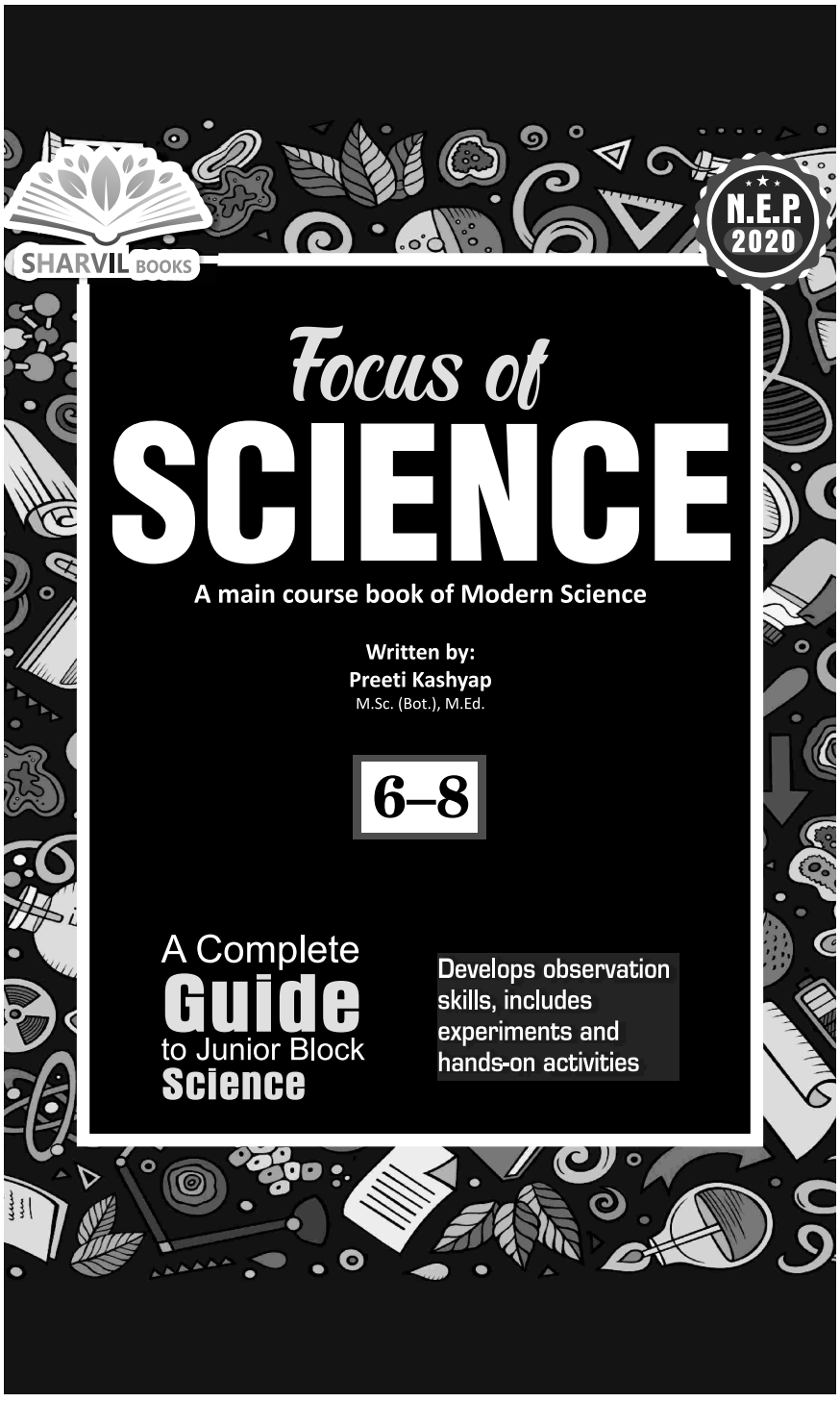
SHARVIL BOOKS
N.E.P. 2020
Focus of
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A main course book of Modern Science
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6–8
A Complete
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Science
Develops observation skills, includes experiments and hands-on activities

Contents

1 Food–Where Does It Come From?

EXERCISE

A. Tick (✓) the correct answer :

Ans. 1. a. ingredients 2. a. Gram
3. b. Wheat 4. d. Onion

B. Fill in the blanks :

Ans. 1. Food protects the body from various **diseases**.
2. Food habits of people depend on the **food production** and **supply**.
3. **Cereals** are rich sources of carbohydrates.
4. Vegetables are rich sources of **vitamins, minerals** and **roughage**.
5. **Poultry products** is a major source of food rich in animal proteins.

C. State true or false :

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

D. Match the statements in Column A with those in Column B :

	Column A	Column B
Ans. 1.	Spinach, radish, carrot, tomato	**d. All are vegetables**
2.	Milk, curd, ghee, paneer	**a. All are animal products**
3.	Honey	**e. Apiary**
4.	Pulses, rice, milk, chapati, vegetables and fruits	**b. A complete diet**
5.	Vulture, jackal, hyena	**c. Scavengers**

E. Very Short Answer Questions :

Ans. 1. Any edible substance, which one eats and which provides material or materials useful for the body of a living being, can be termed as food.
2. Omnivores are these animals who eat both plants and animals as their food.
3. Ingredients used for making *idli* are rice, dal batter and salt.
4. Cooking makes food items soft and easily digestible.
5. Tea and coffee are common beverages.

