vaceum                      9. steel, good

### C. Match the Following.

1. d                      2. e                      3. f                      4. a                      5. c
6. g                      7. h                      8. b

### D. Short Answer Type Questions.

1. Celcius scale Fahrenheit scale
2. The form of energy that flows from a hot body to acold body is called heat energy. Temperature is the measurement of hotness or coldness of an object.

S.No.	Celcius Scale	Fahrenheit Scale
1.	Temperature on this scale is measured in $^{\circ}\text{C}$	Temperature on this scale is measured in $^{\circ}\text{F}$
2.	Lower fixed point is $0^{\circ}\text{C}$	Lower fixed point is $32^{\circ}\text{F}$ .
3.	Upper fixed point is $100^{\circ}\text{C}$	Upper fixed point is $212^{\circ}\text{F}$

4. Heat travels from soup to spoon with the process of conduction. Heat is conducted to spoon, as metal is a very good conductor of heat.
5. Substances that do not allow heat energy to flow through them easily are bad conductors of heat or insulators. Glass, plastic, wood, ebonite, cotton, wool are bad conductors of heat. Air is also a very bad conductor of heat.
6. Black
7. Plastic is an insulator of heat. Plastic mat is used to insulate and prevent damage to the table.
8. The conduction and convection of heat requires medium, while radiation of heat requires no medium.

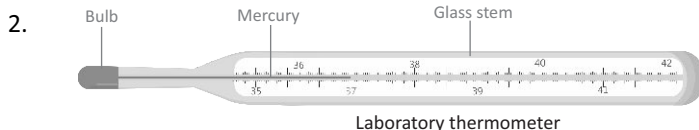
### E. Long Answer Types Questions.

1. (a) We know that  $F = (C \times \frac{9}{5}) + 32$

$$= (35 \times \frac{9}{5}) + 32 \quad (\text{given } C = 35^\circ\text{C})$$
$$= (7 \times 9) + 32$$
$$= 63 + 32 = 95^\circ\text{F}$$

(b) We know that  $F = (C \times \frac{9}{5}) + 32$

$$= (15 \times \frac{9}{5}) + 32 \quad (\text{given } C = 15^\circ\text{C})$$
$$= (3 \times 9) + 32$$
$$= 27 + 32 = 59^\circ\text{F}$$



3. The three main effects of heat are :

- (i) Heat causes temperature to rise.
- (ii) Heat causes temperature to rise.
- (iii) Heat causes expansion.

**Heat Causes Temperature to rise :** When a body absorbs heat, its molecules gain energy. As a result the temperature of the body rises and the body becomes hot.

4. **Land Breeze :** After sunset the land cools much faster. The air above the sea is warmer than that above the land. It rises and the cooler air above the land moves out towards the sea. We call this land breeze.

**Sea Breeze :** The sea takes longer to get heated than does the land. So the land is hotter than the sea during the day. The air in contact with the land becomes hot and rises and the cooler air above the sea rushes in towards the land to take its place. This sets up the convection current which we call a sea breeze.

5. (i) We need two metal pans, one should be painted black from outside and another should be shiny from outside. Fill both containers with equal amount of water. Keep them in the sun for about half an hour. After that take the temperature of water in both the pan. You will notice that the temperature of water, kept in black pan is hotter than that of water, kept in the shiny or light coloured pan.

This shows that a black body absorbs more heat compared to a light coloured body.

- (ii) **Aim** : To observe conduction of heat in solids. You need a metal rod, some nails, wax and candle.

Fix some nails at equal distances on the rod with the help of wax. Fix one end on the metal rod with clamp keeping metal rod in horizontal position. Start heating another tip of the metal rod with a gas burner of a candle.

You will observe that nail which is nearest to the flame falls down first because of melting of wax. Then the second nail falls down, which is followed by other nails one by one.

This happens because heat travels gradually from the hot end of the metallic rod to its colder end. If heat is supplied continuously then conduction will continue until the temperature of whole body of the solid object becomes uniform.

Conditions for the conduction of heat –

- Two objects should be in direct contact.
  - Temperature of the two objects should be unequal.
6. When the bulb of the thermometer is placed beneath the tongue or under the arm of the patient, the mercury inside the bulb expands due to heat of the body and rises in the capillary tube. The marking up to which the mercury rises is the reading of the temperature.

## 7. Applications of Conductors

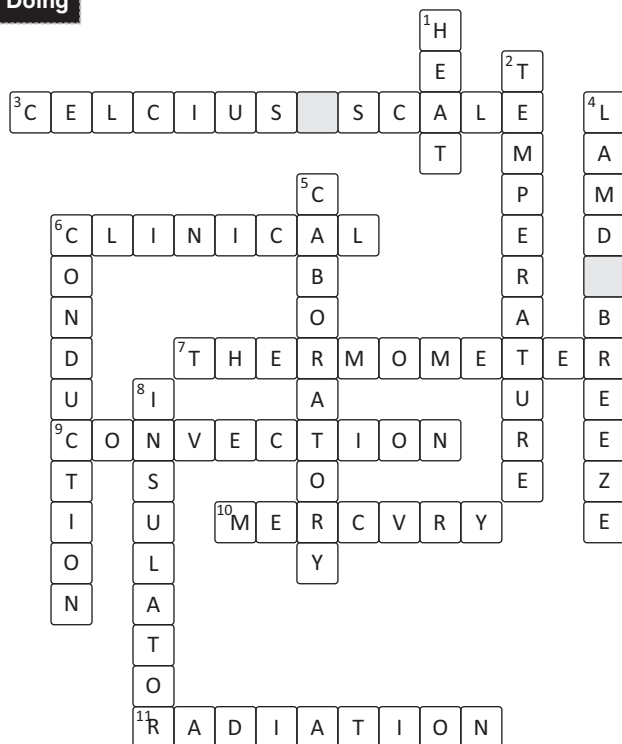
- (i) Both good and bad conductors are useful to us, depending on our needs we use good conductors (metals) for making cooking utensils and heat-resistant plastic for making the handles for these vessels.
- (ii) We wear woollen clothes in winter because wool is a bad conductor of heat. Thus it helps in retaining body warmth. The wool fibre has series of curls and these are called 'crimps'. These crimps create small air pockets. The greater the number of crimps, the greater is the number of air pockets which can hold and trap air. Thus, a thin layer of air is created which insulates us from the cold weather and also prevents body heat from escaping into the surroundings.
- Animals and birds keep their bodies warm due to the trapped air in their fur or feathers.
  - Aluminium, being a good conductor, is used in solar panels, solar heaters, etc.
  - The heating pad of an electric iron is made up of iron or steel as it is a good conductor of heat, whereas the handle is made up of plastic (bakelite).
  - Using two thin blankets together provides more warmth as the air trapped in between does not allow heat to escape.

- The inner walls of a thermos flask, which keeps hot liquids hot and cold liquids cold, are made up of poor conductors so that heat does not escape.
8. (i) Solar panels used in households for heating water are designed to maximize the absorptions of heat from the sun. A black metal sheet is used to increase heat absorption.
  - (ii) Electric room heater is fitted with a curved and polished metal reflector behind the heating element. This polished metal radiates more heat falling on it towards the person sitting in front of it.
  - (iii) People wear white or light-coloured clothes in summer to reflect the heat of the sun and stay cool. On the other hand, in winter dark or black coloured clothes are preferred. They absorb heat and radiate it to the body, thus keeping the body warm.
  - (iv) Base of some cooking utensils are painted in black colour while side of utensils are kept bright. The black colour of the bottom helps in transfer of heats after absorbing it from the flame and radiates it towards the food kept in the utensils more efficiently. The bright coloured side prevents the radiation of heat.



### Learn by Doing

#### PUZZLE





# Respiration



## A. Tick (3) the correct option.

- |        |        |        |        |
|--------|--------|--------|--------|
| 1. (a) | 2. (b) | 3. (a) | 4. (a) |
| 5. (a) | 6. (b) | 7. (c) | 8. (b) |

## B. Fill in the blanks with correct words.

- |           |                |                                    |
|-----------|----------------|------------------------------------|
| 1. energy | 2. stomata     | 3. breathing, cellular respiration |
| 4. guard  | 5. respiration | 6. anaerobic      7. Stomata       |

## C. Short Answer Type Questions.

1. (i) **Cellular respiration** : It is the process of releasing energy form the breakdown of food  
 (ii) **Breathing** : It is a physical process of exchange of gases.  
 (iii) **Stomata** : These are the small pores present on the leaves through which oxygen and carbon dioxide take place.  
 (iv) **Aerobic respiration** : The process of respiration that takes place in the presence of oxygen is called aerobic respiration.  
 (v) **Anaerobic Respiration** : The process of respiration that takes place in the absence of oxygen is called anaerobic respiration.
2. Earthworms breathe through their moist skin.
3. Breathing and cellular respiration.
4. During cellular respiration the sugar molecules in food are oxidised to form carbon dioxide and water and energy is given out.
5. Respiratory system in composed of following organs :
 

• Nasal Cavity,	• Pharynx,	• Larynx,
• Trachea,	• Bronchi and	• Lungs.

6.	<b>S.No.</b>	<b>Physical Change</b>	<b>Chemical Change</b>
	1.	Energy is given out gradually.	Energy is given out suddenly.
	2.	Energy is given out in the form that can be used by the organism.	Energy si given out in the form of heat or light.

7. The exchange of oxygen and carbon dioxide takes place through small pores called stomata (singular–stoma) present in the leaves and stem.
8. Fishes use gills for exchange of gases. Gills are made up of a large number of filaments, richly supplied with them blood veins called capillaries. As

water enters through the mouth it flows over the gills. The blood in the capillaries absorbs oxygen and gives out carbon dioxide through its walls.

#### D. Long Answer Type Questions.

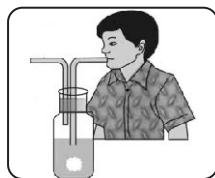
1. All living organisms need energy to do work. Energy is required to perform various functions of life such as nutrition, excretion, growth, movement, transportation and reproduction. Without energy, organisms cannot do any work. Even when you are reading this book, you need energy. You require energy even when you are sleeping, eating, running or doing physical activities. Energy comes from food that we eat.

2. **Aim :** To show that carbon dioxide is given out during breathing.

**Materials Required :** Test tube, lime water (which is made by dissolving slaked lime in water)

#### **Method :**

- (i) Take a drinking straw in your mouth.
- (ii) Through this straw, blow air in the lime water.

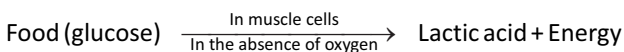


Effect if exhaled air on lime water

**Observation :** The lime water turns milky.

**Conclusion :** This proves that carbon dioxide is exhaled when we breathe out air. Carbon dioxide reacts with lime water to make calcium carbonate. Lime water is calcium hydroxide.

3. In humans, anaerobic respiration can be carried on only for a short time. It occurs in our muscles cells when there is not enough oxygen supply. This happens when we are doing heavy work or exercise, running fast etc. Muscular cramps may develop as a result of heavy exercise or fast running. In fact, when muscle cells respire anaerobically, there is a partial breakdown of glucose and lactic acid is produced. Accumulation of lactic acid causes muscle cramps.

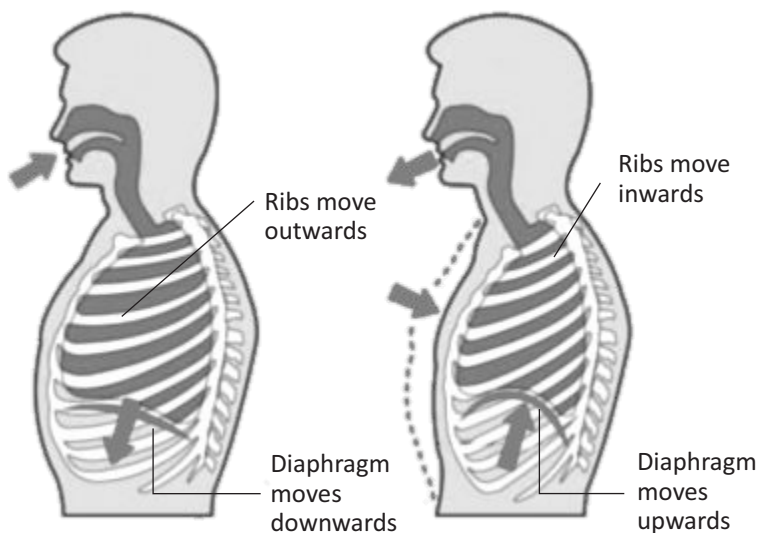


4.	S.No.	Breathing	Cellular Respiration
	1.	It is a physical process of exchange of gases. No chemical reaction takes place.	Chemical reaction of oxidation of food takes place.
	2.	It takes place outside the cell.	It takes place within the cell.
		There is no release of energy.	There is release of energy.

5. (a) Fishes use gills for exchange of gases. Gills are made up of a large number of filaments, richly supplied with them blood veins called capillaries. As water enters through the mouth it flows over the gills. The blood in the capillaries absorbs oxygen and gives out carbon

dioxide through its walls.

- (b) Cockroaches, grasshoppers etc. have openings called spiracles on their bodies. Air enters through these openings and reaches all parts of the body through respiratory tubes called trachea and their branches called tracheoles.
6. Muscular cramps may develop as a result of heavy exercise or fast running. Relief from muscle cramp can be obtained by a hot water bath or a massage. Circulation of blood in the body is improved by these acts.
7. The movement of diaphragm facilitates breathing. When the diaphragm expands the rib cage also expands, it creates a low pressure inside lungs. As a result the air goes inside the lungs. When the diaphragm contracts and the rib cage also contracts, it creates high pressure in lungs. As a result the air goes outside the lungs.



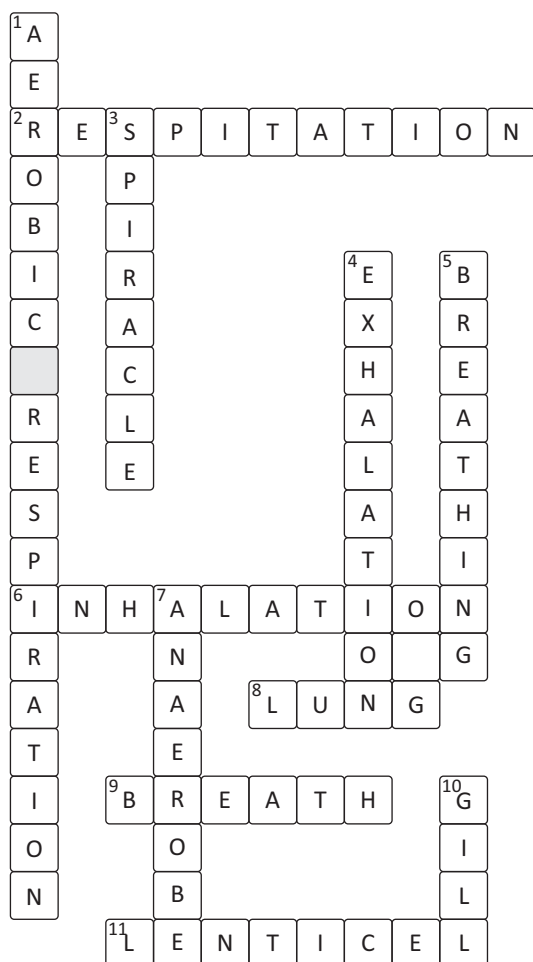
Process of breathing

8. Plants respire by taking in oxygen and giving out carbon dioxide. Plants do not have any organs for breathing. The exchange of oxygen and carbon dioxide takes place through small pores called stomata (singular–stoma) present in the leaves and stem. Stomata along with its nearby guard cells and other cells are called the stomatal apparatus. The expansion and contraction of guard cells, which occurs due to the supply of moisture and light results in opening and closing of the stomata. The rate of exchange of gases in plants is much slower than in animals.



## Learn by Doing

### PUZZLE







## Transport and Excretion



### A. Tick (3) the correct option.

- |        |        |        |        |        |
|--------|--------|--------|--------|--------|
| 1. (c) | 2. (c) | 3. (d) | 4. (b) | 5. (a) |
| 6. (c) | 7. (b) | 8. (d) | 9. (a) |        |

### B. Fill in the blanks with correct words.

- |                 |                   |                 |              |
|-----------------|-------------------|-----------------|--------------|
| 1. capillaries  | 2. hemoglobin     | 3. auricles     | 4. plasma    |
| 5. heart beat   | 6. guard          | 7. deoxygenated | 8. excretion |
| 9. sweat glands | 10. xylem, phloem |                 |              |

### C. Match the following.

- |      |      |      |      |      |
|------|------|------|------|------|
| 1. c | 2. d | 3. e | 4. b | 5. a |
|------|------|------|------|------|

### D. Short Answer Type Questions.

- The transport of materials is necessary in an organism as every cell needs a regular supply of nutrients and oxygen for releasing energy through respiration.
- Carbon dioxide
- Heart, blood vessels, blood
- Plasma, RBCs, WBCs, Platelets
- Nephron
- If a person's kidneys are damaged, doctors remove body wastes by a medical process known as dialysis. A more permanent solution is kidney transplantation in which the damaged kidney is replaced by a healthy kidney donated by someone.
- Food in plants is manufactured by the leaves. Once the food is prepared it needs to be sent to all parts of the plant body. The process by which this takes place is called translocation.
- It is the artificial process of filtering blood, which is done to remove the nitrogenous waste products that can result in toxicity inside the system.
- Heart Beat** : The action of the heart includes contraction and relaxation of the auricles and the ventricles. This rhythmic contraction and relaxation is called heartbeat.
  - Excretion** : The process of removal of wastes from the cells of living organisms is called excretion.
  - Transpiration** : The process by which plants lose water in the form of vapour through their leaves is called transpiration.

### E. Long Answer Type Questions.

1. **Excretion in Animals** : In lower animals such as amoeba, paramecium, Hydra and sponges, there are no special excretory organs. Waste products such as ammonia are excreted by the process of diffusion through the body surface.

**Excretion in Humans** : Excretion in humans is carried out mainly by the urinary system. The urinary system is responsible for removing most of the wastes from the body in the form of urine. Urine consists of 95% water, 2.5% urea and 2.5% other waste products. The main organ of this system are the kidneys.

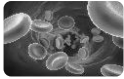
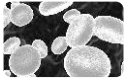
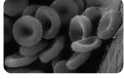
The kidneys consists of a large number of coiled tubes called nephrons. Each kidney contains about one million nephrons. Nephrons are the tiny filtering units of the kidney. They filter out excess water, salts and urea from the blood as it passes through them. The clean blood leaves the kidneys and continues its circulation in the body. The waste removed by the kidneys from a liquid called urine.

2. **Transpiration** : The process by which plants lose water in the form of vapour through their leaves is called transpiration. Some of the water absorbed by the roots is lost by evaporation through the stomata present on the surface of leaves.

Advantages of Transpiration

- Transpiration, i.e., evaporation of water from the leaves creates a force called suction pull which helps to pull water up to great heights in tall trees. As water is given out by transpiration more water is absorbed. This helps in the continuous transport of water and minerals from the soil to the leaves.
  - It protects the delicate cells of plants from the heat of the sun by producing a cooling effect. Otherwise, the leaves and flowers will droop.
  - It provides rigidity to the soft parts of the plant body.
3. Humans have a very well-developed and efficient circulatory system. It consists of:
    - (a) blood
    - (b) blood vessels and
    - (c) heart
- (a) **Blood** : It is the fluid connective tissue. Blood comprises plasma and blood corpuscles (or cells).