F. Short Answer Questions :

Ans. 1. We need nutrients because they help us in maintaining good health.
2. People do not eat same type of food because they have different food habits which depend on climate, culture and availability of food.
3. Fruits have high water content, low food value, but are rich in minerals and vitamins. In common usage, the term 'fruit' is used for those which are usually eaten without cooking.
4. The major spices produced are pepper (*kali mirch*), cardamon (*ilaichi*), ginger (*adrak*), turmeric (*haldi*) and chillies (*mirch*).
Other important spices are cloves (*laung*), saffron (*kesar*), fennel (*saunf*), cumin (*jeera*), coriander (*dhania*), asafoetida (*heeng*), fenugreek (*methi*), nutmeg (*jaiphal*) and thyme (*ajwain*).

5. In India, fish are found both in fresh water (ponds, lakes and rivers) and sea water.
   Fresh Water Fishes : Catla, Labeo, Cirrhina, Barbus, Mystus, Clarius.
   Sea Water Fishes : Hilsa, cat fish, sardines, ribbon fish, red mullet, pomfret, bombay duck.
6. Herbivores are those animals who eat only plants or plant products. Cow, buffalo, horse are herbivores.
   Carnivores are those animals who eat other animals. Lion, tiger are carnivores.

G. Long Answer Questions :

Ans. 1. Food is essential for living beings as it
- provides the energy necessary to carry out various life activities.
- helps in the growth and repair or replacement of worn-out cells.
- protects the body from various diseases and keeps it fit.

2. Based on their sources food items can be classified in the following two categories :
   (i) **Food from plants :** Foods obtained from plants are of different types– cereals, pulses, vegetables, fruits, oils, sugar, tea, coffee and spices.
   - Cereals are the most important sources of food for man and animals. They are rich sources of carbohydrates. Three most important cereals are wheat, rice and maize.
   - Pulses or legumes (commonly called 'dals') are rich in proteins and are obtained from seeds of leguminous plants. Common pulses include pea, bean, groundnut, soyabean and gram.
   - Vegetables are rich sources of vitamins, minerals and roughage.
   - In fruits water content is high (70 to 90 per cent) and their food value is low. Common fruits are banana, mango, apple, grapes, pineapple, guava, orange, litchi, and so on.
   - Chief sugar producing plants are sugarcane and sugarbeet.
   - Tea and coffee are common beverages. Tea is obtained from leaves, while coffee is obtained from seeds.
   - Oils are used for cooking food. Major oil yielding plants are cotton, groundnut, mustard, coconut, soyabean and sunflower.

   (ii) **Food from animals :** Animals provide us food in the form of milk, meat, fish, eggs and honey. There are different categories of food giving animals.
   - Milk-yielding animals : Cow and buffalo.
   - Meat-yielding animals : Sheep and goat.
   - Fish : Fish is a major source of food rich in animal proteins. Fish proteins have high digestibility and growth-promoting value. Also, cod and shark liver oils are rich in vitamin D.
   - Honey bees : The insects which provide us honey are known as honey bees. The honey bees collect nectar (sweet juice) from flowers, convert it into honey and store it in their nest.

3. The seeds we use as spices are cardamom, cumin, coriander, nutmeg and mace, mustard seeds, clove, cassia spice and black pepper. They are used for adding flavour to food.

4. Animals, on the basis of their food habits, are of three types :
   (i) Animals eating plants and plant productsthese are called herbivores. Animals like the cow, deer, sheep and elephant eat plants and are, therefore called herbivores.
   (ii) Animals eating other animals such as lion and tiger are called carnivores.
   (iii) Animals eating both plants and animals are called omnivores. Humans, crow, squirrels and cockroaches are such animals.
5. In our country, people of different states have different food habits. Food habits are affected by food production and supply. For example, rice is the common food in South India, while wheat is commonly eaten in the North.
   Let us know the food habits of people in different Indian states.

(i) Andhra Pradesh : Rice, dry vegetable preparation, arhar dal, upma, dosa, rasam, curd, pickle, etc.
(ii) Bihar : Rice, chapati, sattu (flour of roasted gram), dal, baingan ka bharta (brinjal preparation), bachka (thin slices of vegetables coated with besan), bhujiya (of potato and onion), pappad, chatni, etc.
(iii) Gujarat : Chapati, rice, dal, vegetable preparation, lassi (buttermilk), thepla (fried chapatis made of wheat flour), dhokla, khandvi, etc.
(iv) Punjab : Roti, parantha, missi roti, butter, lassi (buttermilk), pulses, curd, sarson ka saag, chole, gajar ka halwa, dahi bhalla, etc.
(v) Rajasthan : Bajra, dalia, roti, dal, kachori, sev (a besan preparation), rabri, vadi (moong dal preparation), dal-bati.
(vi) Tamil Nadu : Idli, dosa, rice, sambhar, banana chips, etc.

H. HOTS Questions :

Ans. 1. If we do not eat food for a long time our body will feel starve and many of our body functions will get slow. There will a lack of energy in the body and we will not be able to do most of our works.
2. Fish is called a healthy source of food because it provides a range of health benefit. It is lower in fat than any other source of animal protein and are high in the good fats. Since the human body can't make significant amounts of essential nutrients, fish are an important part of the diet.

2 Components of Food

EXERCISE

A. Tick (✓) the correct answer :

Ans. 1. c. calcium 2. d. vitamin C 3. c. amino acids
4. d. iodine

B. Fill in the blanks :

Ans. 1. **Carbohydrates**, **fats** and **proteins** make up the bulk of our food.
2. Foods containing **carbohydrates** and **fats** are called energy-giving foods.
3. **Rickets** is a disease caused by the deficiency of vitamin D.

4. **Water** makes up 70% of the human body weight.
5. Vegetarians that do not eat any animal products are called **vegans.**

C. State True or False :

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

D. Very short Answer Questions :

Ans. 1. Roughage is the dietary fibre present in the food.
2. Water helps in transporting food materials, gases, waste materials, chemicals (enzymes and hormones) from one part of the body to the other.
3. Vitamins are organic substances that protect the body from diseases while minerals are metallic substances which are very important for normal and healthy functioning of our body.

E. Short Answer questions :

Ans. 1. A balanced diet is the diet which contains all the nutrients our body required and that too in required quantities. In other words, it is a diet which contains a proper amount of each nutrient. A balanced diet keeps us healthy and protect our body from diseases.
2. Protein-rich foods are useful for our body because proteins are nutrients that help in the growth of the body. They help in the formation of new cells. The new cells thus formed also replace the dead or worn out cells. Eggs and soyabeans are rich in proteins.
3. A balanced diet for one person is not necessarily the right diet for another because one person's body doesn't process food the same way that another person's does. There are genetic factors, health factors that can effect this.

F. Long Answer Questions :

Ans. 1. We all know that water makes up 70% of the human body weight. Even vegetables and fruits are rich in water. Water is one important component of food that is needed in large quantity.
   - Water helps in transporting food materials, gases, waste materials, chemicals (enzymes and hormones) from one part of the body to the other.
   - It is a medium in which a number of chemical reactions take place in the body.
   - It helps in the removal of waste (sweat and urine) from the body.
   - It assists in keeping our body temperature constant.
   - If the right amount of water is not consumed, a person can get dehydrated.
   - If water in our body is deficient, blood moves very slowly causing severe pains and cramps in muscles.
2. Carbohydrates are obtained from fruits such as grapes (glucose), milk (lactose), sugar cane or beetroot (sucrose). The sugar that our body uses most is glucose.

   Complex carbohydrates are insoluble compounds such as starch. These are found in wheat, maize, millets, potatoes, etc. Carbohydrates found

in our food are mainly in the form of starch and sugars.

3.

Vitamins: Their Sources, uses and Deficiency Diseases

Vitamin	Sources	Uses	Deficiency Diseases
Vitamin A	Milk, butter, eggs, cod liver oil, tomatoes, green leafy vegetables.	Keeps the eyes and skin healthy.	Night blindness
Vitamin B_1	Seafood, milk, meat, pea, cereals, liver, fish.	Normal growth and development, healthy skin growth, healthy nervous and digestive system.	Beri-beri
Vitamin C	Tomatoes, green leafy vegetables, citrus fruits, amla.	Healthy teeth and gums.	Scurvy
Vitamin D	Milk, butter green vegetables, cod liver oil, sunlight.	Helps in the formation of teeth and bones and keeps them healthy.	Rickets

G. HOTS Questions :

Ans. 1. A teenager need more food than a baby because teenager is growing at that age and his/her body is bigger than a baby which requires more diet than what a baby needs.

2. To loose weight, the overweight person should switch over to the foods that are less in fat and carbohydrate. Other than that, he should indulge himself in physical works.

THINGS TO DO

Do it yourself.

EXERCISE

A. Tick (✓) the correct answer :

Ans. 1. a. Silk 2. a. Cotton
3. d. rolling 4. d. Leather

B. Fill in the blanks :

Ans. 1. **Fabric** is the material that we use for clothing.
2. The cotton plant grows best in the black soil of the **Deccan plateau.**
3. **Guncotton** is an explosive made from cotton.
4. Silk is obtained from the **cocoon** of the **silkworm.**
5. Nylon is also known as **polyamide.**

C. Match the following :

Ans.

1. Cotton, wool, silk, nylon	(a) Soaking in water for a few days
2. Lint	(b) Removal of fleece
3. Retting	(c) Common fabrics
4. Shearing	(d) Also known as polyamide
5. Nylon	(e) Deseeded cotton

D. Very Short Answer Questions :

Ans. 1. Cotton, wool and silk.
2. Summer clothing.
3. Removal of fleece from a sheep's body is called shearing.

E. Short Answer Questions :

Ans. 1. The uses of cotton beseles making cloth are :
- Some kinds of paper and cellophane are also made from cotton.
- It is also used for making an explosive, called guncotton.
- Ginned cotton is used for filling mattresses, pillows, quits and cushions.
- Properly cleaned and sterilised (i.e., treated so as to kill all germs) cotton is used in homes and hospitals to absorb blood and pus from cuts and wounds.
- Cotton clothes and fibres are also used in household mops and for cleaning machine parts.
- The seeds of cotton are used for making cottonseed oil, which is an edible oil.