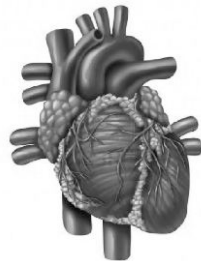
**Plasma** : It is the fluid part of the blood 90% of which is water. It is pale yellow in colour. Rest of it consists of simple food molecules, enzymes, minerals, wastes and some proteins. Proteins enable the blood to clot and fight infection.

Blood Cell	Function
Red blood cells (RBC) round, without a nucleus. 	Contain haemoglobin (an iron containing pigment) that gives blood the red colour. Haemoglobin binds with oxygen and transports it to all parts of the body.
White blood cells (WBC) different shapes has a nucleus. 	Help in fighting disease causing organisms.
Blood platelets irregular without a nucleus. 	Help in blood clotting.

- (b) **Blood Vessels** : The blood vessels, which are arteries, veins and the capillaries form a network and carry the blood throughout the body. Arteries carry oxygenated blood or blood containing oxygen from the heart to the various parts of the body and the veins carry deoxygenated or blood containing carbon dioxide from the various parts of the body to the heart. Arteries divide to form thin tubes called capillaries. Capillaries are very thin blood vessels and join to form veins.

4. **Human Heart** :It is a conical, muscular organ, located in the chest cavity. It is slightly tilted towards the left.

**Structure** : The heart is a two sided, four chambered pump. The upper two chambers are called atria or auricles and the lower chambers are called ventricles. The right and the left side of the heart are completely separated by a muscular partition called septum.

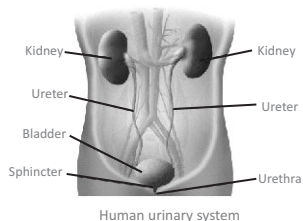


Structure of human heart

**Working of the Heart** : De-oxygenated blood is collected from all parts of the body and enters the right chamber of the heart called the right atrium or auricle. The right auricle then contracts and the blood is poured into the right ventricle through a valve. The right ventricle then contracts and the blood reaches the lungs through the pulmonary artery. The blood gets oxygenated here as we breathe in air. The oxygenated blood comes back to the left auricle through the pulmonary veins. The left auricle then contracts and the blood enters the left ventricle. Then the left ventricle contracts and the blood enters the dorsal aorta (an artery). Valves allow the movement of blood in one direction only i.e., from the auricles to the ventricles. The dorsal aorta then distributes the oxygenated blood to various parts of the body. The pulmonary artery is

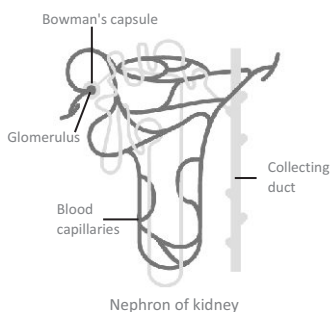
the only artery which transports de-oxygenated blood and the pulmonary vein is the only vein which transports oxygenated blood.

5. Excretion in humans is carried out mainly by the urinary system. The urinary system is responsible for removing most of the wastes from the body in the form of urine. Urine consists of 95% water, 2.5% urea and 2.5% other waste products. The main organ of this system are the kidneys. They



are located on each side of the backbone, just above the waist. This main function is to filter wastes from the blood. You use a filter paper to separate solid impurities from a solution. The kidney work in the same

way. The kidneys consists of a large number of coiled tubes called nephrons. Each kidney contains about one million nephrons. Nephrons are the tiny filtering units of the kidney. They filter out excess water, salts and urea from the blood as it passes through them. The clean blood leaves the kidneys and continues its circulation in the body. The waste removed by the kidneys from a



liquid called urine. It passes from the kidneys through two tubes called ureters into an elastic sac called the urinary bladder. The bladder stores the urine until it is excreted from the body through the urethra. A healthy human being passes out about 1.5 to 2.5 litres of urine everyday. The kidneys must function properly to keep the body healthy.

6. (i) Arteries carry oxygenated blood or blood containing oxygen from the heart to the various parts of the body and the veins carry deoxygenated or blood containing carbon dioxide from the various parts of the body to the heart.

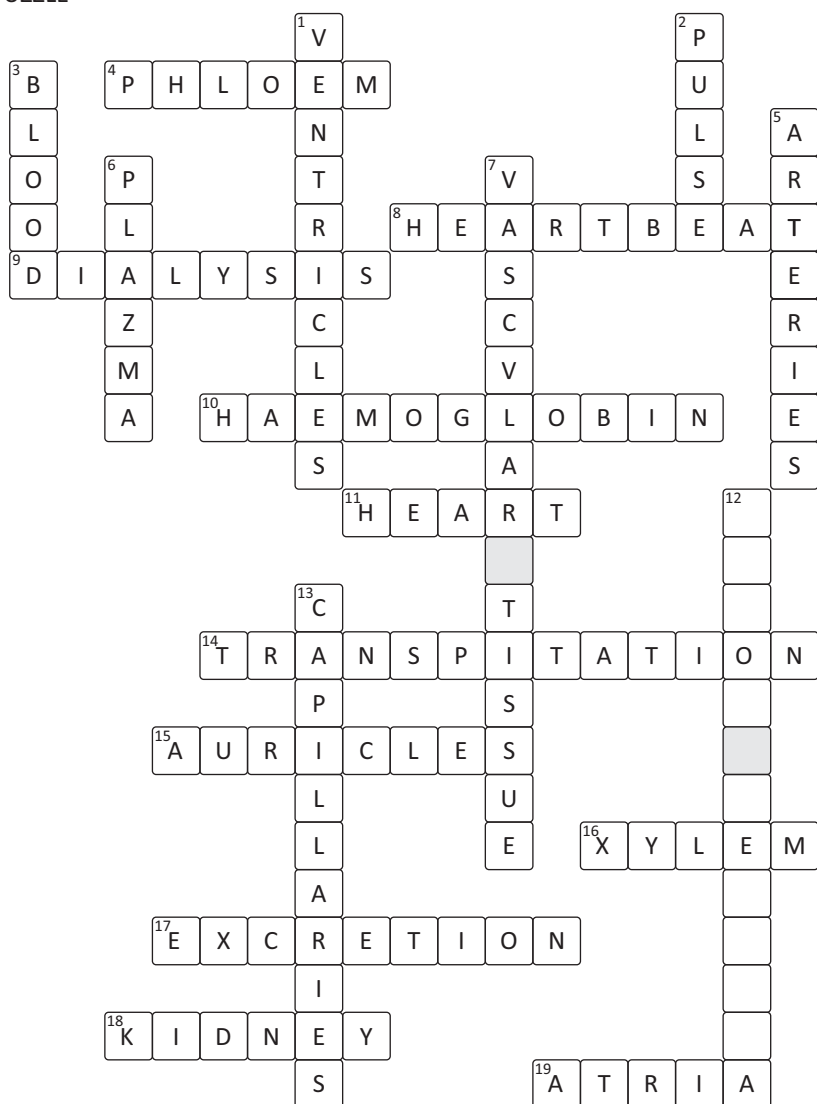
(ii)

Blood Cell	Function
Red blood cells (RBC) round, without a nucleus.	Contain haemoglobin (an iron containing pigment) that gives blood the red colour. Haemoglobin binds with oxygen and transports it to all parts of the body.
White blood cells (WBC) different shapes has a nucleus.	Help in fighting disease causing organisms.



## Learn by Doing

### PUZZLE





# Reproduction in Plants



## A. Tick (3) the correct option.

- |        |        |        |        |         |
|--------|--------|--------|--------|---------|
| 1. (d) | 2. (a) | 3. (b) | 4. (a) | 5. (b)  |
| 6. (d) | 7. (a) | 8. (a) | 9. (a) | 10. (d) |

## B. Fill in the blanks with correct words.

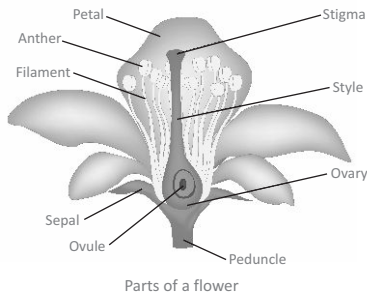
- |                 |             |            |                  |
|-----------------|-------------|------------|------------------|
| 1. Spores, Fern | 2. rhizome  | 3. spore   | 4. fertilization |
| 5. zygote       | 6. wind     | 7. abiotic | 8. fruit         |
| 9. ovary        | 10. budding |            |                  |

## C. Give two examples for the following :

- |                    |                    |                         |
|--------------------|--------------------|-------------------------|
| 1. Sugarcane, Rose | 2. Grapes, Jasmine | 3. Sweet Potato, Dahlia |
| 4. Mosses          | 5. Wind, Water     | 6. Rose, lily           |
| 7. Pumpkin, Papaya |                    |                         |

## D. Short Answer Type Questions.

- Sexual reproduction** : The formation of new plants through the fusion of male and female gametes is known as sexual reproduction.
- Sugarcane, rose
- 



- Gladiolus, crocus
- The process of transfer of pollen grains from the anthers to the stigma is called pollination.
- Layering** : This is a method most commonly used in grapes, jasmine and Bougainvillea.
  - In this process, a young branch is lowered down and bent towards the ground and covered by moist soil forming a layer.
  - After sometime, roots arise from the branch and grow downwards.

- The branch can then be cut off from the parent plant and allowed to grow into a new plant.
7. **Balsam**
  8. The process of growing new plants by artificial methods is known as artificial propagation. Some of these methods are as follows. Tissue culture, cutting, Layering and grafting.
  9. (i) **Fertilization** : The process of fusion of male and female gametes is called fertilization.
  - (ii) **Pollination** : The process of transfer of pollen grains from the anthers to the stigma is called pollination.
  - (iii) **Zygote** : The result of fusion of male and female gamete is called zygote.
  - (iv) **Cross-pollination** : The process where pollen grains are transferred from the anther of one flower to the stigma of another flower is known as cross-pollination.
  - (v) **Dispersal of seeds**: Nature has arranged some agents of dispersal by which the seeds of a plant get scattered over a large area. This is called dispersal of seeds.

#### E. Long Answer Type Questions.

1. **Advantages of Vegetative Propagation** : Vegetative propagation has the following advantages :
  - (i) Seedless plants can reproduce by this method.
  - (ii) The new plant is identical to the parent plant. This helps to conserve the characteristic features of the parent plant.
  - (iii) Plants reproduced by vegetative reproduction take less time to grow, and bear flowers and fruits faster than those produced from seeds.
2. **Asexual Reproduction** : Asexual reproduction involves the simple division of the plant body into two or more parts of spore formation. New plant body is formed from a single parent. This happens under favourable conditions. Vegetative reproduction is also a type of asexual reproduction in which a cell, tissue, or part of an organ of a plant develops into a new organism.
 

**Sexual Reproduction** : Sexual reproduction takes place by the formation of seeds. It involves two parents and the fusion of male and female reproductive cells called gametes to form a single cell called a zygote.
3. A plant produces a large number of seeds. If all these fall below the plant and start growing, they will not get enough space, water, minerals and the sunlight. They will not develop into healthy plants. Many of them may even die. Nature has arranged some agents of dispersal by which the

seeds of a plant get scattered over a large area. This is called dispersal of seeds.

S.No.	Agents of Dispersal	Seed
1.	Wind	Cotton
2.	Water	Coconut
3.	Animals	Xanthium
4.	Explosion	Balsam

4. **Agents of Pollination :** Pollination takes place with the help of external agents such as wind, water and insects. They are called the agents of pollination.

**Pollination by Wind :** In some plants pollen grains are transferred from male flowers to female flowers by wind. The male flower is on a greater height than female flowers in such cases. Corn shows very good example of pollination by wind. In a corn plant, the flower at the top is the male flower and the flower below it is the female flower.

**Pollination by Animals :** When an insect sits on a flower to feed on nectar, pollen grains stick to its legs. Thus pollen grains get transferred to another flower. Colourful flowers attract birds and thus birds facilitate cross-pollination in them. Some foul smelling flowers attract bats and bats become the agent of pollination.

**Pollination by Water :** Pollen grains of aquatic plants like lily and lotus are very light and are carried by water currents.

5. Sepals are green in colour. They form the first and the outermost whorl of the flower. Sepals help to protect the petals which form the second whorl and the other internal parts of the flower. Petals are brightly coloured and attract insects.

The female reproductive organ of the flower consists of the carpels. A collection of carpels is called the pistil. It includes an ovary, a style and a stigma. The ovary contains ovules. Ovules contain the female reproductive cells.

6. **Fertilization :** The process of fusion of male and female gametes is called fertilization. Once pollen grain reach at the top of stigma they start germinating. A pollen tube is formed in the pollen grain.

This pollen tube goes to the ovule. The male gamete is carried inside the pollen tube. Once the pollen tube reaches the ovule, the male gamete is released and it fuses with the female gamete (eggs) present there. This process is called fertilization. A zygote is formed after fertilization takes place.





## Learn by Doing

### PUZZLE

					<sup>1</sup> A	S	E	X	U	A	L
					<sup>2</sup> R	A	D	I	C	L	<sup>3</sup> E
											M
				<sup>5</sup> L	I	L	Y				B
		<sup>4</sup> Z									R
		Y				<sup>6</sup> S					Y
		G				T					O
<sup>8</sup> S	P	O	R	E	S		O				
		T				<sup>9</sup> S	C	I	O	N	
		E					K				

O



## Electric Current and Its Effects



### EXERCISES

#### A. Tick (3) the correct option.

1. (b)      2. (a)      3. (c)      4. (d)      5. (a)
6. (d)      7. (d)      8. (c)

#### B. Fill in the blanks with correct words.

1. circuit      2. coil      3. charge      4. electromagnet
5. Fuse      6. iron      7. heating      8. low

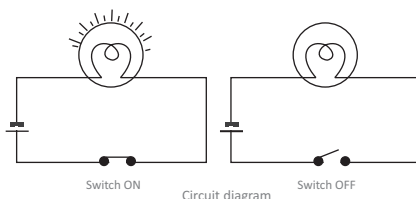
#### C. Match the following.

1. f      2. b      3. d      4. e      5. c      6. a

#### D. Short Answer Type Questions.

1. (i) **Electricity** : The flow of electric charge is called electricity.
- (ii) **Electromagnet** : An electro magnet is a temporary magnet in which a current carrying wire behaves like a magnet.

(iii) **Circuit Diagram :**



(iv) **Electric cell :** An electric cell is the simplest unit for generating electric current.

2. Electric iron, room, heaters, geysers, oven.
3. Resistance.
4. Electric fuse.
5. Human body is a good conductor of electricity and current can easily pass through the body to the ground leading to electric shocks. Hence , it is advised to wear rubber footwear when dealing, with electrical appliances as rubber acts as an insulator.
6. When we place an iron nail in a current carrying coil, the iron nail gets magnetized.
7. This is because it offers large resistance and gets heated when current flows through it.
8. The difference between a MCB and a fuse :

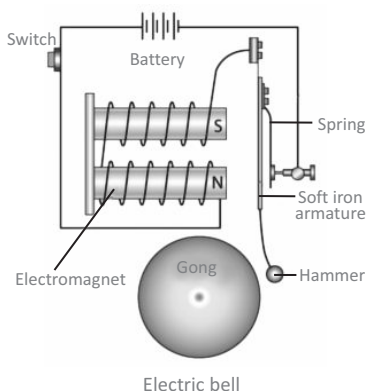
**MCB :** A miniature circuit breaker is an automatically operated electric switch that protects an electric circuit during an overload or short circuit. They can be reset (manually or automatically) to restore normal operation, whereas fuses need to be replaced after single operation.

**Electric Fuse :** A fuse is a safety device used in an electric circuit. An electric fuse prevents a large amount of current from flowing into any appliance or device as it cuts off the supply of electric current, thus preventing further damage.

**E. Long Answer Type Questions.**

1. The electric bell consists of an electromagnet an armature, a contact adjusting, screw, a gong and a hammer. The armature consists of a soft iron rod mounted on a spring. One end of the iron rod passes against the top of the contact adjusting screw.

**Working :** When the switch is passed on, current flows in the electromagnet. It then attracts the



iron rod towards itself, causing the hammer to strike the gong. At the same time the armature loses contact with the screw and the current is switched off. This causes the electromagnet to lose its magnetism and the armature springs back to its original position to close the circuit once again. Current flows again and the cycle repeats itself till, the current is switched off.

2. **Electromagnets** : A length of wire wound closely together is called a coil. A current carrying coil also behaves like a magnet. An electromagnet is a temporary magnet in which a current carrying wire behaves like a magnet. It is a temporary magnet because it behaves like a magnet only when an electric current is passing through it.

### **Uses of Electromagnets**

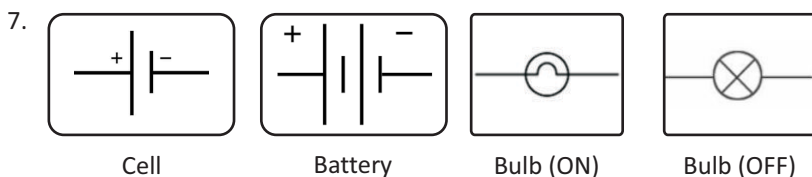
Electromagnets have numerous uses. Some common ones are as below :

- Cranes with strong electromagnets are used to pick up the iron objects. To put them down, the current through the electromagnet is switched off. Electromagnets are also used for separating object made of magnetic materials from others.
  - A thin iron strip attracted by an electromagnet produces a sound as it strikes against the electromagnet or a gong placed in its path. Electric doorbells, buzzers and telegraph sounders work on this basis. Telephones also have electro magnets. In the earpiece of a telephone, a thin iron disc placed close to an electromagnet vibrates to produce sound when a varying current passes through the electromagnet's coil.
  - Electromagnets are used in motors that drive fans, mixers, washing machines and so on. They are also used in different types of machines in factories and in large generators.
3. (i) Spread some steel pins on a wooden board and bring an iron nail near them.
- (ii) Now, make one of the magnetic poles of the bar magnet touch one end of the iron nail.
- (iii) Slid it along its length in one direction slowly till the other end is reached.
- (iv) Repeat the process 20 to 30 times.
- (v) The magnet has to be moved in one direction only.
- (vi) Avoid the swiping of the magnet back and forth.
- (vii) Now, bring the iron nail hear the steel pins.
- (viii) The steel pins stick to the iron because nail has become a temporary magnet.
4. The electric fuse works on the principal of heating effect of current. The

amount of heating caused depends on the amount of current flowing through the wire. The greater the current the more is the heating caused.

An electric fuse consists of a thin wire usually placed inside a glass or ceramic cartridge. The wire is made of a material that melts easily when heated. It is designed such that only a certain maximum amount of current can flow through it. If the current exceeds this maximum amount, the heating in the wire causes it to melt. We say that the fuse 'blows'. This breaks the circuit and stops the flow of current in the circuit.

5. **MCB** : A miniature circuit breaker is an automatically operated electric switch that protects an electric circuit during an overload or short circuit. They can be reset (manually or automatically) to restore normal operation, whereas fuses need to be replaced after single operation.
6. The filament of a bulb is made of a very thin, long tungsten wire which, offers a high resistance. It gets heated to such a high temperature that it starts glowing.



## 8. Uses of Electromagnets

Electromagnets have numerous uses. Some common ones are as below :

- Cranes with strong electromagnets are used to pick up the iron objects. To put them down, the current through the electromagnet is switched off. Electromagnets are also used for separating objects made of magnetic materials from others.
  - A thin iron strip attracted by an electromagnet produces a sound as it strikes against the electromagnet or a gong placed in its path. Electric doorbells, buzzers and telegraph sounders work on this basis. Telephones also have electromagnets. In the earpiece of a telephone, a thin iron disc placed close to an electromagnet vibrates to produce sound when a varying current passes through the electromagnet's coil.
9. (i) When we connect a bulb to a cell with conducting wires, we make a circuit. A circuit has to be continuous to make the current flow. When the switch is in the ON position and the circuit is said to be a closed circuit. If we want to turn off the bulb, we have to break the circuit. We can do this by simply disconnecting the wires. When the circuit is broken, it is said to be an open circuit.

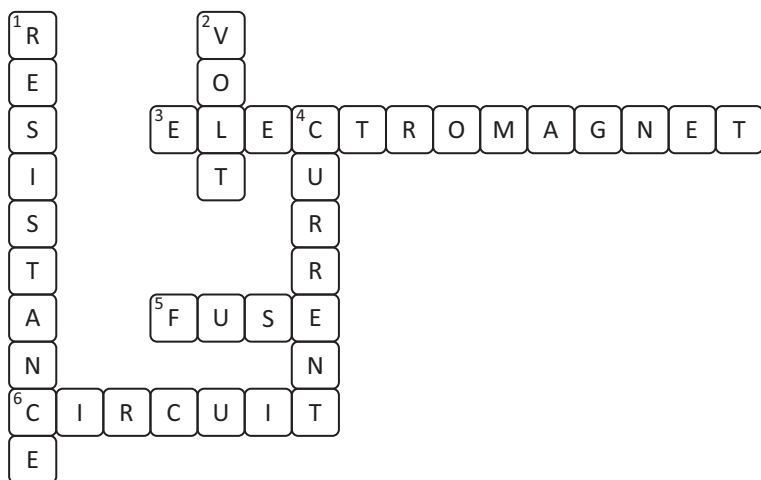
(ii)

S.No.	Maghet	Electromagnet
1.	Magnetic properties exist when the material is magnetised.	The magnetic properties are displayed when current is passed through it.
2.	The strength icon be adjusted depending upon the amount of flow of the current.	The strength depends upon the nature of the material used in its creation.
3.	It requires a continuos supply of electricity of maintain its magne-tic field.	If does not require a cotinuous supply.
4.	The poles of this magnet can be altered with the flow of current.	The poles of this kind of magnet can not be changed.



### Learn by Doing

#### PUZZLE



## Light



### EXERCISES

#### A. Tick (3) the correct option.

- (a)
- (b)
- (c)
- (b)
- (a)
- (a)
- (c)
- (c)

**B. Fill in the blanks with correct words.**

- |            |                  |                |
|------------|------------------|----------------|
| 1. convex  | 2. convex lens   | 3. energy      |
| 4. concave | 5. convex mirror | 6. thick, thin |
| 7. real    | 8. spectrum      | 9. prism       |

**C. Match the following.**

- |      |      |      |      |
|------|------|------|------|
| 1. e | 2. g | 3. b | 4. a |
| 5. f | 6. d | 7. h | 8. c |

**D. Short Answer Type Questions.**

1. (i) **Image** : The appearance or picture of a real object, formed by the light that passes through a lens or is reflected from a mirror.  
(ii) **Virtual image** : An image that cannot be formed on a screen.  
(iii) **Converging lens** : Convex lens is thicker in the middle than at the edges, whereas the concave lens is thinner in the middle than at the edges. The convex lens is also called converging lens as it converges (bends inside) the rays of light passing through it.  
(iv) **Diverging lens** : The concave lens on the other hand is called diverging lens as it diverges the rays of light passing through it.  
(v) **Prism** : A triangular piece of glass that can disperse light.  
(vi) **Spectrum** : The set of colours formed on splitting of white light.  
(vii) **Dispersion of light** : The phenomenon of splitting of white light into component colours.
2. Concave mirrors are useful in the following ways :
  - (i) They are used in make-up and shaving mirrors.
  - (ii) They are used as reflectors in the torches and headlights of automobiles.

Convex mirrors are used as rear view or side view mirrors in cars and scooters as they can view a much larger area than would be possible with a plane mirror.

3. Characteristics of Image formed by Different Types of Mirrors.

Type of mirror	Characteristics		
	Real/Virtual	Erect/Inverted	Size
1. Concave	Virtual when the object is very closed to the mirror and real for all other positions	Erect when virtual and inverted when real.	Magnified or diminished
2. Convex	Virtual	Erect	Diminished

4. Both a convex lens and a concave mirror converge parallel ray of light to

focal point and they both create real or virtual images depending on the position of the object relative to the focal point.

5. The side mirrors of the car and the rear view mirror of a car are made up of convex mirror. This is because the image formed by a convex mirror is diminished and erect image, thus it provides a larger field of view.
6. The convex lens is also called converging lens as it converges the rays of light passing through it.
7. The concave lens on the other hand is called diverging lens as it diverges the rays of light passing through it.
8. A rainbow is made of seven colours – violet, indigo, blue, green, yellow, orange and red.
9. When sunlight passes through the water droplets present in air, it splits into different colours, which together form a rainbow.

#### E. Long Answer Type Questions.

1. (a) The image formed by a concave mirror can be larger or smaller than the object. It can be real or virtual. As the distance of the object from the mirror increases, the size of the image decreases.

The image formed by a convex mirror is virtual, erect and smaller in size than the object.

- (b) The image formed by a concave mirror can be larger or smaller than the object. It can be real or virtual. As the distance of the object from the mirror increases, the size of the image decreases.

When the reflecting surface is plane, the mirror is called a plane mirror. When light falls on a plane mirror it is reflected.

- (c) Any smooth or polished surface which reflects light to form images.

A piece of transparent material (plastic or glass) which has one or both surfaces spherical.

(d)

Convex Lens	Concave Lens
It is thicker in the middle and tapering at the edges.	It is thicker at the edges and thinner in the middle.
It converges the rays of light.	It diverges the rays of light.
It generally forms real and inverted image. However, when the object is placed very close to the lens, then it forms a virtual, erect and magnified image.	It always forms virtual and erect image, smaller in size than the object.

2. Mirrors having a curved surface are called spherical mirrors. Spherical mirrors are called so as they are a part of complete sphere. The two types of spherical mirrors.

- If the reflecting surface of the mirror is on the inner side of the sphere, it is called a concave mirror.
  - If the reflecting surface of the mirror is on the outer side, it is called a convex mirror.
3. The image formed by the plane mirror has the following characteristics :
    - It is erect (upright) and virtual.
    - It is of the same size as the object.
    - The image formed is at the same distance as the object from the mirror.
    - The image is laterally inverted.
  4. This is because when the driver of a vehicle in front of the ambulance looks in the rear view mirror, it appears as  $\text{AMBULANCE}$  and he can make way for it.
  5. **Aim :** To show that convex lens converges whereas concave lens diverges the rays of light.

Take a convex lens and place it in the path of sunlight. Adjust its position so that a bright spot can be formed on a piece of white paper placed on the other side of the lens. The bright spot is the real image of the sun. Hold the lens in this position for sometime. What do you observe?

The paper starts burning at this point.

Now repeat the activity using a concave lens. Are you able to get a bright spot on the paper this time also? No. This shows that convex lens converges the rays of light and concave lens diverges the rays of light.

6. **Aim :** To observe the dispersion of light by a prism.

**Material Required :** A source of narrow beam of light (a small hole in the window), a prism and a white screen or white wall

**Method:**

1. Place a prism in a dark room such that a narrow beam of light through a small hole in the window falls on it.
2. Observe the characteristics of the image formed.
3. The beam of light passes through the prism and falls on the white screen.
4. Observe the pattern of the light coming out of the prism.

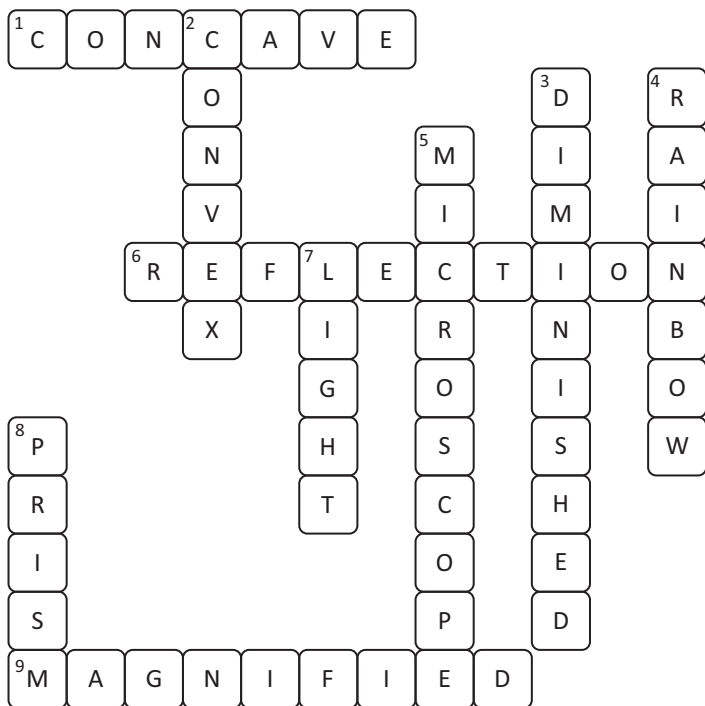
**Observation**

The prism splits the light forming a spectrum which can be seen on the white screen.





PUZZLE





## Time And Motion



### A. Tick (3) the correct option.

1. (a)    2. (c)    3. (a)    4. (b)    5. (c)    6. (d)    7. (d)

### B. Fill in the blanks with correct words.

1. Second            2. m/s            3. uniform            4. string  
5. speed            6. kilometer            7. duration

### C. Match the following.

1. f            2. a            3. e            4. c            5. d            6. b

### D. Short Answer Type Questions.

- (i) **Simple pendulum** : A small heavy metallic ball known as bob, hung from a fixed support by a thin inextensible string.  
(ii) **Motion** : A change in the position of a body with respect to time is called motion.  
(iii) **Speed** : Distance travelled by a body in unit time.  
(iv) **Slow motion** : An object which takes longer time to cover a certain distance is called slow motion.
- A motion where a body covers equal distance in equal intervals of time is called uniform motion.
- Sundial, Hourglass
- A small heavy metallic ball known as bob, hung from a fixed support by a thin inextensible string. The time taken by the pendulum in one second is called its frequency. The time period of a pendulum is given by the equation  $T = 2\pi\sqrt{l/g}$
- The movement of the pendulum will not differ at all because the mass of the bob has no effect on the motion of a simple pendulum. The pendulum are only affected by the period (which is related to the pendulum's length) and by the acceleration due to gravity.
- Non-uniform motion.

### E. Long Answer Type Questions.

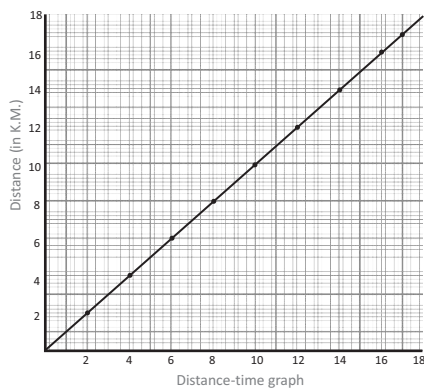
- Suppose you and your family plan to go out for vacations. You choose to travel by train. Now, if you are to get the reservation done for travelling by trains, how will you proceed? Surely you will first decide the dates on which you wish to travel and then you will consult the railway time-table to look for the trains, the days on which they run and their departure and

arrival time. Can you plan your journey without this information? Certainly not. We cannot plan and do things in a systematic way if we are not aware of time. Perhaps this is the reason that man felt the need to measure time.

2. The motion can be categorised into uniform and non-uniform motion.

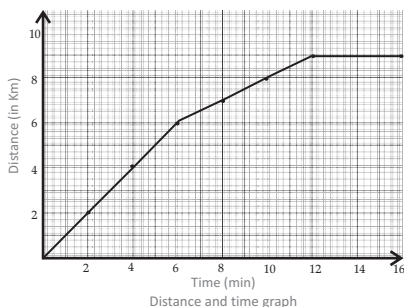
(i) **Uniform Motion** : A motion that can be represented by a straight line on the graph paper is called uniform motion. In other words a body is said to be in uniform motion if it covers equal distances in equal intervals of times. The motion of a body as shown in graph paper below is uniform as the speed remains constant.

Time (min.)	Distance (k.m.)
2	2
4	4
6	6
8	8
10	10
12	12
14	14
16	16
18	18



(ii) **Non-Uniform Motion** : A motion that cannot be represented by a straight line on the graph is called non-uniform motion. In other word, a body is said to be in non-uniform motion, if it covers different distances in equation.

Time (min.)	Distance (k.m.)
2	2
4	4
6	6
8	7
10	8
12	9
14	9
16	9



3.

Time (120km/h)	Distance (k.m.)
1	120
2	240
3	360
4	480

4.	S.No.	Uniform Motion	Non-
	1.	It involves covering equal distance in equal interval of time.	It involves covering unequal distance in equal interval of time.
	2.	It maintains a constant speed.	It does not maintain a constant speed.

5. Speed of bike at 8:00 hours = 52 km/h  
 Speed of bike at 8:25 hours = 66 km/h  
 Time taken = (8:25 – 8:00) hour  
 = 25 minutes  
 =  $\frac{25}{60}$  hours =  $\frac{5}{12}$  hours.  
 Average speed =  $\frac{52 + 66}{2}$  km/h  
 =  $\frac{5}{12}$  km/h = 59 km/h

Then, Distance covered by bike = speed  $\times$  Time taken

$$= (59 \times \frac{5}{12}) \text{ km}$$

$$= \frac{295}{12} \text{ km}$$

$$= 24.58 \text{ km}$$



## Forest-Our Lifeline



### A. Tick (✓) the correct option.

1. (b)    2. (b)    3. (d)    4. (a)    5. (a)    6. (c)    7. (d)

### B. Fill in the blanks with correct words.

1. natural                      2. Food web                      3. Roots  
 4. deforestation              5. erosion                        6. Afforestation

### C. Match the following.

1. b            2. e            3. d            4. c            5. a

### D. Short Answer Type Questions.

1. (a) **Forest** : A large area of land where various plants animals and microorganisms exist in their natural homes.  
 (b) **Food chain** : Simple representation of energy flow in nature is called food chain.

- (c) **Deforestation** : Large-scale felling of trees is called deforestation.
  - (d) **Afforestation** : Large-scale planting of trees in deforested areas or for commercial purposes is called afforestation.
  - (e) **Food chain** : Simple representation of energy flow in nature is called food chain.
2. The crown, canopy, understoreys, forest floor and emergent layer are the layers of a forest.
  3. **Global warming** : Increase in the temperature of the earth with the increase in CO<sub>2</sub> concentration.
  4. Humus is the organic component of the soil which is formed by disposition of leaves and other plant materials. Humus gives good fertility to the soil.
  5. Decomposers play a crucial role in ecosystem nutrient cycling by breaking down dead organisms and waste materials.
  6. Afforestation is the process of growing trees to increase plant cover. Roots of trees bind the soil together strongly.

#### E. Long Answer Type Questions.

1. **Uses of Forest** : Forests are very important renewable resources. They are useful in the following ways.
  - (i) **Timber and Paper** : The timber (wood) we use to make houses, furniture, boats, bridges, sports goods, chests or even matchsticks, comes from forests. Paper is made from bamboo, grasses and coniferous trees like fir and spruce. All these come from forests.
  - (ii) **Rubber, Resin, Gum, Oil** : Rubber comes from rubber trees. Resins from coniferous trees are used to make paints and varnishes. Gum trees (babool, Kikar) yield gum. And oils from eucalyptus, sandalwood and so on, are used to make perfumes, incense and medicines.
  - (iii) **Medicinal Plants** : Quinine used to cure malaria, is made from the bark of cinchona trees. Morphine, used to relieve pain, comes from poppy plants. Neem, amla, tulsi and eucalyptus are some other medicinal plants.
  - (iv) **Balance of Gases** : Forests maintain the natural balance of carbon dioxide and oxygen by using up carbon dioxide and releasing oxygen. They can help check the rise in the proportion of carbon dioxide in the air due to human activities like burning fuels.
2. **Dependence of Plants on Animals** :  
Plants depend on animals for the following :
  - Carbon dioxide
  - Pollination
  - Dispersal of seeds

## Dependence of Animals on Plants

Animals depend on plants for the following :

- Food
- Oxygen
- Shelter

3. Large-scale felling of trees is called deforestation. Deforestation is the permanent destruction of forests and wood lands.

If forests get destroyed, global climate and local weather may change drastically. This will result in the lose of many species of animals and plants and biological diversity.

Large amounts of greenhouse gases such as carbon dioxide are released into the atmosphere due to deforestation. Natural resources such as timber, medicinal plants, fruits and nuts are depleted due to deforestation. Deforestation can cause severe flossing , soil erosion, landslide etc.

4. A good chain outlines who eats whom. A food web is all fo the food chain in an ecosystem. Each organism in an ecosystem occupies a specific tropic level or position in food chain or web.

5. **Forest Conservation** : Forests need to be protect from indiscriminant felling of trees. Some ways to prevent deforestation are :

(i) **Planned Harvesting** : An efficient way to get wood from forests for our requirement is to cut only some of the trees in an area. The uncut trees prevent erosion. Fruits of these trees produce seeds so that new trees can grow. This way the forest cover is maintained.

(ii) **Afforestation** : This is the practice of renewing a forest by planting seedlings or small trees. These days in our country, planned afforestation is being done not only by the government but also by private organization for commercial purposes. Selective cutting of trees in these plantations provides wood for construction and also keeps the forest cover intact.

(iii) **Protection From Fire** : Huge forest areas are destroyed by fire every year. Fire may occur due to the carelessness of people, or due to the lighting during a storm on by friction between dry stems and dry branches of trees.

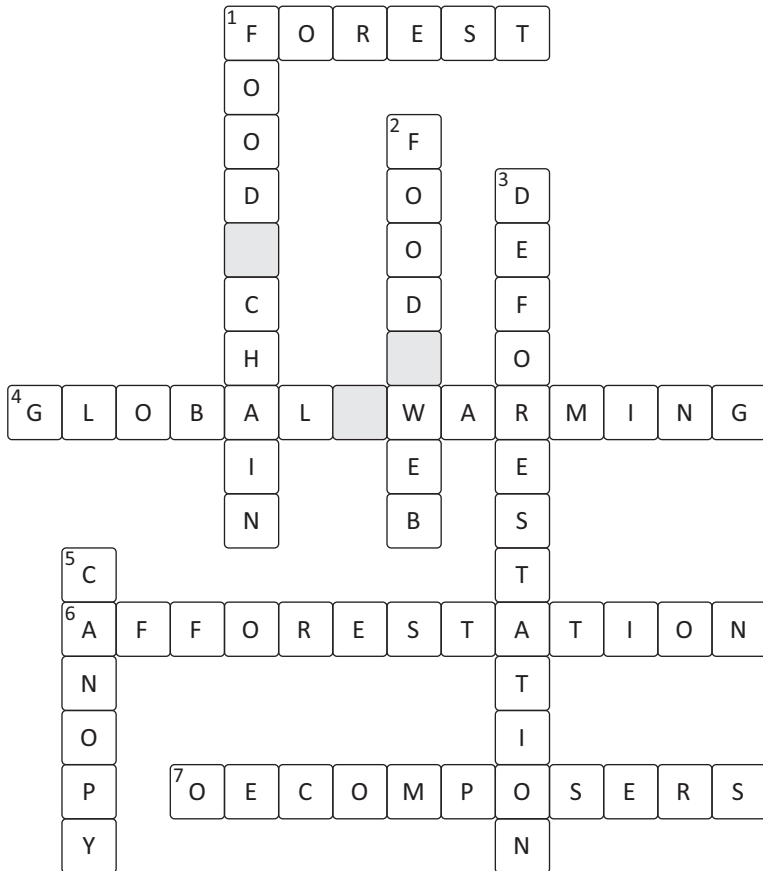
Forest fires are controlled by spraying fire extinguishing solutions from aircrafts or by changing the direction of wind using strong blowers.