2. Silk is obtained from the cocoon of the silkworm. Silkworm is reared on mulberry leaves for the production of silk. A caterpillar hatches from the egg of a silkworm. As it matures, it spins a continuous thread up to 800 metres long to make a cocoon around itself. At this stage, silkworms are killed by dipping the cocoons in boiling water. This kills the insects and loosens the cocoon.
3. The optimum conditions for the growth of jute are alluvial soil, 34°C temperature and annual rainfall of 180 cm or more.
4. We wear clothes :
- To protect us from adverse environmental conditions.
- To protect us from injury.

- To retain our body heat.
- Clothes are one of our basic necessities.

F. Differentiate between each of the following :

Ans. 1. **Plant fibres :** The fibres which are obtained from plants are called plant fibres.
Animal fibre : The fibres which are obtained from animal sources are called animal fibres. For example, wool and silk.

2. **Ginning :** The process of removing seeds from the cotton fibre is called ginning.
Spinning : The conversion of fibres into yarn is called spinning.

3. **Warp :** The yarn is placed lengthwise on the frame of the loom. It is called warp.
Weft : The thread in the shuttle moves back and forth with the help of the machine and this is called weft.

G. Long Answer Questions :

Ans. 1. **Natural Fibres :** The fibres obtained from natural sources are called natural fibres. They are of two types :
(a) Fibres obtained from plants are called plant fibres, e.g., cotton and jute.
(b) Fibres obtained from animals are called animal fibres, for example, wool and silk.
Synthetic Fibres : Man-made fibres are called synthetic fibres. Some common synthetic fibres are rayon, nylon and polyester.

2. Jute is a natural fibre. It is a long, soft and shiny fibre. It is obtained from the stem of the jute plant called patsun. It is one of the cheapest fibre. It has long, shiny and soft fibres. It is biodegradable, durable and strong. Due to all these properties ropes and bags are made from jute.

3. The people (of ancient India or world whether men or women) had no idea about clothes. They used to live in tropical regions of world where clothing was not required. (These people started to wear bark, leaves or animal skin to keep themselves warm. In colder regions, fur of animals were used to keep themselves warm.) But after the invention of fire, people could fight against cold conditions. Hence, they began to move towards colder regions and build up their civilisations in those parts.
With the development of agricultrue, people could twist the stem of plants into mats and baskets. They could spin thread out of wool and similarly cotton and flax were grown in the valleys of Ganga, Brahmaputra and Nile. People started covering only certain parts of body according to their requirement. With the invention of sewing needle about 40,000-50,000 years ago, people started cutting and stitching clothes into different shapes and designs. They started experimenting different techniques to drape various fabrics around them.

H. HOTS Questions :

Ans. 1. Wool, silk, cotton and jute are called natural fibres because these are obtained from the natural things.

2. We need to wear clothes because clothes protect us from the different types of weather, animals and insects.

THINGS TO DO

Do it yourself.

4 Sorting Out Materials and Objects

EXERCISE

A. Tick (✓) the correct answer :

Ans. 1. a. materials 2. a. Oil 3. c. Iron

B. Fill in the blanks :

Ans. 1. **Grouping** makes it easier for us to find things when we need them.
2. Things are grouped together for **convenience.**
3. Light does not pass at all through **opaque** materials.
4. A **pencil** floats on the surface of water.
5. Almost all **metals** are conductors of heat.

C. State True or False :

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

D. Very Short Answer Questions :

Ans. 1. Classification means grouping the things on the basis of their similarities and dissimilarities.
2. Floating and sinking of a body depends on its density.
3. Some materials are attracted to a magnet. Such materials are called magnetic materials.

E. Short Answer Questions :

Ans. 1. The materials that occur in nature of their own are called natural materials, e.g., trees, fruits, wool, etc.,
The materials which do not occur in nature but are produced or made by man are called man-made materials, e.g., soap, rayon, plastics, etc.
2. Trasparency is the quality of being early seen through.
3. Conduction of heat is a measure of how easily a substance allows heat to pass through it. We must have seen frying pans and pressure cookers with a wooden or plastic handle. These objects have wooden or plastic handles because they are bad conductors of heat and do not let heat pass through them.
4. (a) **Cotton :** towel, socks, shirt, saree, bed sheet.
(b) **Leather :** Bag, belt, shoes, purse, jacket.
(c) Paper : Paper bag, Envelope, books, newspaper, kite.
(d) **Plastic :** Computer mouse, Bottle, chair, bowl, button.
(e) **Metal :** Screws, jewellery, utensils, key, bicycle.
(f) **Wood :** table, chair, blackboad, toys, pencil.

F. Long Answer Questions :

Ans. 1. **Advantages of Classification**
- Classification of the objects helps in their identification.
- Classification helps in the sorting of the objects. Otherwise, things get mixed up.

- Classification helps in locating the things. It is only because of classification that you are able to locate a book (that you need) out of the thousands in your school library.
- Classification makes study of different objects easy and more meaningful rather than studying each object separately. We can study just one out of each class of different objects and generalise our results for the class as a whole.
- Classification helps to understand similarities and dissimilarities among the objects.