(iv) **Protection from Insects and Pests** : Other important causes of forest destruction are insects and pests. Methods of controlling diseases in forest include removing infected trees and using insecticides and fungicides. Insects and pests can be efficiently controlled by natural insect predators. They kill insects in large numbers.

5. **Protection from Overgrazing :** Overgrazing by cattle, sheep, horses, etc., not only destroys grasslands but also trees in forests. They young trees are either eaten up or trampled. The lower leaves are eaten up and roots and trunks are injured. Overgrazing must therefore be prevented to save forests.



## PUZZLE





# Waste Water Management



## A. Tick (3) the correct option.

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

## B. Fill in the blanks with correct words.

- |                 |                 |           |
|-----------------|-----------------|-----------|
| 1. chlorine     | 2. manure       | 3. sewage |
| 4. purification | 5. oils, grease | 6. sludge |

## C. Match the following.

1. c      2. e      3. b      4. a      5. d

## D. Short Answer Type Questions.

1. Network of sewers used to carry sewage.
2. Proper disposal of human waste and the protection of water sources.
3. Yes.
4. Sewer
5. The contaminated water carrying human faeces, urine and other substances is called sewage.
6. The sludge is used to obtain methane, carbon dioxide and humus like material. Dried sludge can be used as a fertilizer.
7. Sewage treatment consists of removing the solid material from the sewage and also to make the liquid part of the sewage less harmful to humans and fish when it is allowed to flow into water bodies. It involves physical, chemical and biological processes that remove the physical, chemical and biological contaminants present in waste water.
8. The sewer system is a channel of pipelines which carries out sewage from our houses.
9. Railways have big army of sanitation workers which cleans platforms, railway lines and train compartments. Now many private operators have been given contracts to do the cleaning job at major railway stations.

## E. Long Answer Type Questions.

1. Primary Treatment :

**Step-1 :** The wastewater is first passed through screens of vertical bars, which remove large solid materials such as plastic bags, cans and sticks.

**Step-2 :** The water is then passed through settling tanks known as grit

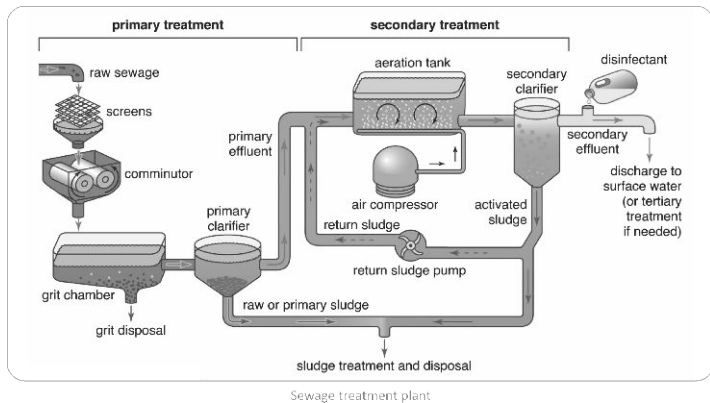


chambers. Its speed is reduced so that solids such as sand, silt and gravel settle down and are removed.

**Step-3:** After this, the waste water passes into a sedimentation tank called a clarifier, in which organic materials settle down and are removed with a scraper. This is called sludge. Floating materials like oil and grease are removed with the help of skimmer. The water that emerges from the settling tank is called clarified water.

### Secondary Treatment

**Step-4:** This sludge is then used to obtain methane, carbon dioxide and humus like material by a process called digestion. It consists of decomposing the sludge with the help of anaerobic bacteria. Dried sludge can be used as a fertilizer. The methane formed can be used as a fuel.



**Step-5:** Next air is pumped through the clarified water in an aeration tank. This allows aerobic bacteria to grow and consume organic contaminants. Such as faeces, food waste and soap still left in the water. The bacteria ultimately settle down at the bottom as activated sludge, and the water is removed from the top. The dried sludge is used as manure.

**Step-6:** The treated water now contains low enough levels of organic matter and suspended impurities to be discharged into a water body.

2. This sludge is then used to obtain methane, carbon dioxide and humus like material by a process called digestion. It consists of decomposing the sludge with the help of anaerobic bacteria. Dried sludge can be used as a fertilizer. The methane formed can be used as a fuel.
3. At places where there is no sewage system, low cost on-site sewage

disposal systems such as septic tanks, chemical toilets and composting pits should be encouraged.

**Septic Tanks :** Septic tanks are suitable for hospitals, for groups of 4-5 houses and other isolated buildings. The household waste flows into the underground septic tank which acts as a sedimentation-cum-digestion tank. The sludge settles down and the lighter waste flows on top. Anaerobic bacteria present in the sludge help in decomposing the waste. The septic tank needs to be cleaned every 4-5 months.

**Chemical Toilets :** Chemical toilets are built in some organisations. The excreta from the toilet seats flows directly into a biogas plant through covered drains. The biogas produced can be used as a source of energy (fuel).

**Vermicomposting Toilets :** Vermicomposting toilets are a new technique being used nowadays. In these toilets, human excreta is converted into vermicakes by the action of redworms. Vermicakes or vermicompost can be used as manure in fields. The amount of water required for processing is little. The operation is simple, safe and hygienic.

**Sanitation of Public Places :** In India, public places are always overcrowded. Special attention on towards sanitation must be given as public places like bus stand, a railway station, airports, hospitals and markets as large amount of waste is generated daily in these places. These places are always teeming with people. Maintaining hygiene at such places is really a complex task. We should avoid littering at public places.

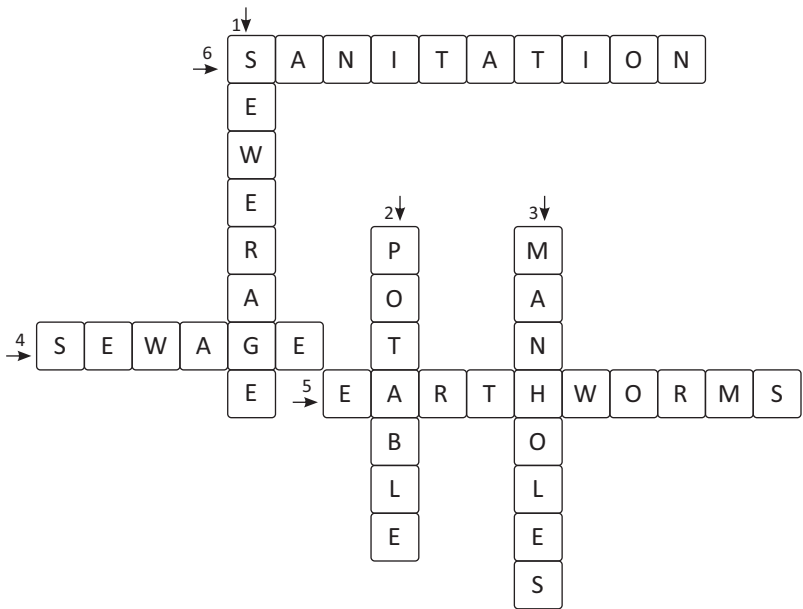
4. Sanitation is the hygienic means of promoting health through prevention of human control with the hazards of wastes. In other words, maintaining cleanliness all around us can be termed as sanitation. Our homes should be clean and should be free from germs. For maintaining sanitation in and around our homes we should follow certain basic principles.
  - Don't allow water to accumulate in kitchen or bathroom.
  - Wash your hands before every meal. This would remove any germs which may be present on hands.
  - Wash your hands after coming from the toilet. Human waste contains lot of dangerous microorganisms.
  - While throwing waste water in kitchen drains, solid waste should be segregated and should be thrown in garbage bins.
  - Germicides should be used with water for mopping. Some people keep their homes clean but throw everything on the road. This makes your neighbourhood dirty which can be annoying and unhygienic for everyone.
  - Whenever you are eating or drinking something outside your home,

always throw used containers or fruit peels in garbage bins. You may have seen some people littering almost everywhere.



Learn by Doing

PUZZLE





## Nutrition in Plants



### A. Tick (3) the correct option.

1. (d)    2. (a)    3. (e)    4. (d)    5. (c)    6. (b)    7. (c)

### B. Fill in the blanks with correct words.

1. crop                      2. ploughing                      3. loosening the soil  
4. broad casting    5. irrigation                      6. decreases                      7. combine

### C. Match the Following.

1. e                      2. c                      3. b                      4. f                      5. a                      6. d

### D. Short Answer Type Questions.

1. (a) The crops which are sown in June/July and harvested in September/October are called kharif crops.  
(b) The crops which are sown in the month of October/November and harvested in March/April are called rabi crops.  
(c) Weeds are unwanted and uncultivated plants that grow along with the crop plants. They grow on their own. Some examples of common weeds are Amaranthus (Chaulai), Chenopodium (bathua) and wild oat (javin).  
(d) The process of separating grains from the harvested crop.  
(e) The process of adding manure to the soil.
2. If seeds are sown too deep in the soil, then their roots will not be able to respire while those sown close to the surface may be eaten by birds and insects.
3. Manual spacing leads to wastage and reduced crop yield. But by the method of seed drilling seeds are sown at correct depth and interval. It saves time and labour.
4. Traditional system, sprinkler system, Drip system.
5. Disadvantages of using a fertiliser :  
(i) It cause water pollution.  
(ii) They are expensive.  
(iii) They reduce soil fertility.

- (iv) They change the nature of soil, making it either too acidic or too alkaline.
- 6. Yes, Weeds reduce crop yield as they compete with the crops for water, minerals and sunlight. So, it is necessary to remove them from the fields from time to time.
- 7. The ploughed field may have big pieces of soil called clumps. It is necessary to break these clumps with a plank. The field is levelled for sowing as well as for irrigation purposes. The levelling of soil is done with the help of leveller. Water can get collected during irrigation in the soil pits, in the absence of levelling.
- 8. Irrigation helps seeds to germinate. It is also essential for absorption of nutrients by plants from the soil and also essential for the elongation of roots. Water also protects crops from frost and dry hot air currents.

### **E. Long Answer Type Questions.**

1. Benefits of Ploughing Advantages of Ploughing
  - (i) The loose soil helps the crop roots to breathe easily even in deep soil.
  - (ii) Loose soil helps the earthworms and microorganisms to grow better. Earthworms are called farmer's friends as they help to turn the soil and add nutrients to the soil in form of their excreta.
  - (iii) It allows roots to penetrate deep into the soil.
  - (iv) It helps to uproot weeds from the soil.
  - (v) Manures and fertilizers mix better in ploughed soil.
  - (vi) The loosening and turning of soil during ploughing brings the nutrient rich soil to the top so that the plants can use them.
2. The crops which are sown in June/July and harvested in September/October are called kharif crops. These crops are also called summer crops. Rice (paddy), soyabean, maize, pulses, cotton, groundnuts are some examples of kharif crops. These crops require plenty of water and largely depend on monsoon rains.
3. Some farmers practice crop rotation to improve the soil fertility. The process in which different types of crops (leguminous and non-leguminous) are grown alternatively in the same field is called crop rotation.
4. Earthworms are called farmer's friends as they help to turn the soil and add nutrients to the soil in form of their excreta.
5. Food materials like food grains on small scale or at domestic level, grain is stored in jute bags or metallic bins. On large scale or at commercial level, grain is put in gunny bags, in silos or in granaries.
6. Farmers remove weeds from their crops by any one of the following methods:

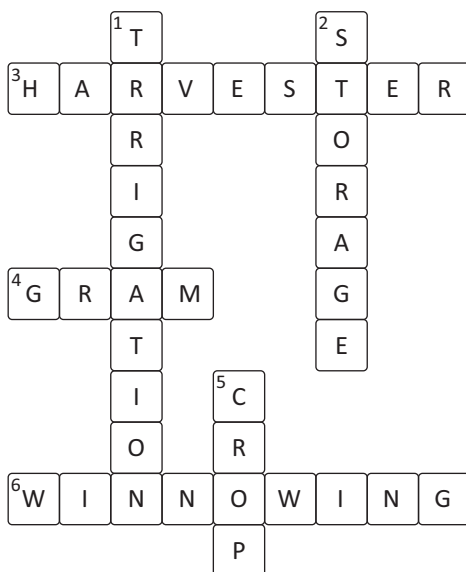
**Manual Removal :** The weeds are removed or pulled out (uprooted) by hand or by cutting them close to the ground at intervals. This is done with the help of a trowel (khurpi).

**Removal with Chemicals :** Certain chemicals are also used to control weeds. Chemicals which destroy the weeds but do not harm the crops are called weedicides. 2,4-D is a commonly used weedicide.



### Learn by Doing

#### CROSSWORD PUZZLE



## Microorganisms

### EXERCISES

#### A. Tick (3) the correct option.

1. (b)      2. (d)      3. (b)      4. (b)      5. (a)
6. (a)      7. (a)      8. (b)

#### B. Fill in the blanks with correct words.

1. Bacteria      2. Lactobacillus      3. Pathogen
4. vaccines      5. Penicillium moulds      6. Micro organisms
7. Moisture

**C. Match the Following.**

1. c      2. e      3. b      4. a      5. s

**D. Short Answer Type Questions.**

1. Microorganisms belong to five major groups – bacteria, algae, protozoa, fungi and viruses.
2. Yeast
3. Rhizobium bacteria are present in the root nodules of leguminous plants like pea and bean. These bacteria are able to fix atmospheric nitrogen and convert it into suitable forms like nitrates. Some bacteria and blue-green algae living in the soil can also fix atmospheric nitrogen into nitrates. These microbes are commonly called biological nitrogen fixers. Soil fertility increases with nitrogen fixation.
4. Vaccines injected into the body, stimulate the immune system to produce special proteins called antibodies to fight against diseases. These antibodies remain in the body and protect it from any microbial attack in future. The process of administering a vaccine in an organism's body is called vaccination.
5. **Pasteurization** : This method is used for preserving milk. In this method, (i) milk is heated to about 70°C for about 15-30 seconds and (ii) then quickly cooled (chilled) and stored in sterilized bottles or pouches. Heating kills the bacteria present in milk. Quick cooling prevents the remaining bacteria from growing.

**Salting and Adding Sugars** : Many food items are preserved by adding salt and sugar. Due to the addition of these, the cells of the microbes lose water. Microbes are thus not able to grow in such food items.

6. Yeast is used in making bread, alcoholic drinks and other bakery items due to fermentation. It breaks down sugar to alcohol and carbon dioxide in the absence of oxygen.
7.
  - Mushrooms although bigger than the microorganisms, is a fungi which are eaten by many people. They are rich in proteins and vitamins.
  - Yeast is rich in proteins and vitamin B. It is an important source of food.
  - Many seaweeds and algae like Chlorella are used as food in China and Japan.
  - Algae are a source of food to fish and sea animals.
8. **Drying (Dehydration)** : Drying reduces the moisture content of food materials. Removal of water from the food materials is called dehydration. Dehydration prevents the growth of microorganisms. Food items like cereals, pulses, vegetables like spinach, cauliflower and methi

leaves and spices are dried in the sun (sun drying).

**Boiling :** Food items like milk and water are preserved by boiling. Boiling kills microorganisms. You may have observed your mother boiling milk before storing it.

**Refrigeration and Freezing :** Like boiling, cooling by refrigeration and freezing also helps to preserve food items. Refrigeration and freezing do not kill microorganisms, but only stop them from growing and multiplying.

#### E. Long Answer Type Questions.

1. Virus grow only inside cells of other plants and animals. whereas other micro organisms can grow by itself. Other micro organisms have both positive and negative uses but viruses only have negative effect-It causes diseases.
2. Bacteria and fungi breakdown (decompose) dead and decaying plant and animal matter into simple inorganic substances. They are thus called decomposers. Inorganic compounds like phosphates, nitrates, sulphates are mixed in the soil and are used by green plants during the process of photosynthesis. Hence, decomposers help to keep the environment clean by preventing the accumulation of remains and waste of dead organisms.
3. (i) Antibiotics are the medicines that kill or stop the growth of disease causing microorganisms. These are formulated to destroy bacteria by not effective against diseases causes by virus. Bacteria and fungi are used to manufacture them. Some common antibiotics made from fungi and bacteria are : Penicillin, Streptomycin, Erythromycin, Neomycin etc. Antibiotics are used to treat many diseases in plants and animals caused by microorganisms.  
(ii) Vaccines are substances used to produce immunity to diseases in the living body.
4. **Vectors and Carriers:** Houseflies, mosquitoes, rats, etc., carry bacteria, viruses or protozoans and pass them onto humans, thus causing diseases. Vectors transmit diarrhoea malaria, plague, etc.

**Air:** A person may inhale spores of bacteria, fungi and viruses present in the air and this may result in diseases. Common cold, whooping cough, measles, tuberculosis, etc., are spread through air.

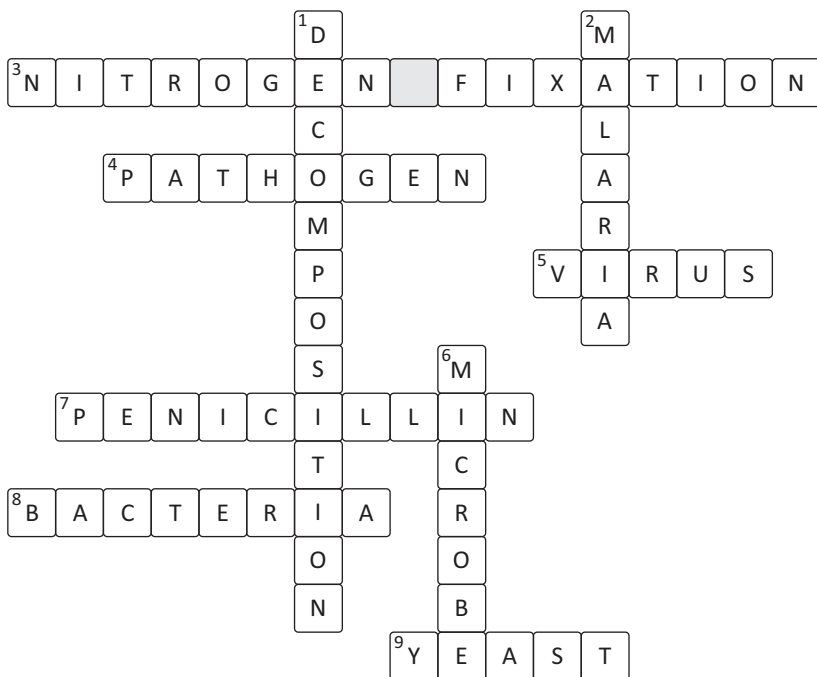
**Infected Food and Water:** Intake of food/water infected by bacteria/fungi may lead to diseases. Cholera, typhoid, diarrhoea, etc., are caused by infected food or water.

**Direct Contact with Infected Person:** Diseases, such as measles, chicken pox, common cold, COVID-19, etc., spread through contact with infected persons or their belongings.



- 

## CROSSWORD PUZZLE





# Combustion and Flame



## A. Tick (3) the correct option.

- |        |        |        |        |        |
|--------|--------|--------|--------|--------|
| 1. (b) | 2. (c) | 3. (a) | 4. (c) | 5. (b) |
| 6. (c) | 7. (b) | 8. (a) |        |        |

## B. Fill in the blanks with correct words.

- |               |                    |                |                   |
|---------------|--------------------|----------------|-------------------|
| 1. Oxygen     | 2. LPG             | 3. Combustible | 4. carbon dioxide |
| 5. combustion | 6. Carbon monoxide | 7. Calorific   |                   |

## C. Match the Following.

- |      |      |      |      |      |      |      |
|------|------|------|------|------|------|------|
| 1. f | 2. g | 3. e | 4. d | 5. a | 6. b | 7. c |
|------|------|------|------|------|------|------|

## D. Give two examples of each of the following:

- |                  |                   |                 |
|------------------|-------------------|-----------------|
| 1. Paper, Petrol | 2. Glass, Cement  | 3. LPG, Alcohol |
| 4. Coal, Wood    | 5. Petrol, Diesel | 6. CNG, Biogas  |

## E. Short Answer Type Questions.

- Combustion** : A chemical reaction in which a fuel react with oxygen to give out heat and light.
- Rapid Combustion** : Some substances catch fire very quickly. Such type of combustion that takes place very fast with the emission of large amount of heat and light is called rapid combustion. ely with the evolution of heat and light.

**Spontaneous Combustion** : Some substances catch fire on their own when they exposed to air. Such type of combustion is called spontaneous combustion.

- Water cannot be used in case of fire caused due to liquid fuel like oil or electric short circuit. Oil is lighter than water and floats on its surface, hence water cannot extinguish such fire.
- Good fuels have high calorific value. They have moderate rate of combustion and moderate ignition temperature, are least polluting and burn completely.
- Characteristics of a Good Fuel
  - It should be cheap and easily available.
  - It should have high calorific value.
  - It should not produce harmful gases on burning and should not leave ash behind.
  - It should be safe to handle and transport.

6. Carbon containing fuels release the carbon dioxide which is a greenhouse gas. It has the ability to trap heat. The excessive use of such fuels lead to increase in the level of carbon dioxide in the atmosphere. Due to this, the average temperature of earth increases. This increase in the temperature is called global warming.
7. Carbon dioxide is the best extinguisher for fire caused by burning of inflammable liquids like petrol or oil and also electrical fires. Carbon dioxide being heavier than air forms a layer on the burning material and cuts the supply of oxygen. This stops fire. Also, the carbon dioxide gas does not harm most of the electrical equipment.
8. Wood unburnt carbon particles into the environment on burning. These are very fine particles that can cause respiratory problems such as asthma and bronchitis.

**F. Long Answer Type Question.**

1. The calorific value of gaseous fuel is greater than that of solid and liquids, which means that it will release a large amount of energy when burned.
2. High atmospheric temperatures and dryness offer favorable circumstance for a fire to start.
3. Those substances which burn easily to produce heat and light are called combustible substances. For example : paper, wood, petrol, kerosene, coal, diesel, natural gas, etc.

Substances which do not burn easily in air or oxygen are called non-combustible substances. For example : glass, cement, soil, iron, stones, etc.

4. **(a) Fuels :** Any substance that burns to produce heat and light energy is called fuel. On the basis of the physical state, fuels are grouped into three categories :
  - (i) **Solid Fuels :** The fuels like wood, coal, coke and cow dung cake which exist in solid state at room temperature are called solid fuels.
  - (ii) **Liquid Fuels :** The fuels like oil, alcohol, petrol and diesel which exist in liquid state at room temperature are called liquid fuels.
  - (iii) **Gaseous Fuels :** The fuels like natural gas, biogas and petroleum gas which exist in gaseous state at room temperature are called gaseous fuels.

**(b) A Candle Flame :** A candle flame is divided into the following three zones:

- (i) The innermost zone : It appears black and is the dark zone of a candle. No combustion occurs here because of lack of oxygen. It

contains unburnt wax and is the least hot region of the candle flame.

(ii) The middle zone : Partial combustion takes place here and wax vapour start burning with a yellowish flame. This region of the candle flame is moderately hot. It is also known as the luminous zone.

(iii) The outer zone : This is the region of complete combustion of wax vapour, with a blue colour flame. The wax burns here completely and produces carbon dioxide, water vapour and heat. This region is the hottest part of the candle flame.

5. **Conditions Necessary for Combustion** : There are three conditions necessary for combustion as follows :

- Presence of air or oxygen.
- Presence of a combustible substance.
- Attainment of ignition temperature or kindling temperature of the combustible substance.

6. (a) The lowest temperature at which a particular substance burns in the presence of air is called its ignition temperature. A substance cannot catch fire if the temperature is lower than its ignition temperature.

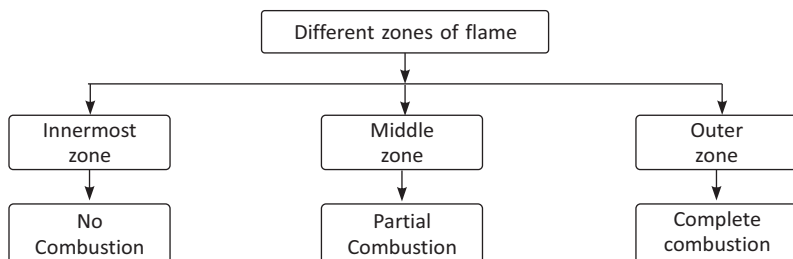
(b) The amount of heat energy produced by the complete combustion of 1 g of a fuel is called calorific value of fuel. Calorific value of a fuel is expressed in kilo joules per gram (kJ/g).

(c) A fire extinguisher is a handheld active fire protection device usually filled with a dry or wet chemical used to extinguish or control small fires, after in emergencies.



### Learn by Doing

#### MIND MAP





## Coal and Petroleum



### A. Tick (3) the correct option.

1. (d)      2. (c)      3. (b)      4. (c)      5. (b)      6. (d)

### B. Fill in the blanks with correct words.

1. Carbonization      2. Coal, Petroleum      3. petroleum  
4. coal tar      5. paraffin was      6. Natural gas

### C. Match the Following.

1. f      2. a      3. e      4. b      5. c      6. d

### D. Short Answer Type Questions.

1. Nature has provided us with lots of useful things to fulfil our needs. These are called natural resources. Natural resources are of two types – renewable and non-renewable.

S.No.	Breathing	Cellular Respiration
1.	Petroleum gas (LPG- Liquified Petroleum Gas)	<ul style="list-style-type: none"> <li>Fuels for home and industries.</li> <li>In the production of carbon black.</li> </ul>
2.	Petrol	<ul style="list-style-type: none"> <li>Fuel in vehicles like cars, scooters.</li> <li>As a solvent for dry cleaning clothes.</li> </ul>
3.	Kerosene	<ul style="list-style-type: none"> <li>As a fuel in wick stoves.</li> <li>Used for lighting in petromax lamps.</li> <li>As a fuel in jet aeroplanes.</li> </ul>
4.	Diesel	<ul style="list-style-type: none"> <li>As a fuel in heavy vehicles like ships, trucks, etc.</li> <li>To run water pumps and generators.</li> </ul>
5.	Lubricating oil	<ul style="list-style-type: none"> <li>Used to lubricate machinery.</li> </ul>
6.	Paraffin Wax	<ul style="list-style-type: none"> <li>Used for making candles, wax paper, vaseline, grease, shoe polish.</li> </ul>
7.	Bitumen	<ul style="list-style-type: none"> <li>Used for making road surfaces and paints.</li> </ul>

3. **Renewable Resources** : The natural resources which are present in unlimited quantity in nature are called renewable or inexhaustible natural resources. Inexhaustible means something which cannot be used up completely. They cannot be exhausted by human activities. For example – water, air and sunlight.

**Non-renewable Resources :** The natural resources which are present in limited quantity in nature are called non-renewable or exhaustible natural resources. Exhaustible means something which can be used up completely. They can be exhausted by human activities. For example – wildlife, forest, coal, petroleum and natural gas.

4. (i) Coal is used to produce electricity.  
(ii) Coal is used as fuel for cooking and a source of heat.
5. Natural resources which are formed by decomposition of dead remains of living organisms (fossils) are called fossil fuels.

6. **Common Varieties of Coal:**

**Peat :** It is brown in colour and most inferior in quality. It is the youngest variety of coal and contains 50% to 60% of carbon (lowest carbon content). It has high moisture content and burns with a sooty flame.

**Lignite :** It contains 60% to 70% of carbon. It is a soft coal and catches fire easily. It contains some amount of sulphur which causes pollution when burnt.

**Bituminous :** It contains approximately 75% of carbon. It is used for domestic purposes and also known as household coal.

**Anthracite :** When bituminous coal remains on the earth for a long time and undergoes extreme pressure, then anthracite coal is formed. It contains 90% to 95% of carbon. It is called as hard coal. It is present at maximum depth as compared to other types of coal.

7. Crude petroleum is a mixture of about 200 hydrocarbons. It contains useful substances like petroleum gas, petrol, diesel, paraffin wax, lubricating oil, etc. The process of separation of various constituents of petroleum is called refining of petroleum. It can be done by fractional distillation.

**E. Long Answer Type Questions.**

1. **Formation of Coal :** Coal was formed from the dead remains of trees, ferns and other plants that lived 300 to 400 million years ago. In some areas of eastern United States, coal was formed from swamps covered by sea water. It is believed that dead plants were covered by rocks and soil and were decomposed by bacteria. New plants grew in the soil and they too got buried under the soil and rocks. Volcanic eruptions and earthquakes destroyed forests which also got buried under the surface of the earth and got covered with sand, clay and water.

Over the years, these remains went deeper and deeper and due to high temperature and high pressure inside the earth and in absence of air, they got converted into coal.

2. Natural gas is a fossil fuel. It is found deep inside the earth, between two

layers of non-porous rocks, either alone or along with oil above petroleum deposits. It is stored under high pressure as Compressed Natural Gas (CNG). Natural gas contains mainly 95% methane and small amounts of gases like ethane, propane, butane, pentane with small amount of nitrogen, carbon dioxide, hydrogen sulphide and traces of water.

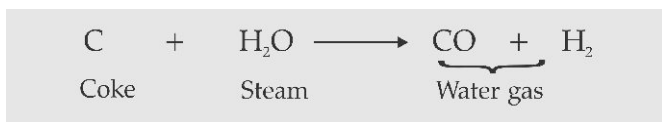
### Uses of Natural Gas

- (i) It is used as a cooking and heating fuel in household and industries.
- (ii) It is also used as a non-polluting fuel for vehicles.
- (iii) Natural gas is used for manufacturing many chemicals and fertilizers.
- (iv) Natural gas is used as fuel in thermal power stations for generating electricity.

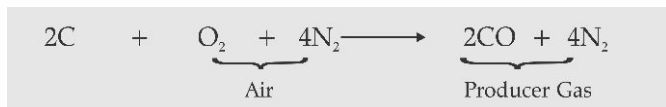
3. **Destructive Distillation of Coal** : When coal is heated strongly in the absence of air it produces various useful organic and inorganic products.

**Coke** : The solid residue left behind after dry distillation of coal is known as coke. It is tough, porous and black. It contains about 98% carbon and is used to manufacture steel and extract many metals from their ores.

When steam is passed over red hot coke, it produces water gas which is a fuel gas. It is a mixture of carbon monoxide and hydrogen.



When air is passed over red hot coke, producer gas which is a mixture of carbon monoxide and nitrogen is formed.



**Coal Tar** : It is a thick black liquid with an unpleasant smell. It is a mixture of about 200 substances which are used in the manufacture of dyes, drugs, perfumes, explosives, paints, etc. Pitch derived from coal tar is used to construct roads but these days bitumen, a petroleum product is used for making roads.

**Coal Gas** : This gas produced during processing of coal is a mixture of methane, carbon monoxide and hydrogen. It is known as coal gas. It is a very good fuel and is used in many industrial units situated near the coal processing plants.

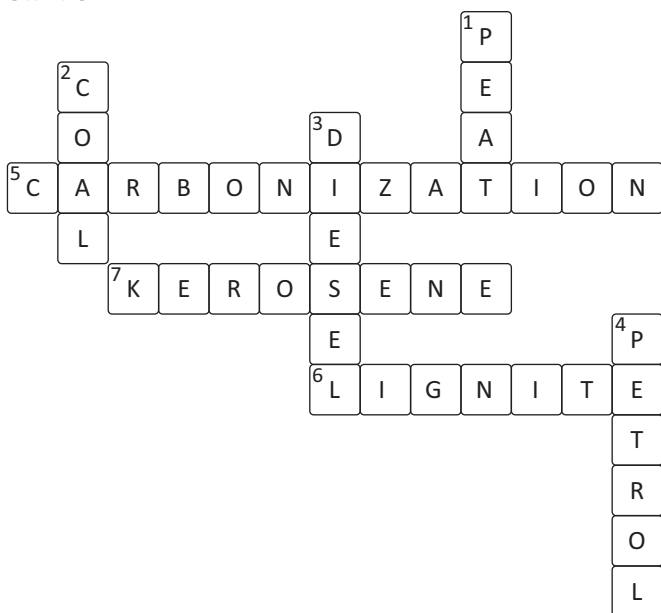
4. These measures include the following :
  - (i) In India 75% of the total amount of coal used every year goes in the

- (ii) Use alternative sources of energy like solar energy by setting up or installing solar energy heating panels and lighting devices.
- (iii) Our cars eat up a lot of petrol carpooling can be done. This is shared use of a car by the driver and one or more passengers, usually for commuting.
- (iv) Short distances can be travelled by bicycle or by foot. This will also prove to be healthy.
- (v) Proper tuning and checkups of the vehicles should be done.
- (vi) Go for cleaner fuels like CNG.

5. The slow chemical process of conversion of wood into coal is called carbonization. The volatile substances were driven off while the carbon content of the dead and decayed plant matter grew. Carbonisation is a very slow process and may have taken thousands of years to convert decayed plant matter into coal.
6. They are called exhaustible natural resources because all the fossil fuels are used up, they will be gone forever. In this chapter, we will learn about exhaustible fuels, such as coal, petroleum and natural gas.



## CROSSWORD PUZZLE







# Conservation of Biodiversity



## A. Tick (3) the correct option.

1. (a)    2. (a)    3. (d)    4. (b)    5. (c)    6. (c)    7. (b)

## B. Fill in the blanks with correct words.

1. natural            2. biodiversity            3. endemic            4. overgrazing  
5. overgrazing    6. endangered            7. soil erosion            8. afforestation

## C. Short Answer Type Questions.

1. The diverse forms of plants and animals on the earth is called biodiversity.  
2. Different plants growing in a particular area are called flora. Animals found in a particular area are called fauna.

3. **Industrialization and Urbanization** : The land cleared by deforestation is used for erecting industries, homes and roads to fulfill the needs of the increasing population.

**Overgrazing** : Overgrazing by increasing population of animals also leads to loss of biodiversity.

4. To protect the flora and fauna and their habitats, our government under the wildlife (Protection) Act, 1972 created protected areas.  
5. The forest conservation act is the practice of planting more trees and maintaining the forested areas for the sustainability for future generations.  
6. **Extinct Species** : Some species of plants and animals which do not exist anymore on the earth are known as extinct species. Dinosaur, dodo are some examples of extinct animals. Similarly nilgiri holly and cry pansy are examples of extinct plants.

**Endangered Species** : There are some species of plants and animals that are at high risk of becoming extinct. Such species are called endangered species. Their numbers have been drastically reduced due to their indiscriminate hunting or destruction of their habitats. For example- the Indian rhinoceros, Asiatic lion, crocodile and blue whale are endangered species.

7. Planting of new trees where forests have been destroyed is called reforestation.  
8. (a) Pachmarhi Biosphere Reserve.            (b) Nilgiri Biosphere Reserve.  
(b) • Gir Wildlife Sanctuary (Gujarat)

- Sultanpur Bird Sanctuary (Haryana)
- Dachigam Sanctuary (Srinagar)
- Mudumalai Sanctuary (Tamil Nadu)
- Kaziranga Sanctuary (Assam)
- Periyar Sanctuary (Kerala)
- (c) • Jim Corbett National Park (Uttarakhand)
- Dudhwa National Park (Uttar Pradesh)
- Ranthambore National Park (Rajasthan)
- Kanha National Park (Madhya Pradesh)
- Simlipal National Park (Orissa)

#### **D. Long Answer Type Questions.**

1. All living things depend on non-living natural resources and there needs to be a balance between them. But with increase in human population, the demand for natural resources has increased tremendously. There is, thus, a need for conservation of natural resources. The wise and judicious use of natural resources is called conservation. Such a use would ensure that resources are available for future generations as well as overuse or wastage of resources must be avoided.

Conservation is broadly aimed at two aspects :

- (i) to ensure a continuous availability of useful plants, animals and materials for future generations.
- (ii) to preserve the quality of our environment.

2. **Causes of Deforestation:** Various man-made causes of deforestation are:

- construction of houses and industries.
- clearing land for agricultural purposes.
- using wood as fuel.
- using wood to make paper, furniture and other things.

Deforestation also occurs naturally due to forest fires, earthquakes, severe droughts and floods.

#### **Consequences of Deforestation :**

- (i) Deforestation leads to increase in temperature and pollution level on the earth. This disturbs the water cycle and reduces rainfall.
- (ii) The level of carbon dioxide in the atmosphere increases on account of deforestation. You know that plants need carbon dioxide for photosynthesis.
- (iii) Deforestation results in soil erosion. Soil erosion removes the top layer of the soil that contains the fertile humus. Removal of top layer, thus makes the soil less fertile, as the lower layers of soil contain less humus. If this goes on, the fertile land gets converted into a desert.

- (iv) As a result of deforestation, groundwater level also gets lowered. The capacity of the soil to hold water is reduced. The movement of water from the soil surface into the ground slows down. In the absence of trees and their root system, water is not able to seep into the soil. As a result, in rainy season water just flows over the soil, bringing about floods.
3. The level of carbon dioxide in the atmosphere increases on account of deforestation. You know that plants need carbon dioxide for photosynthesis. Reduced number of trees require lesser carbon dioxide. So the level of this gas has gone up in the atmosphere, resulting in global warming.
  4. The factors leading to formation of endemic species :
    - (i) Destruction of habitat.
    - (ii) Increasing population
    - (iii) Introduction of new species.
  5. Project tiger was launched by the Indian government in 1973 to protect the tigers in the country. The tiger population in India has been decreasing sharply over the years. In 1948, population of tigers was about 20,000. In 1989, it was about 4,000 and it went down to about 1,233 in 2000.

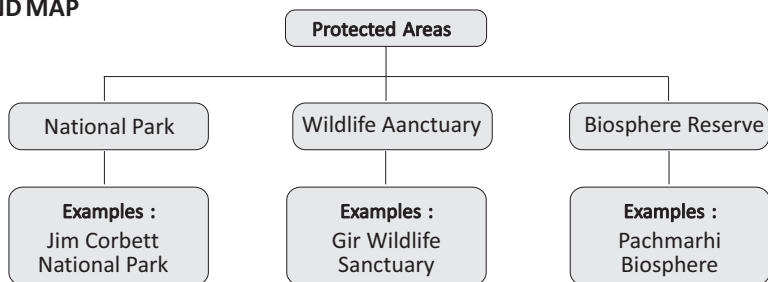
Realising this decline, the project tiger was initiated by the Government of India. At present, there are 39 Tiger Reserves in 17 Indian states. According to the latest tiger census report released by the National Tiger Conservation Authority on March 28, 2011, the current tiger population estimated is 1706.