2. Some materials cannot be pressed with hands or scratched or cut easily. Such materials are hard. For example, wood, glass, a piece of stone, metal key and an iron nail are hard materials. In fact, most metals are hard.

   Materials, which can be compressed with hands or scratched or cut easily, are soft. For example, cotton and sponge are soft materials.

   A more hard substance can scratch or cut a less hard substance. Thus, diamond is used to cut glass. Hard substances (metals and stones) are used to make cutting tools.

3. **Transparent materials :** Materials through which you can see clearly. Light passes fully through these materials. For example, glass, water, air, some plastics and acrylic sheets.

   Translucent materials : Materials through which you can see only partially. Light passes only partially through these materials. For example, oily paper, thin muslin cloth, butter paper and frosted glass.

   Opaque materials : Materials through which you cannot see at all. Light does not pass at all through these materials. For example, wood, wall (made of concrete), metal sheet, notebook and paper.

4. To identify good and bad conductors of heat—

   Boil some water in a beaker. Keep a metal spoon and a wooden spoon in this water for about five minutes.

   Feel them after every minute. you will observe some difference when you touch them You will find that the metal spoon becomes hot, while the wooden spoon does not. This is because metal conducts heat from the water to your hand whereas wood does not. The substances that conduct heat are known as good conductors of heat.

   Metals such as copper, aluminium and iron are good conductors of heat.

   Non-metallic materials like plastic, wood, rubber, etc., are bad conductors of heat.

   Rise of mercury in a thermometer (due to heat) shows that mercury is a good conductor of heat. Water is a bad conductor of heat.

G. HOTS Questions :

Ans. 1. **Similarities between plants and animals :**

- Both plants and animals undergo cellular respiration in the mitochondria.
- Both require water to survive.
- Both pretty much contain the same cell organelles.

- Both have a vascular system.

Dissimilarities between plants and animals :

- Plants need CO_2, minerals, water and light to produce their own food whereas animals do not produce their food.
- Plants roughly have a greater surface area because they need sunlight whereas animals to retain water in their body to survive so surface area is much less to prevent more sweat.
- Plants usually excrete O_2 as waste whereas most animals excrete CO_2.
- Both can respond to invaders but plants do not have a complex immune system like animals do.
- Plants hold themselves up with their cell walls whereas animals are held together with skeletal structure or cartilage.

2. Wood has less density than water. Hence wood being lighter than water which makes it float.

THINGS TO DO

Do it yourself.

5 Separation of Mixtures

EXERCISE

A. Tick (✓) the correct answer :

Ans. 1. d. all of these 2. c. Sand and water
3. c. evaporation 4. b. hand-picking

B. Fill in the blanks :

Ans. 1. **Iron** and **silver** are pure substances.
2. A **mixture** may contain two or more substances in any ratio.
3. The process of threshing is usually followed by **farmers.**
4. **Residue** is the substance that remains in the filter.
5. Water is known as a **universal solvent.**

C. State True or False :

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

D. Very Short Answer Questions :

Ans. 1. When two or more pure substances are mixed together in such a way that each component retains its properties, we call it a mixture.
2. Evaporation.
3. The process in which water heats up and evaporate in the form of water vapours is known as evaporation.
4. Winnowing is used to separate heavier and lighter components of a mixture by wind or blowing air.

E. Short Answer Questions :

Ans. 1. To remove the undersirable or harmful components. For example, small pieces of stones and unwanted seed grains are removed from rice and pulses before cooking.

2. The process in which water heats up and evaporate in the form of water vapours is known as evaporation. The process of evaporation may be used to separate dissolved material from the solvent.
3. A solution in which no more solute can be dissolved at a given temperature is called a saturated solution.
4. Condensation is the process of changing of water vapours back into liquid water.

F. Define the following :

Ans. 1. The substance that settles at the bottom of a liquid is called a sediment.
2. The process of settling down of a solid at the bottom of a liquid is called sedimentation.
3. The pouring of liquid after settled down the solid material in a liquid is known as decantation.
4. Filtration is a method of separating insoluble solid components from a liquid by passing them through a filter paper.
5. Winnowing is a method of separating husk from grains using wind.
6. Solution is a mixture of solute and solvent.

G. Give reasons :

Ans. 1. A mixture of sugar and water cannot be separated by filtration because sugar is soluble in water.
2. Filtration is a better method of separating an insoluble solid component as compared to decantation because in filtration, we could really separate the liquid part from the solid parts, even how small they are. But with decantation some small solid parts are still suspended on our liquid solution, eventually when we start pouring, those solid parts will still mix with our separated liquid part. Thus we really didn't separate the solid from the liquid.
3. After harvesting the crop, the farmer cannot separate husk from grains by handpicking because the quantity of crop is very big and it is not possible to separate the very big amount by handpicking.
4. Water can dissolve many substances : solids, liquids and even gases. It is, therefore, known as a universal solvent.