6. Red data book is a source which gives a record of all the endangered animals and plants. This is published by the International Union for Conservation of Nature and Natural Resources (IUCN), now known as the World Conservation Union (WCU). The main aim of IUCN is to focus the attention of conservationists towards species that are endangered and are at high risk of extinction.



### Learn by Doing

#### MIND MAP





# Reproduction



## A. Tick (3) the correct option.

- |        |        |        |        |        |
|--------|--------|--------|--------|--------|
| 1. (b) | 2. (c) | 3. (a) | 4. (a) | 5. (a) |
| 6. (b) | 7. (c) | 8. (a) |        |        |

## B. Fill in the blanks with correct words.

- |                     |                   |              |             |
|---------------------|-------------------|--------------|-------------|
| 1. internal         | 2. Fallopian tube | 3. Oviparous | 4. external |
| 5. Test Tube Babies | 6. 23             | 7. Foetus    | 8. sex      |

## C. Give two examples of each of the following :

- |                  |                 |
|------------------|-----------------|
| 1. Amoeba, Hydra | 2. Human, Birds |
| 3. Hen, Frog     | 4. Cow, Dog     |

## D. Match the following.

- |      |      |      |      |      |      |
|------|------|------|------|------|------|
| 1. c | 2. a | 3. f | 4. b | 5. e | 6. d |
|------|------|------|------|------|------|

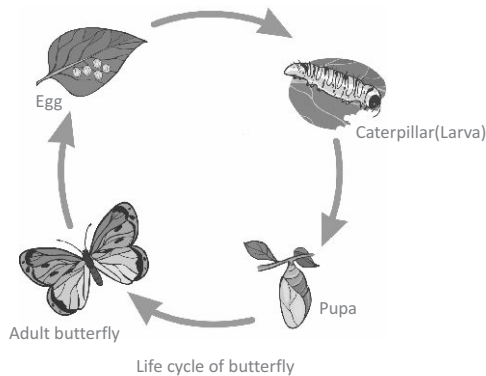
## E. Short Answer Type Questions.

- (a) The process by which living organisms produce young ones of their own kind.
  - (b) In this mode of asexual reproduction, a unicellular organism, like amoeba divides itself into two equal individuals. During the process of binary fission, first the nucleus divides, forming two nuclei. This is followed by the division of the cytoplasm into two parts. Finally two daughter amoebae are formed, having cytoplasm with one nucleus each. Each daughter amoeba grows into an adult or fully grown amoeba.
  - (c) In this mode of asexual reproduction, a small bulb-like projection called 'bud' is formed on the body of the animal. Hydra reproduces by budding. In Hydra, small 'buds' are formed on the body. The nucleus of the parent hydra divides into two and one of the nuclei moves into the bud. After some time when the bud is grown, it gets detached from the parent Hydra and grows into an independent individual.
  - (d) The process of fusion of male and female gametes to form the zygote is called fertilization.
2. **Asexual Reproduction** : In this mode of reproduction, a single parent is involved in the production of a new individual of its own kind.

**Sexual Reproduction** : In this mode of reproduction, two individuals the

male and the female are involved in the production of a new individual of their own kind.

3. In Hydra, small 'buds' are formed on the body. The nucleus of the parent hydra divides into two and one of the nuclei moves into the bud. After some time when the bud is grown, it gets detached from the parent Hydra and grows into an independent individual.
4. On the basis of the mode of reproduction, animals can be categorised into oviparous and viviparous animals. Animals which lay eggs are called oviparous animals like hen, frog, lizard, fish etc., while those that give birth to young ones are called viviparous animals like mammals (cows, dogs, etc.).
- 5.



6. The sex of a baby is determined by strands of genetic material present inside the nucleus of a cell. These strands or thread-like structures are called chromosomes.

#### F. Long Answer Type Questions.

1. (a) When the egg gets fertilized, it results in pregnancy.  
(b) If the egg is not fertilized by the sperm then the lining of the uterus wall with blood vessels breaks down and passes out of the vagina with the unfertilized egg, resulting in bleeding.
2. Zygote moves from the oviduct to the uterus and gets attached to the wall of the uterus. As it moves, it divides repeatedly by the process of cell division and forms a ball of cells. The ball of cells gets embedded on the wall of the uterus for further development. This developing structure is called an embryo. The cells in the embryo form groups which develop into different tissues and organs of the body.
3. We should take care of our health at all ages but adolescents should take extra care of themselves as their body demands are high. To grow healthy both physically and mentally, you should strictly follow some health rules. Some of these are listed below.

**Balance Diet :** Adolescence is a stage of rapid growth and development. Hence during this age, a balanced diet should be taken and junk foods should be avoidable. A balanced diet includes adequate amount of all the nutrients required by the body. Indian meal (roti, rice, dal and vegetables) constitutes a balanced diet. In addition milk, fruits, green leafy vegetables, jaggery, amla, nuts, eggs, meal, etc., should be included as per the food preferences.

**Personal Hygiene :** Cleanliness must be maintained by girls during menstrual cycle otherwise they might catch various RTIS (Reproductive Tract Infections).

Teenagers should take care of their cleanliness as there is an increased activity of sweat glands which causes body odour. Hence taking a bath is very important.

**Physical Exercise :** All teenagers must do some physical exercises on a regular basis. Walking and playing in fresh air keeps the body fit and healthy. Teenagers must take walks, exercise and play outdoor games.

4. **Male Reproductive System :** A male reproductive system includes a pair of testes (singular – testis), two sperm ducts, urethra and a penis.

**Testes :** The testes are the site where millions of male gametes or sperms are produced.

**Sperm ducts :** The sperms formed in testes leave the testes through a pair of narrow ducts called sperm ducts or vas deferens. Sperms are the male gametes of male reproductive system.

**Urethra :** The two vas deferens open into the urethra. Urethra carries the sperms to an organ called penis.

**Penis :** It opens outside the body. It passes the sperms from the man's body to the woman's body for the purpose of reproduction. It is used to pass urine as well.

### **Female Reproductive System**

A female reproductive system of humans includes a pair of ovaries, two oviducts, uterus and vagina.

**Ovaries :** A woman has two ovaries. Each ovary produces the female gametes called eggs or ovum. Usually one ovum is produced from one of the ovaries every month by a process called ovulation.

**Oviduct or Fallopian Tube :** A tube is present just above each ovary, called oviducts. It is a muscular tube which joins the uterus with the ovary. The sperms and the ovum meet in the oviduct and fertilisation occurs.

**Uterus or Womb :** It is a hollow, muscular pear shaped organ. The development of foetus occurs inside it. The lower narrow part of the uterus is called cervix which is connected to the vagina.

**Vagina** : The uterus opens into a wide muscular tube called vagina. It is the female genital organ. It receives the sperms from the male's body.

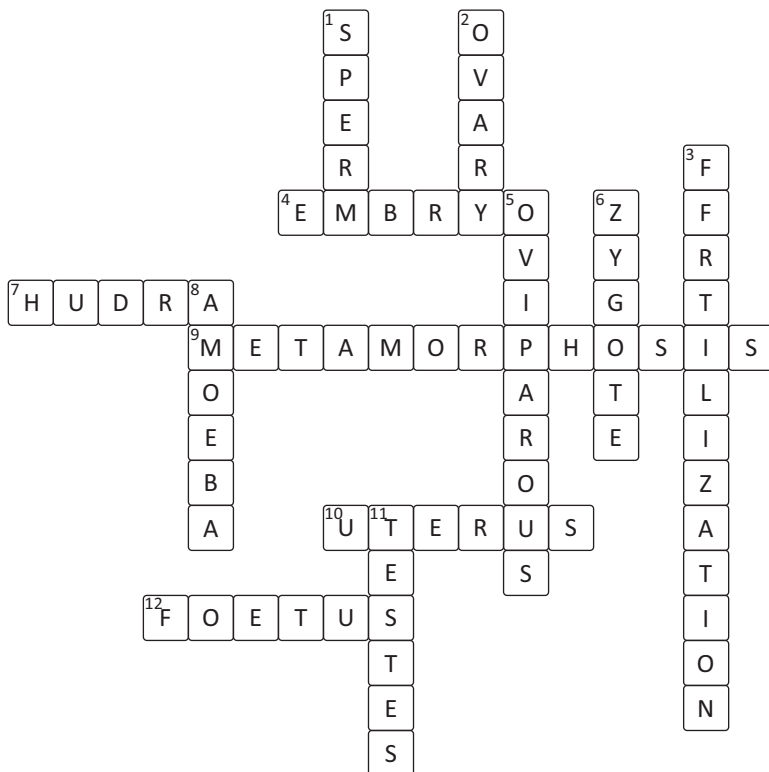
- On the basis of the mode of reproduction, animals can be categorised into oviparous and viviparous animals. Animals which lay eggs are called oviparous animals like hen, frog, lizard, fish etc., while those that give birth to young ones are called viviparous animals like mammals (cows, dogs, etc.).
- Human body cells contain 23 pairs of chromosomes. The 23rd pair of chromosome differs in males and females. In a male, the 23rd pair consists of an X (long) and a Y (short) chromosome (XY). In a female, the 23rd pair consists of two X chromosomes (XX). X and Y chromosomes are called the sex chromosomes.

The sex chromosomes determine the sex gender of the body. Hence, they are named sex chromosomes.



### Learn by Doing

#### CROSSWORD PUZZLE





## Reaching the Age of Adolescence



### A. Tick (3) the correct option.

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

### B. Fill in the blanks with correct words.

1. thyroid      2. menarche      3. menopause  
4. Ovaries      5. Ovulation

### C. Match the following.

1. d      2. a      3. b      4. e      5. c

### D. Short Answer Type Questions.

1. In females, one of the two ovaries produce one egg or ovum, which is released once in every 28-30 days. This process of the release of a mature ovum by an ovary is called ovulation.
2. The age at which reproductive organs become functionally active is called puberty.
3. The full form of AIDS is Acquired Immuno Deficiency Syndrome. It is caused by the HIV virus. This virus destroys the defence mechanism of the body. It can pass from an infected person to a normal person by sharing syringes used for injecting drugs, blood transfusion, sexual contact with a person infected with HIV. It can also pass to an infant from the milk of an infected mother.
4. The beginning of menstruation at puberty is called menarche (it is the first menstrual flow). In the beginning, menstrual cycle may be irregular but after sometime it becomes regular.  
Menstrual stops at the age of 45-50 years. The permanent stoppage of menstruation is called menopause.
5. The use of drugs for purpose other than medicinal use is called drug abuse.

### E. Long Answer Type Questions.

1. This is also known as master gland, as it produces several hormones which control the activities of other endocrine glands. The growth hormone stimulates growth in the body, and the thyroid stimulating hormone stimulates thyroid gland. Other hormones secreted from this gland stimulates testes and ovaries.
2. Human body cell contain 23 pair of chromosomes. The 23rd pair of



chromosome differs in male and females. In a male, the 23rd pair consists of an x (long) and Y (Short) chromosome (XY). In a female, the 23rd pair consists two. X chromosome (XX). X and Y chromosomes are called the sex chromosome.

**Testes** : It secretes the male sex hormones testosterone which is responsible for the development of secondary sexual characters in a boy.

**Ovaries** : They produce the female sex hormone oestrogen which helps in the development of secondary sexual characters in a girl. Another hormone called progesterone is also released from the ovary. It is sometimes called the pregnancy hormone and is responsible for the maintenance of pregnancy.

3. If the egg is not fertilized by the sperm, then the lining of the uterus wall with blood vessels breaks down and passes out of the vagina with the unfertilized egg, resulting in bleeding. This is called menstruation. Menstruation occurs for 4-5 days after every 28 to 30 days.
4. During puberty, a number of physical and psychological changes take place. Some of the changes which take place in boys and girls are as follows :

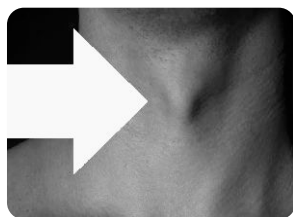
**Increase in Height** : There is a sudden increase in height during puberty. It is one of the most visible changes in puberty. This is due to the elongation of long bones in both arms and legs.

It is observed that girls initially grow faster than boys. Both boys and girls reach their maximum height at around 18 years of age.

**Changes in Body Shape**: In boys, the shoulders become broader and the chest becomes wider. The muscles develop more in boys than in girls.

In girls, the pelvic bones grow and hips broaden. Breasts develop and increase in size.

**Change in Voice**: At puberty, the voice box or larynx begins to grow. The increase in its size is more visible in boys than in girls. In boys, it is seen as a protruding part of the throat, called Adam's apple. Boys develop a deep or low pitched voice that occasionally becomes hoarse. This is temporary and becomes normal after a few days or months.



Adam's apple

The voice box is smaller in girls and is not visible from the outside. Girls have a high pitched voice.

**Increase in Activity of Sweat and Oil Glands**: During puberty, the secretions from sweat and oil (sebaceous) glands increase leading to increased sweating. The skin becomes oily. The increased activity of

these glands leads to acne and pimples on the faces of adolescents.

### Development of sex organs

- At puberty, the male sex organs (the testes and penis) develop completely. The testes start producing male gametes called sperms.
- In girls, the ovaries enlarge and start releasing mature eggs.

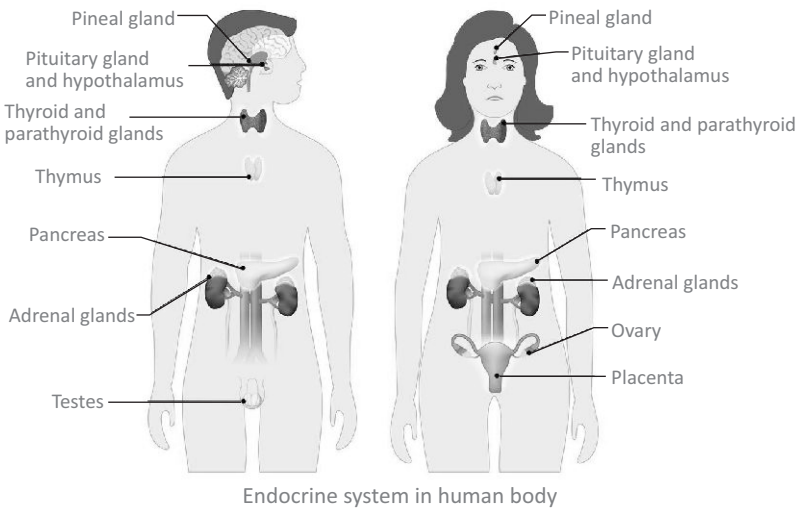
### Mental, intellectual and emotional changes

- The adolescents become more independent and self-conscious.
- Intellectual development takes place and they start contemplating about various things and situations in life.
- At times, they may feel insecure and confused while trying to adjust to the changes in the body and mind.
- They develop attraction for the opposite sex or gender.
- Due to an increase in hormonal levels, mood swings may occur. One moment an adolescent may feel happy and the next moment sad.



Mood swing

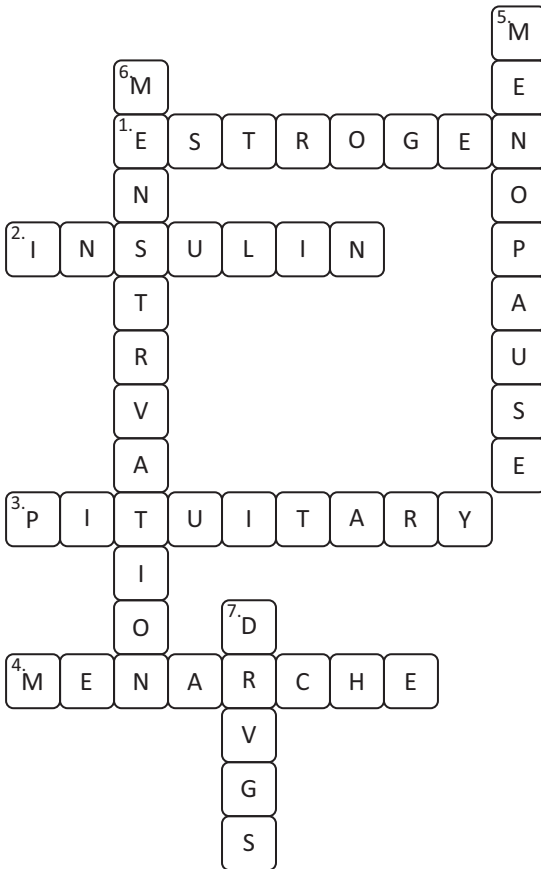
5.



Endocrine system in human body



CROSSWORD PUZZLE





## Force and Pressure



### A. Tick (3) the correct option.

1. (b)    2. (d)    3. (b)    4. (d)    5. (b)    6. (d)    7. (c)

### B. Fill in the blanks with correct words.

1. Muscular    2. wider    3. non-contact    4. larger  
5. pascal    6. pressure    7. Atmosphere

### C. Match the following.

1. c    2. a    3. e    4. b    5. d

### D. Short Answer Type Questions.

1. (a) A pull or push acting on a body which tends to change its state of rest of motion is called force.  
(b) Force acting per unit area is called pressure
2. The sharp knife has a very small area of contact with the surface, while the blunt knife has a larger area of contact. If both knives are pushed down with the same force, the sharp knife will exert a greater pressure on the surface as compared to the blunt knife so the sharp edge of a knife is used to chop vegetables rather than blunt edge.
3. Objects or things fall towards the earth because it pulls them. This force is called the force of gravity or just gravity. This is an attractive force. The force of gravity acts on all objects.
4. We have,    pressure    =    8 Pa  
and    Area    =    152 cm<sup>2</sup>  
We know,    Pressure    =     $\frac{\text{Force}}{\text{Area}}$   
8    =     $\frac{\text{Force}}{152}$   
Force    =    8 x 152  
=    1216 N    Answer
5. Pressure depends on the amount of force. The more the force, the more the pressure. Pressure is directly proportional to the force and inversely proportional to the area of contact.

Pressure is thus defined as force acting per unit area.

$$\text{Pressure (P)} = \text{Force (F)} / \text{Area (A)}$$

- The pressure exerted by the atmosphere on an object is called atmospheric pressure.
- The atmospheric pressure at a place depends on its altitude. The atmospheric pressure reduces as we go to high altitudes.

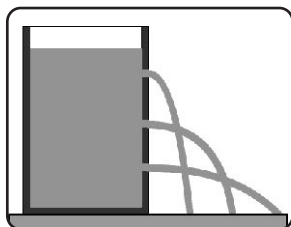
### E. Long Answer Type Questions.

- If we go into space without wearing a 'space suit', our bodies will burst. Space suits are designed to maintain a normal atmospheric pressure on the body, as there is no atmosphere in space.
- Aim :** To show that liquid pressure varies with depth.

#### Method :

- Take a plastic bottle and punch three holes at different heights.
- Now, pour some water into it and let the water flow through these holes.

What do you observe?



#### Observations :

Liquid pressure varies with depth

You will observe that water from the lowest hole comes out with the greatest force and falls at the maximum distance. You will observe that water from the topmost hole comes out with the least force and falls at the minimum distance.

Repeat the experiment with different liquids. This proves that liquid pressure varies with depth. The pressure increase with depth of the liquid.

- Force can produce motion :** Force can be applied on an object by pushing, pulling or hitting it with another object. This applied force can make the object move. For example –
  - We push a heavy box to move it ahead.
  - We pull a car door to open it.

**Force can stop motion :** We can stop a moving body by applying force on it in the direction opposite to the direction of its motion. For example— we apply force to stop a moving ball or a rolling stone. However, if the stone is too bulky, we may not be able to stop it if the force applied by us is not sufficient.

**Force can change the direction of motion :** In a game of cricket, football, hockey, tennis, etc. we can change the direction of the force applied is the same as the direction of the motion of the object, the direction of the object will not change, but its speed will increase.

**Force can change the speed of motion :** We can increase the speed of a moving body by applying force on it in the direction of the motion of the

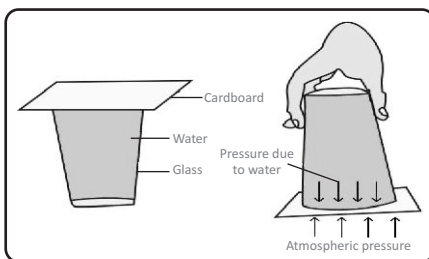
body. For example, by kicking a moving football in the direction of its motion, we can increase its speed.

By applying force in the direction opposite to the direction of the motion of the body, we can reduce its speed.

4. **Aim :** To confirm the presence of atmospheric pressure. **Materials Required:** A glass, water and cardboard

**Procedure :**

- Take a glass and fill it with water up to the brim, such that there is no air gap between the water level and the brim of the glass.
- Now cover the glass with the cardboard piece. Keeping one of the palms tightly pressed against the cardboard and invert the glass quickly.
- Now gently remove your hand from below the cardboard.



Existence of atmospheric pressure

**Observation :** You will observe that the cardboard remains intact at its place and does not fall down.

**Discussion :** This suggests presence of some force acting on the cardboard from below, which is strong enough to hold the weight of water above it. This force is the atmospheric pressure acting in the upward direction on the cardboard.

**Conclusion :** Atmospheric pressure surrounds us.

5. **Aim :** To show that liquid exerts the same pressure in all directions at a given depth.

**Method:**

- (i) Take a plastic bottle.
- (ii) Punch three holes in the bottle at the same height.
- (iii) Now, pour some water into it and let it flow through these holes.



Liquid exerts the same pressure in all directions at given depth.

**Observations :**

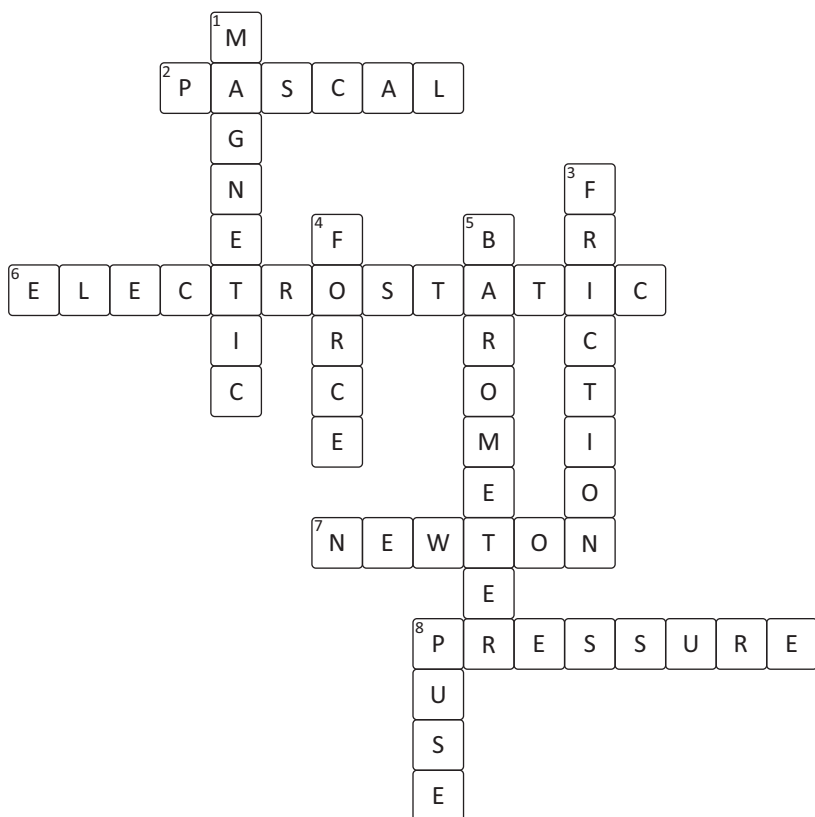
You will observe that water comes out from all the holes with the same force and falls at the same distance.

This shows that liquids exert the same pressure in all directions at a given depth.



## Learn by Doing

### CROSSWORD PUZZLE



## Friction

### EXERCISES

#### A. Tick (3) the correct option.

1. (c)    2. (a)    3. (a)    4. (b)    5. (b)    6. (c)    7. (a)

#### B. Fill in the blanks with correct words.

1. opposite    2. rolling    3. more    4. heat  
5. friction    6. roughness    7. decrease    8. smooth

#### C. Match the following.

1. b    2. e    3. d    4. a    5. c

#### D. Short Answer Type Questions.

- (a) Friction is a force that opposes the motion of an object.
  - (b) A substance used to reduce friction between two surfaces. are called lubricants.
  - (c) All fluids (Liquids and gases) exert a force of friction on objects that move through them, which is called drag.
- The friction can be reduced by making the surface smoother. We can reduce friction by using wheels. A suitcase with wheels can be pushed easily.
- The use of brake pads is also another method of increasing friction. The brake pads in brake system of a bicycle do not touch the wheels until you press the brakes.  
Sand and gravel is thrown on slippery ground during rainy season to increase friction.
- The boats and aeroplanes are made in streamlined shapes because these shapes less the friction.
- When an object starts sliding the contact points on its surface do not get enough time to lock into the contact points on the floor. So sliding friction is slightly smaller than static friction.
- Sliding Friction** : The force of friction acting between two bodies when they slide on one another with a uniform speed is called sliding friction.  
**Rolling Friction** : The force of friction that exists between two surface when a body rolls over the other body is called rolling friction.
- Friction is caused by the rubbing of irregularities on two surfaces in contact.
- (a) A fluid friction is a resistance offered by a fluid against its flow. When an object moves through a fluid (air or water), it has to overcome the friction acting on it. In this process, it losses energy. Hence, object moving fluids must have special shapes. These shapes are called streamlined shapes.
  - (b) **Sliding Friction** : The force of friction acting between two bodies when they slide on one another with a uniform speed is called sliding friction.  
**Rolling Friction** : The force of friction that exists between two surface when a body rolls over the other body is called rolling friction.

#### E. Long Answer Type Questions.

- Friction reduces the speed of a moving objects** : You cannot move faster on a rough road on your bicycle. It is difficult to drag a heavy object due to friction that opposes the motion.



**Friction causes wear and tear :** Rubber tyres of automobiles wear and tear due to friction produced between the tyre and the road while running. The sole shoes gets worn out due to friction caused between the shoes and the ground while walking.

2. **Static Friction :** Static friction is the frictional force that exists between two bodies so long as they are relatively at rest, even though an external force is acting upon them. It is the opposing force that comes into play when one body tends to move over the surface of another but actual movement has not started. Static friction must be overcome before an object can be set in motion.

**Sliding Friction :** The force of friction acting between two bodies when they slide on one another with a uniform speed is called sliding friction.

When an object starts sliding the contact points on its surface do not get enough time to lock into the contact points on the floor. So sliding friction is slightly smaller than static friction.

**Rolling Friction :** The force of friction that exists between two surfaces when a body rolls over the other body is called rolling friction.

Rolling reduces friction. That is why it is easy to move a heavy box when it is fitted with wheels. We will need to apply a lot of force, if it is without wheels.

3. The friction can be reduced by making the surface smoother. The material used to make a surface smooth is called a lubricant. The most commonly used lubricants are oil, grease, graphite, boric powder, talcum powder, etc.

When oil or grease is applied between moving parts, it forms a thin layer so the surfaces do not rub directly and friction is reduced. By reducing friction, we can reduce the wear and tear of moving parts and movements become smooth.

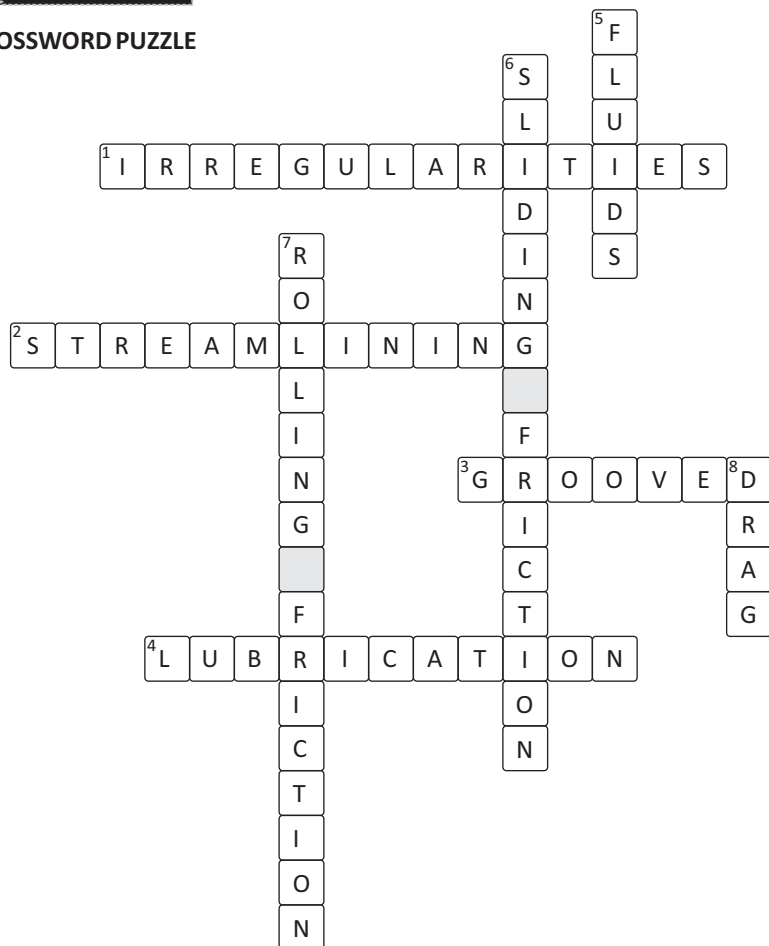
4. Friction is a necessary evil because it has both harmful and beneficial effects Exp :
  - (i) We can walk easily because the ground offers friction. With less friction, the walking situation becomes almost impossible.
  - (ii) Tyres of vehicles have treads for better grip over the road. It provides friction to the surface of the road. When treads are worn out, the tyres need to be replaced with a new one. Because the tyres lose their friction.
  - (iii) Friction can also produce heat. Vigorously rub your palms together for a few minutes.
  - (iv) Writing with a pen is possible because paper provides friction to the tip of a pen.

5. When an object moves through a fluid (air or water), it has to overcome the friction acting on it. In this process, it losses energy. That is why, objects having streamlined shape, experience lesser friction. Automobiles are designed narrow from front. So as to reduce friction of the air. The streamlined body of fish enables it to move easily in water by minimising fluid friction. Aeroplanes, rockets and missiles are made into streamlined shapes to enable them to move in air easily.
6. A fluid friction is a resistance offered by a fluid against its flow. When an object moves through a fluid (air or water), it has to overcome the friction acting on it. In this process, it losses energy. Hence, object moving fluids must have special shapes. These shapes are called streamlined shapes.



### Learn by Doing

#### CROSSWORD PUZZLE





# Sounds



## A. Tick (3) the correct option.

1. (d)    2. (a)    3. (a)    4. (a)    5. (d)    6. (d)    7. (b)

## B. Fill in the blanks with correct words.

1. vibration    2. hertz    3. neck    4. stirrup  
5. Noise    6. medium    7. music

## C. Match the following.

1. c    2. a    3. d    4. e    5. b

## D. Short Answer Type Questions.

1. Sound is produced due to vibrations. The rapid back and forth movement of body about its mean position is called vibration. If you play a radio very loud and place your palm against its speaker, you will feel its vibrations. If you tightly stretch a rubber band and pluck it, it vibrates and produces a sound. You must have heard the sound of a mosquito. It flap its wings so many times in a sound that you are able to hear the sound its flap.
2. The time taken by the wave to transverse one wavelength is called its time period. It is denoted by the symbol T and is measured in second (s).
3. Any sound that is pleasing to the ears is called music. Any sound that is not pleasing to the ears is called noise.
4. (a) **Frequency** : The number of oscillations completed by medium particles in one second is called the frequency of a wave.

**Frequency = Number of oscillations/Time period**

It is denoted by the symbol f and is measured in hertz (Hz).

**Amplitude** : The maximum displacement of medium particle on either side of their respective mean position is known as amplitude of the wave.

- (b) The sounds of frequencies below 20 Hz are called infrasonic sounds or infrasonics and the sounds of frequencies above 20,000 Hz are called ultrasonic sounds or ultrasonics.
5. The time taken by the wave to transverse one wavelength is called its time period. It is denoted by the symbol T and is measured in second (s).
6. Road traffic, air and rail traffic, noise from construction sites and industries, domestic noise like TV, kitchen appliances and many others.

7. **Percussion** : A percussion type of musical instrument is played by striking. Examples are the tabla, the drum and the tambourine and the dholak.

**Wind Instruments** : The flute or bansuri, clarinet and saxophone are some examples of wind instruments. They all have a tubular structure. The air column within the tube of the instrument is made to vibrate by blowing in. This produces sound. There are holes along the side of the tube.

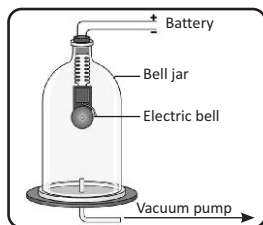
**String Instruments** : Violin, sitar, guitar, sarangi, tanpura, etc., are some stringed instruments. String instruments produce sound through vibrating strings. These strings transfer the vibrations to the air. The strings are stretched across a hollow box. When the strings are made to vibrate the air inside the box is also set to vibrate and produce sound.

#### E. Long Answer Type Questions.

1. **Aim** : Sound cannot travel in vacuum, it requires a medium to travel.

**Method** :

- Take a bell jar connected with a vacuum pump and place a small electric bell in it.
- Connect the electric bell with a battery and close the circuit by switching on the current.
- Now close the jar. You will be able to hear the sound produced by the electric bell.
- Next pump out the air from the bell jar using a vacuum pump.



**Observation** :

You will notice that the sound of the electric bell gets feeble and finally disappears as more and more air is removed from the bell jar. This proves that sound cannot travel through vacuum.

2. A human ear consists of three parts.

**Outer Ear** : The outer ear consists of the pinna and the cavity called auditory canal through which air vibrations travel to reach the tightly stretched membrane called the eardrum. These vibrations cause the eardrum to vibrate. The vibrations are then passed to the middle ear.

**Middle Ear** : The middle ear consists of the eardrum and the three bones the hammer, anvil and stirrup attached to it. These bones transmit the vibrations to the inner ear.

**Inner Ear** : The inner ear consists of the three semicircular canals and the cochlea. The cochlea is a coiled tube and is the real organ of hearing. Coiling down the middle of its whole length is the basilar membrane, which has a large number of hair cells cross its width. These cells are

connected with nerves to the brain. They transmit the vibrations as nerve impulses to the brain. The brain interprets the nerve impulses and produces the sensations, which we call sound.

Human ear is a sense organ which detects the presence of sound. It acts as a receiver of sound.

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Human ear is a sense organ which detects the presence of sound. It acts as a receiver of sound.

4. • Noise pollution directly affects the mind. People take longer time to concentrate in the environment having lots of noise.
- Prolonged exposure to high level noise can-load to temporary or permanent loss of hearing.
- It can cause nervous tension, headache, high blood pressure, irritation.
5. When an object vibrates back and forth in air, the molecules of air in contact with the object begin to vibrate. These air molecules transfer their motion to the next layer close to them due to which they also start vibrating back and forth. A chain reaction initiates which is called sound wave. Sound waves travel in all directions from the body that produces sound.

Sound needs a medium to propagate from a source to a listener. When we hit the drum, membrane of the drum vibrates producing sounds. Sound can travel through solids, liquids and gases, but it cannot travel in vacuum.

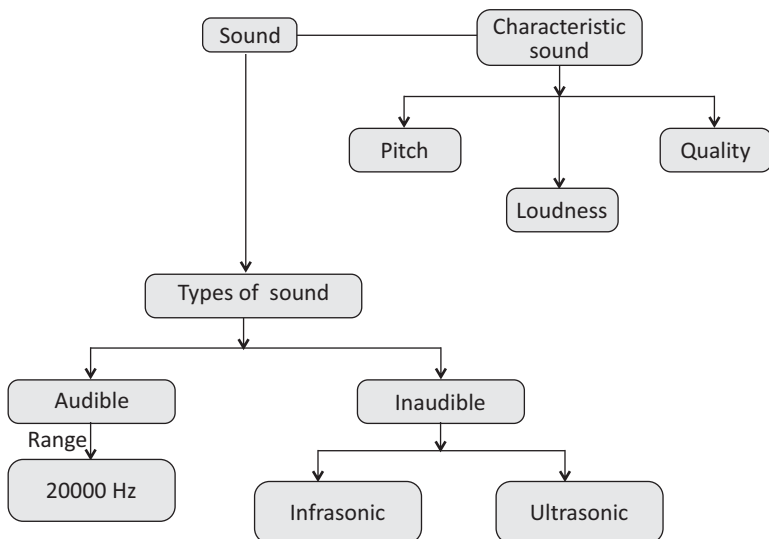
6. • Factories and airports should be made away from the residential areas to reduce the noise created by aeroplanes and machines in the factories.

- Automobiles should be fitted with silencers.
- People should avoid blowing horns of vehicles unnecessarily.
- Workers in noisy factories should wear ear plugs.
- Television, radio, music system should be played at a low volume.
- Trees should be planted along roads and buildings. This will help in reduction of noise pollution because sound waves are absorbed by the trees or they act as a barrier for sound waves. You must have seen stones lying on the railway tracks. They actually absorb sound and help in reducing noise created due to the movement of trains.



### Learn by Doing

### MIND MAP





# Chemical Effects of Electric Current



## A. Tick (3) the correct option.

1. (c)    2. (a)    3. (b)    4. (b)    5. (b)    6. (d)    7. (b)

## B. Fill in the blanks with correct words.

1. good                      2. positive                      3. Electrolysis                      4. zinc  
5. negative                      6. anions                      7. electrolysis                      8. Zinc

## C. Match the following.

1. e                      2. c                      3. f                      4. a                      5. d                      6. b

## D. Short Answer Type Questions.

1. The liquid which conducts electricity and undergoes decomposition is called an electrolyte.
2. Materials that allow electricity to flow through them easily are called conductors, while materials that do not allow electricity to flow through them are called insulators. Rubber, plastic, wood are examples of insulators. Most of the metals like iron and aluminium are good conductors of electricity.
3. The process of deposition a thin layer of a metal on any conducting substance by the process of electrolysis is known as electroplating.
4.
  - Chromium is plated on car and cycle parts, taps, kitchen gas burners, bicycle handle bars, wheel rims and many other things. It gives a shiny looks to the objects.
  - Iron vessels and containers used for storing food have to be plated with tin. Tin is less reactive with food and it does not rust, so food is protected from getting spoilt.
  - Jewellers electroplate gold and silver over inexpensive metals like iron and copper and make ornaments look precious at a lower cost sometimes gold is also plated over silver.
  - Zinc is coated on iron to avoid corrosion, in car parts as well as a construction of bridges.
  - Gold plating is done on electronic parts to reduce contact resistance. (If you open the CPU of your computer you may see this).
5. Tap water consists of ions of dissolved salts and minerals, so when electricity passes through the tap water, it conducts. Distilled water is pure water as it has very few ions. Due to lack of ions, distilled water

cannot conduct electricity.