H. Long Answer Questions :

Ans. 1. To distill water you will need a kettle, a metal plate, a jug, water, some ice cubes and a gas stove. Fill the kettle with water. Boil the water in the kettle on the gas stove. When steam comes out of the spout of the kettle, hold the metal plate above the steam. Keep the ice cubes on top of the metal plate. You will see that the steam changes to water droplets when it touches the cool plate. Collect these water droplets in the jug and you will have distilled water.
2. In the process of evaporation when water is heated than it evaporates in the form of water vapours. But the process of condensation is apposite to the evaporation. In condensation when water vapours cool down than they convert into liquid form as water.
3. To separate a mixture of sand and sugar

We place the mixture in a beaker and pour some water into it. Stir well. We observe that sugar dissolve in water. Now, filter the mixture with the help of filter paper. Sand remains on the filter paper as residue while the water containing sugar flows down and collects in the beaker as filtrate.

Now we heat the beaker containing sugar and water. The water starts evaporating.

After all the water has evaporated, sugar will be left in the beaker.

So, we used two methods to separate a mixture of sand and sugar in water filtration and evaporation.

4. We may need to separate components of a mixture for various reasons, such as :
   (i) To remove the undersirable or harmful components. For example, small pieces of stones and unwanted seed grains are removed from rice and pulses before cooking.
   (ii) To remove the impurities as to obtain pure sample of a substance. Pure substances are needed in medicines, research, industries and also in daily use.
   (iii) To separate useful components of a mixture so that each component can be properly used. For example, petrol, diesel, kerosene etc. are all useful components of and need to be separated.

I. HOTS Questions :

Ans. 1. Yes, she still can dissolve more sugar into this solution. This can be done by heating the solution. It will make the solution unsaturated.
2. No, because salt and sugar are soluble in water and soluble substance cannot be separated by filtration method.

THINGS TO DO

Do it yourself.

6 Changes Around Us

EXERCISE

A. Tick (✓) the correct answer :

Ans. 1. c. Burning of a paper
2. d. Melting of ice
3. c. Burning of a piece of coal
4. b. chemical change

B. Fill in the blanks :

Ans. 1. In a **chemical** change, new substances are formed.
2. In a **physical** change, no new substances are formed.
3. Most physical changes are **reversible.**
4. Most **chemical** changes are irreversible.
5. Squeezing of a rubber ball is an example of a **physical** change, while burning of coal is a **chemical** change.

C. Very Short Answer Questions :

Ans. 1. Yes.

2. Physical change.

3. No, all physical changes are not reversible. For example cutting down a tree, cutting a paper.

4. Smoke and ash new substances are formed on burning wood.

5. Yes, all chemical changes are irreversible.

D. Short Answer Questions :

Ans. 1. A change in which no new material is formed is called a physical change. A physical change is temporary and reversible. In a physical change, the composition of the substance remains unchanged. For example : melting of butter.

2. A chemical change is more or less a permanent change in which new substances with different properties are formed. Burning is an example of a chemical change. When something burns, the original substance changes into ash and some gases.

3. When ice is heated it changes into water. It is a reversible change because if we freeze it, it will change into ice again.

4. Folding paper, melting ice cubes, water changes into water vapour— reversible changes.

   Mixing of cement with water, cooking eggs, cooked chapati— irreversible changes.

E. Long Answer Questions :

Ans. 1. We can do the following activity to understand that a chemical change cannot be reversed.

   Materials Required : An incense stick and a matchbox

   Procedure : Light an incense stick with a matchstick and note your observations.

   Observation : On lighting an incense stick, smoke, ash and smell are produced. Also, the size of the incense stick becomes small.

   Conclusion : New substances are formed on burning an incense stick.

   We cannot get back the original incense stick from smoke, ash and smell. Hence, burning of an incense stick is a chemical change.

2. Heat is a form of energy. When we heat a substance, it gains energy and changes occur in it. These changes can be of many types :

   i. **Change in the size of an object on heating—** On heating substances increase in size. This kind of change is called expansion and the object is said to have expanded. Expansion can take place in all three states of matter.

      a. In solids : Most of the solids expand on heating.

      b. In Liquids : On boiling, milk expands. If the burner is not turned off, the milk spills out of the container. Mercury metal expands a lot on heating.

      c. In Gases : If you keep an inflated balloon in bright sunlight, it

might burst. This is because the heat of the Sun expands the air inside the balloon which makes the balloon burst.

ii. **Change in hardness of objects**— Many solid objects on heating become soft. This is how a blacksmith makes tools of iron. On heating, till red hot, iron becomes soft and can be easily beaten into any shape.

iii. **Change in physical state of substances**— We know that solids turn into liquids and liquids turn into gases on heating.

	heat		heat	
Ice	⇌	Water	⇌	Water vapour
(solid)	cool	(liquid)	cool	(gas)

F. HOTS Questions :

Ans. 1. Irreversible.

2. Once the curd is formed milk cannot be re-obtained from it. Thus, it is a irreversible change. Also, both milk and curd have different properties. Since these are the properties of a chemical change, setting of curd is a chemical change.

THINGS TO DO

Do it yourself.

7 Getting to Know Plants

EXERCISE

A. Tick (✓) the correct answer :

Ans. 1. a. carrot 2. b. stamen

3. a. potato 4. a. Pitcher plant

B. Fill in the blanks :

Ans. 1. Plants are found in various kinds of **habitats.**

2. The root takes in **water** and **minerals** from the soil.

3. The **lamina** is the flattened part of the leaf.

4. The carpel is the **female** reproductive part of the flower.

5. **Radicle** and **plumule** are the two parts of the embryo.