6. LED (Light Emitting Diode) can be used in place of a bulb to detect weak currents flowing through the circuit. LED has two wires called lead. One lead is slightly longer and is always connected to the positive terminal of the battery. The shorter lead is connected to the negative terminal of the battery.
7.
  - Purification of metals
  - Extraction of metals
  - Electroplating
8. **Liquid Conductor** : Lemon juice, vinegar , salt solution, sea water rain water.

**Non-liquid Conductor** : Milk, distilled water.

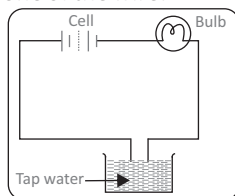
### E. Long Answer Type Questions.

1. (a) An ion is an atom or a molecule with an electric charge created by losing or gaining one or more electrons.  
(b) The liquid which conducts electricity and undergoes decomposition is called an electrolyte.  
(c) It is a process of refining a metal by the process of electrolysis.
2. We should not handle electrical appliances with wet hand's because water is a good conductor of electricity and one might get electric shock.
3. Impurities in water contains ions. Impurities dissolved in water increases its conductivity because the electric current is transported by the ions increases.
4. The process of decomposition of electrolyte solution into ions on passing current through it is called electrolysis. Electrolysis is carried out in an apparatus called voltmeters or electrolytic cell. It consists of a glass vessel containing an electrolyte and two metal plates called electrodes connected to a battery. The electrode connected to the positive terminal of the battery is called anode and the one connected to the negative terminal is called cathode.
5. **Aim** : To test the electrical conductivity of tap water.

**Materials Required** : A cell, a bulb, tap water and three wires

**Method** :

- (i) Join the positive end of cell with the bulb using one of the wire.
- (ii) Then connect the negative end of cell with another wire whose other end is free.
- (iii) Similarly connect the other end of the bulb with the third wire and let the other end be free. Now your tester is ready.





(iv) Test the tester by joining its end to each other.

### Observations :

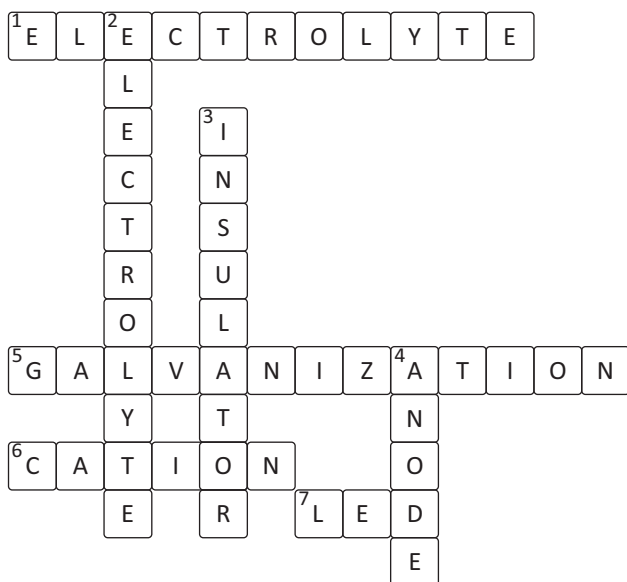
If bulb glows, it is working. Now, take tap water in a beaker and dip the free ends of the tester into tap water. You will see that bulb of the tester glows. It shows that tap water conducts electricity.

6. • Chromium is plated on car and cycle parts, taps, kitchen gas burners, bicycle handle bars, wheel rims and many other things. It gives a shiny looks to the objects.
- Iron vessels and containers used for storing food have to be plated with tin. Tin is less reactive with food and it does not rust, so food is protected from getting spoilt.
- Jewellers electroplate gold and silver over inexpensive metals like iron and copper and make ornaments look precious at a lower cost sometimes gold is also plated over silver.
- Zinc is coated on iron to avoid corrosion, in car parts as well as a construction of bridges.
- Gold plating is done on electronic parts to reduce contact resistance. (If you open the CPU of your computer you may see this).



### Learn by Doing

#### CROSSWORD PUZZLE





## Some Natural Phenomena



### A. Tick (3) the correct option.

- |        |        |        |        |        |
|--------|--------|--------|--------|--------|
| 1. (a) | 2. (d) | 3. (b) | 4. (a) | 5. (a) |
| 6. (d) | 7. (a) | 8. (s) |        |        |

### B. Fill in the blanks with correct words.

- |                    |                |                        |
|--------------------|----------------|------------------------|
| 1. opposite, equal | 2. seismograph | 3. lightning conductor |
| 4. attract         | 5. crust       | 6. Earthquake          |
| 7. seismologist    |                |                        |

### C. Short Answer Type Questions.

- (a) The streak of bright light produced when negative charges meet the positive charges called lighting.

(b) Earthquakes are sudden shaking and vibration at the surface of the earth.

(c) The process of transfer of charges from a charged body to the earth is called earthing or grounding.

(d) Earth's lithosphere is not in one piece. It is divided into many fragments (pieces) called tectonic plates.

(e) The location directly above it on the earth's surface is called epicentre.
- Earthquakes generate seismic waves, which can be recorded on seismograph.
- Crust, Mantle and core the crust and the upper layer of the mantle together form the lithosphere.
- During an earthquake remember three things drop, cover and hold on.
  - Drop under something sturdy, like a large table and hold on.
  - Protect your eyes by covering your face against your arms.
  - If you are in bed, hold and stay there, covering your head with a pillow.
- The scale which is used to measure the magnitude of an earthquake. is called the Richter scale.
- In India, the Himalayan region is a place high in earthquake activity. Other high earthquake prone areas are the North-East, Rajasthan, Kachchh in Gujarat, parts of central India and some parts of South India.

7. On the principle of induction the gold leaf electroscope works.
8. To protect high storey from damage of lighting, a tall metal rod is fixed on them. This is called a lightning conductor.

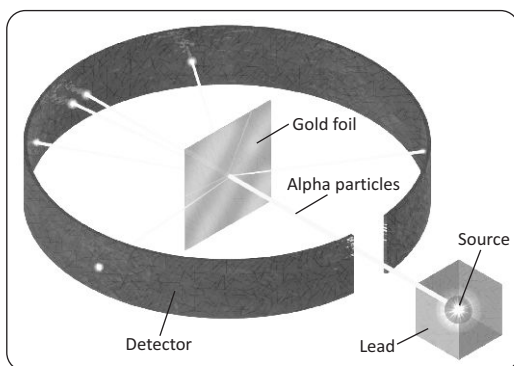
### C. Short Answer Type Questions.

1. The temperature of the core is very high while the temperature of the crust is just about 300 C. So there is a constant flow of heat from the core to the crust. This sets a convection current in the molten magma. Due to this a pressure is developed in the magma. This pressure can cause movements in plates and the plates keep moving around slowly and continuously. The plates squeeze or stretch or suddenly slip past one another or get crushed or fractured.

Due to movement of these plates forces are induced on themselves and released and it moves through the earth in the form of waves. On the surface of the earth, we feel it as a tremor. We call this an earthquake.

2.
  - No open place is safe during lightning or thunderstorm.
  - Rush to a safer place like a house or a building on hearing thunder.
  - If you are travelling by car or by bus, you are safe inside, with windows and doors of the vehicle shut.
3. **Aim :** To show transfer of charge from a charged body to an uncharged body using a gold leaf electroscope.

**Method :** Take a gold leaf electroscope. Take a glass rod or plastic scale and rub it with a silk cloth, so that it gets positively charged. Bring the charged glass rod or plastic scale near the brass disc of the electroscope and touch it. You will observe that the gold leaves inside the electroscope diverge. This happens because on touching the charged rod with the brass disc the charge flows from the rod to the gold leaves along the brass rod. Since both the gold leaves carry the same charges, they repel, thus diverge.



The gold leaf expand experiment.

Next touch the brass disc with your hand, the gold leaves collapse and come back to their original position. This happens because the gold leaves lose charge to the earth through your body (as the human body is a good conductor).

4. A gold device called electroscope is used to detect and measure charge and is based on the above principle. It consists of a brass rod fitted in a glass jar through a rubber stopper. A brass disc is present at the top of the brass rod. The lower end of the brass rod that lies inside the beaker has two thin gold leaves hanging parallel to each other. The lower inner sides of the glass jar has metal foil, which increases the sensitivity of the electroscope.
5. An electrically neutral object can be charged in three ways –  
(i) by friction                      (ii) by conduction                      (iii) by induction

**Charging by Friction:** A body can be charged by rubbing with the other body. Take a plastic scale or a comb and rub it against your dry hair 8-10 times. Keep small pieces of paper on a table. Bring the freshly rubbed comb near the pieces of paper. You will see that the pieces of paper get attracted to the comb. It happens because the comb gets charged.

**Charging by Conduction :** A body can also be charged by conduction. If a charged object is touched to an uncharged object, the electric charge flows from the charged object to the uncharged object. By this, the object attains the same charge as the charged body. This method of charging a body is called charging by conduction.

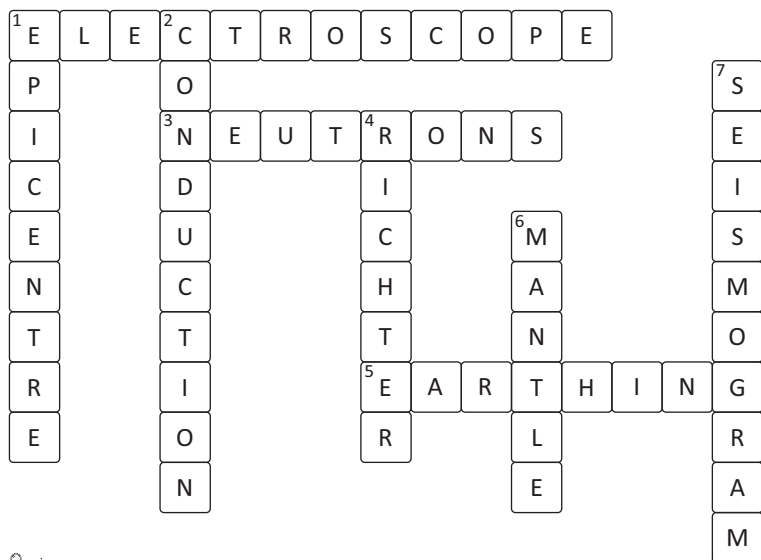
**Charging by Induction :** Induction is another method of charging a body. If a charged object is brought close to an uncharged object (but does not touch it), the charged body induces the opposite charge on the uncharged body. Thus, method of charge transfer is called induction.

6. when two clouds are different heights having enormous amount of positive and negative charges approaches each other, the air becomes a good conductor of electricity and this phenomena is called electric discharge. Electrons from a negatively charged clouds push their way through air to reach a positively charged cloud at different heights. As a result, air gets white hot and a yellowish white streak of light is formed, this is called lightning.
7. A seismograph consists of a spring and a weight hanging from a frame that is placed along the earth's surface. As the ground vibrates, the vibrations are transferred to the frame to the weight through the spring. This movement is transferred to a recording drum which rotates and on which a pen attached from the height marks the movement. A plot of the motion of the ground is obtained which is called a seismograph.



## Learn by Doing

### CROSSWORD PUZZLE



## Light



### EXERCISES

#### A. Tick (3) the correct option.

1. (a)    2. (a)    3. (a)    4. (b)    5. (c)    6. (c)    7. (c)

#### B. Fill in the blanks with correct words.

1. concave                      2. newton                      3. seven  
4. lens                          5. Cornea                      6. Far

#### C. Short Answer Type Questions.

1. The bouncing back of light from the surface of an object is called reflection of light.

The two laws of reflection as given below :

**Law I :** The incident ray, the reflected ray and the normal to the reflecting surface lie in the same plane.

**Law II :** The angle of incidence is equal to the angle of reflection.

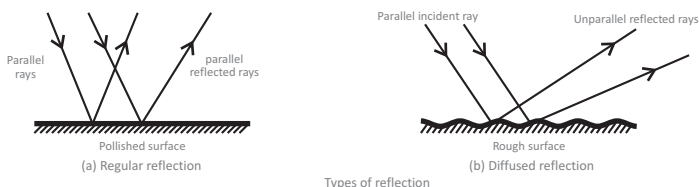
#### 2. Regular Reflection

- It is called specular reflection.

- It is the reflection from polished surfaces.
- Reflected rays are parallel to each other.
- It can be seen in a plane mirror, unused stainless steel plate, water, etc.

### Diffuse Reflection

- It is also called irregular reflection.
- It is the reflection from rough or irregular surfaces.
- Reflected rays move in various directions.
- The image is diffused or irregular.
- It can be seen in scratched mirrors, rippling water, etc.



3. The plane mirror is used in barber's shop.
4. If two plane mirrors are inclined at an angle  $\theta$ , then the number of images formed by them is given by a formula.

$$\text{Number of images formed} = \frac{360^\circ}{\theta} - 1$$

5. **Blind Spot** : It is an area on the retina that does not have light sensitive receptors. No vision is possible at this spot.
6. Blind spot is present at the junction of the optic nerve and the retina.
7. Some people can see only near objects clearly but cannot see distant objects clearly. This defect is called short sightedness or myopia. In such a defective eye, the image of a distant object is formed in front of the retina and not on the retina itself.
8. (i) Include foods rich in vitamin A. Such as raw carrots, broccoli, green vegetables, cod liver oil egg, milk, curd, yellow fruits like papaya, etc., in your diet which are good for eyes.  
 (ii) Eyes can become dry. When working on a computer or watching television for too long. You must blink often to keep the eyes moist.  
 (iii) Always try to read from a normal distance of vision. If you have difficulty in reading a book or writing on blackboards, get your eyes checked by an eye specialist or a doctor immediately. If eye specialist advises, use suitable spectacles.  
 (iv) Wash your eyes at least two times a day with clean water. Never rub your eyes. If particle of dust gets into your eyes, wash them with clean water. Consult a doctor if there is no improvement.

9. (i) The image is formed behind the mirror.
- (ii) It is a virtual image which cannot be taken on the screen.

#### D. Long Answer Type Questions.

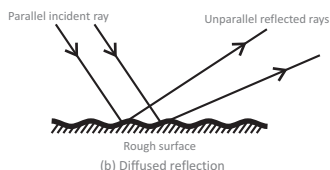
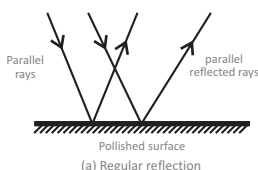
1. We can categories reflection into two types.

##### Regular Reflection

- It is called specular reflection.
- It is the reflection from polished surfaces.
- Reflected rays are parallel to each other.
- It can be seen in a plane mirror, unused stainless steel plate, water, etc.

##### Diffuse Reflection

- It is also called irregular reflection.
- It is the reflection from rough or irregular surfaces.
- Reflected rays move in various directions.
- The image is diffused or irregular.
- It can be seen in scratched mirrors, rippling water, etc.



Types of reflection

2. The eye consist of an eyeball that is nearly spherical in shape. The eyeball is kept firm by the presence of a jelly like substance called the aqueous humour in front of the lens and vitrous humour behind the lens. Eyes help us to see things around us. The eyelids protect the eyes from injury and shut out light when not required. Let's study about the different parts of an eye.

**Sclera** : It is the outer most covering of the eye that is made of white fibrous tissues. It protects the internal parts of the eye.

**Cornea** : The sclera continues in the front of the eye as cornea, which is the transparent portion of the eye. It protects the eyes and also helps in focussing light.

**Iris** : The coloured part of the eye behind the cornea is called iris. It regulates the amount of light entering the eye by adjusting the size of the pupil. Pupil is tiny hole in the centre of the iris.

In dim light, the iris makes the pupil enlarge to allow more light to enter the eye. In bright light, the iris makes the pupil contract, to reduce the amount of light entering the eye.

**Lens** : A transparent double convex lens lies behind the iris. It is held in position by the ciliary muscles which can change the thickness of the lens and hence its focal length. The lens focuses light to form an image on the retina. When ciliary muscles relax, the lens become flatter and thinner for distance vision and when they contract the lens becomes rounder and thicker so that eyes can focus on nearby objects.

**Retina** : It is a delicate membrane just behind the eye ball. It acts as a screen as which the image is formed. It has light sensitive receptors called rods and cones. Cones are sensitive to colour. While rods are sensitive to the intensity of light.

**Optic Nerve** : It is a bundle of the nerves that connect the rods and comes of the retina to the brain. They carry optical messages in the form of electrical signals to the brain.

**Blind Spot** : It is an area on the retina that does not have light sensitive receptors. As blind spot is present at the junction of the optic nerve and the retina, where there are no rods or comes, so no vision is possible at this spot.

3. Ciliary muscles control the lens and help us to see both near and far objects clearly. When the eye focuses on distant objects the ciliary muscles relax, thus reducing the thickness of the lens. When the eye focuses an object close to us, the ciliary muscles contract, thus making the lens thicker and reducing its focal length.

The ability of the eye to adjust the focal length of the lens so as to see the objects clearly is called power of accommodation.

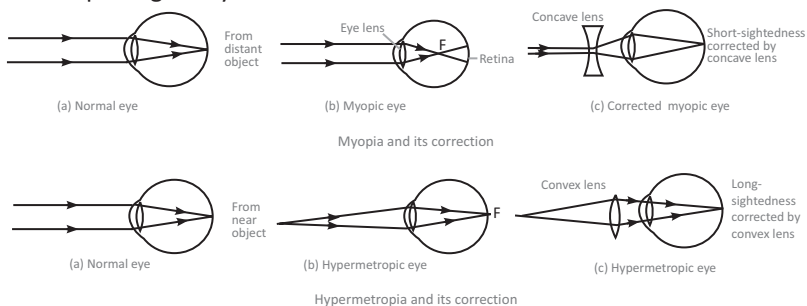
4. **Short-sightedness or Myopia** : Some people can see only near objects clearly but cannot see distant objects clearly. This defect is called short sightedness or myopia. In such a defective eye, the image of a distant object is formed in front of the retina and not on the retina itself. It can be corrected by wearing spectacles with concave lens of appropriate focal length. A concave lens of appropriate power or focal length can bring the image of the object back on the retina itself.

**Long-sightedness or Hypermetropia** : Some people can see only distant objects clearly but cannot see nearby objects clearly. This defect of vision is called long sightedness or hypermetropia. In this case, the image is formed behind the retina. This defect can be corrected by wearing spectacles with convex lens of appropriate focal length. Eyeglasses with converging lenses supply the additional focusing power required for forming the image on the retina.

**Cataract** : Till a person is around the age of 45 years, the shape of the lens can be changed. This allows the lens to focus on an object, whether it is close or far away. With the increasing age, proteins in the lens begin to



break down and the lens becomes cloudy. What the eye sees may appear blurred. This condition is known as cataract. Old people often suffer from blurred vision. Cataract can be treated surgically or through laser by replacing the eye lens with a new artificial lens.



5. This phenomenon of splitting of white light into its component colours is called dispersion of light. The white light disperses into a spectrum of seven colours in the order violet, indigo, blue, green, yellow, orange and red (VIBGYOR). a prism can split white light

#### 6. Uses of convex lens.

- (i) It is used to correct hypermetropia or long-sightedness.
- (ii) It is used in camera because it focuses light and produces a clear and crisp image.
- (iii) It is used in microscopes.

#### Used of concave lens

- (i) It is used to correct myopia or short-sightedness.
- (ii) It is used in camera to focus on a single object.
- (iii) It is used in flashlights to widen the beam produced by the bulb.



### Learn by Doing

#### MIND MAP