C. Very Short Answer Questions :

Ans. 1. The Root system and the Shoot system.

2. Stomata helps in the exchange of gases during transpiration.

3. Stem holds the plant upright and supports the branches.

4. Apical bud is the bud which is responsible for the growth of a plant.

D. Short Answer Questions :

Ans. 1. The root system has the following important roles to play in a plant.

Anchorage : The root spreads out into the soil and holds a plant firmly

to the ground, making it difficult to uproot it. Fixing the plant to the soil is a major function of the root.

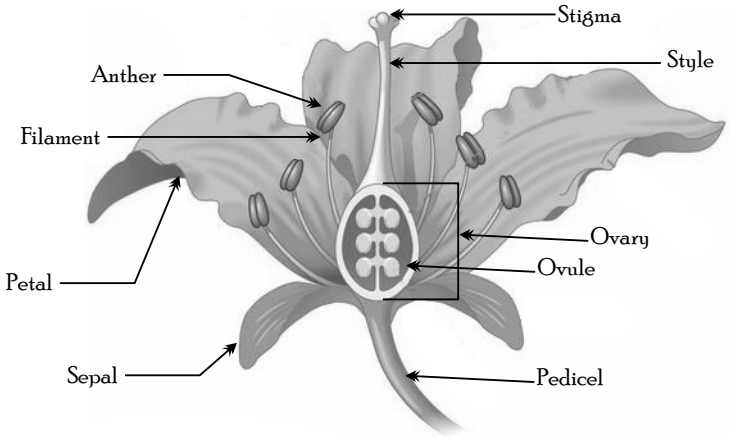
Absorption : The root takes in water and minerals from the soil.

Transport : Roots transport water and minerals from the soil to the stem.

2. Herbs are small plants with weak and green tender stems, e.g., grass, mustard, sunflower, pea and wheat.

   Shrubs are bigger plants with hard, strong, woody stems. Shrubs are medium-sized plants and their branches arise just above the ground, e.g., rose, tulsi and hibiscus.

3. The part of the potato we eat grows in the ground, it is not the root of the plant. It is the underground part of the stem that has thickened. Because potato is a stem and grows underground, it is called underground stem.

4. 

Longitudinal section of a flower showing its parts

5. Stem helps the plant in the following ways :
   Support : In plants like cucumber, stems have coiled structures called tendrils. The tendrils coil around a support and help the plant to climb up.
   Store water : In desert plants like cactus, stems store water in them and hence become thick and fleshy.
   Photosynthesis : In cactus, where the leaves are reduced to spines, stems are green and hence perform the function of making food as well.

E. Long Answer Questions :

Ans. 1. In most plants main root grows vertically downward in the soil. This is the primary root. Primary roots give out lateral roots called secondary roots. Such roots are called tap roots.

Functions of the Root

The root has the following important functions.

Anchorage : The root spreads out into the soil and holds a plant firmly to the ground, making it difficult to uproot it. Fixing the plant to the soil is a major function of the root.

Absorption : The root takes in water and minerals from the soil.

Transport : Roots transport water and minerals from the soil to the stem. Examples of tap root are— carrot, mango, neem etc.

2. **Functions of the leaf**
   (i) They are the food factories of plant. They help the plant to make their food by the process called phtosynthesis and starch (carbohydrate) is obtained as food.
   (ii) They help in respiration, i.e., exchange of gases as oxygen and carbon dioxide between the plant and surroundings. They intake carbon dioxide and give out oxygen during day. Thus, they clean the air.
   (iii) The remove the excess of absorbed water as water vapour. This process is called transpiration.
3. **Modifications of the Root**
   In some plants roots perform some special functions. Such roots are called modified roots.

   Storage of food : In some plants like carrot, beetroot, turnip, etc., the roots are swollen. This is due to food stored in them. We use these roots as food. They are called storage roots.

   Support : In some plants long and thick roots hanging down from branches. In a banyan tree some roots grow from the branches of the tree and give support to the tree, Such roots are called prop roots. Climbers, for example, money plant has climbing roots which help the plant climb, holding on to a support.
4. Pollination is the transfer of pollen grains from the anther to the stigma of a flower. This can be done by wind, water, birds and insects. After pollination, fertilization takes place and a flower change into a fruit which bears seeds and this seeds help in the growth of new plant. By this plant increase their generation. In this process, male and female reproductive cells fuse together.

F. HOTS Questions :

Ans. 1. Food comes from one that is stored in then.
2. The reason why some flowers produce nector is that they need to give pollen to the bees because its sticks to them when they go in the flower to get pollen and then when they go to another flower they drop of their nectar so the seeds grow.

THINGS TO DO

Do it yourself.

8 Body Movements

EXERCISE

A. Tick (✓) the correct answer :

Ans. 1. c. ulna
2. a. Earthworm
3. c. Cockroach
4. c. skull bones

B. Fill in the blanks :

Ans. 1. Locomotion is absent in most **plants.**
2. Bones of the skull protect the **brain** from injury.
3. **Muscles** have the property of contraction and relaxation.
4. The body of an **earthworm** is made up of ring like segments.
5. A **streamlined** body offers least resistance to the flow of water.

C. Very Short Answer Questions :

Ans. 1. The movement of organisms from place to place is known as locomotion.
2. Hinge joint.
3. Joints are the points where two or more bones meet. Joints may be supported by yellow tight (strong) bands called ligaments.
4. The body of a fish is called 'streamlined' because the body shape of a fish is tapers at the two ends.

D. Short Answer Questions :

Ans. 1. The purposes of animals movement include search for food, running away from predators and other dangers, migration for a more favourable environment.
2. Our elbows not move backwards because our elbow has hinge joint. This joint allow movement only in one plane like a door hinge. It cannot move more that 180 degrees.
3. Animals move in a variety of ways like walking, running, flying, jumping, crawling and swimming.
4. If we raise our hand, you can feel the biceps getting shorter and harder. The triceps becomes longer and softer. When we lower our hand, our triceps becomes shorter and harder, and the biceps becomes longer and softer.
   That is now, muscles work in pairs to bring about the movement of a bone.
5. Downstroke movement and upstroke movement.

E. Long Answer Questions :

Ans. 1. Joints are the points where two or more bones meet. These joints are of different kinds.

I. Immovable Joints

The joints where no movement is observed are called immovable joints such as joints between skull bones, teeth in sockets of jaw, etc.

II. Slightly Movable Joints

In this type of joint, there is slight movement in bones, e.g., joints of backbone, thumb, etc.

III. Movable Joints

Those joints that give motion or show movement are called movable joints such as :

(i) Pivot joint : In this joint, one bone rotates on the other in many planes-up and down, sides, etc., It is the joint between skull and neck.

(ii) Ball and socket joint : In this type of joint, one bone has ball like structure that fits into a socket of another bone. This type of joint provides movement in all the directions, e.g., shoulder joint, hip joint, etc.

(iii) Hinge joint : In this type of joint, the movement acts in one plane only. It is like opening and closing of a door. Its movement is not more than 180°, e.g., elbow joint, finger joint, knee joint, etc.

2. a. Snakes move very fast by crawling on their bellies. Special structures called scales are present on their bodies. The scales help in crawling. During movement, the body curves into many loops. Each loop gives the snake a forward push by pressing against the ground.
   b. Cockroaches can walk, climb as well as fly in the air. Two pairs of wings are present. Also three pairs of legs are present which help in walking. Muscles present near the legs help in walking, while the breast muscles attached to the wings help in flying.
   c. The shape of a fish is like that of a boat. It is narrow in the front (head) and the tail and broader in the middle. The body thus tapers at the two ends. This body shape is called streamlined. Fish also has various types of fins that help it to swim.
   A streamlined body offers least resistance to the flow of water and allows the fish to move in water easily.
   d. Movement in snails takes place by a muscular organ called the foot which produces a slimy fluid called mucous.
   When a snail has to move, the foot comes out of the shell through an opening in the shell. It produces the mucus, so that the animal gets a smooth surface to walk (or crawl). The muscular foot produces a series of wave-like movements that help the animal to move forward. The shell is dragged along with the foot.
   e. When an earthworm moves, the bristles at the rear end hold firmly to the ground, while the front of the body is free to stretch forward with the help of strong muscles. Then the bristles under the front of the body anchor the front part of the body, while those under the rear end relax. This makes it possible for the earthworm to pull up the rear end with the help of its muscles. Then the process is repeated, and the animal moves forward with the help of a wave of contractions travelling down the body.
   f. Birds have hollow bones which are filled with air. Hence they are light. They have large wings with the help of which they push down the air and lift themselves up. The wings have a curved shape, with the upper surface even more curved. This shape creates an upward lift which acts on the wings when the bird flies. Birds also have a streamlined body to reduce friction with air. The muscles that are attached to the wings are very strong. Wings have feathers. The feathered wings show two types of movement at the time of flight as downstroke movement and up stroke movement.

F. HOTS Questions :

Ans. 1. No, movement no same as locomotion. Locomotion is a process of moving from one place to another whereas movement is just an act of motion. Yes, the movement from one place to another and change in position of a part of the body can be used to distinguish locomotion and movement. This is so because the former is locomotion whreas the latter is just movement.

2. Underwater divers wear fin like flippers on their feet to help them move around easier and quicker without getting tired and to protect their feet from objects on the seabed.

THINGS TO DO

Do it yourself.

9 The Habitat

EXERCISE

A. Tick (✓) the correct answer :

Ans. 1. a. Hydrilla 2. d. Cactus 3. d. Grassland

B. Fill in the blanks :

Ans. 1. A **habitat** is the natural dwelling area of an organism.
2. All living organisms exist mainly in **two** types of habitat.
3. **Forests** provide a home for a large number of organisms.
4. Plants are classified into **hydrophytes**, **mesophytes** and **xerophytes.**
5. Animals living in water are known as **aquatic** animals.

C. State True or False :

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

D. Compare and contrast.

Ans. 1. The presence of specific features or certain habits, which enable a plant or an animal to live in its surroundings, is called adaptation.
Animals like squirrel, bear and dornmouse store food as fat in their body during summer. In winter, when food is not available, they simply go off to sleep. This is known as hibernation.
2. Heterotrophs are the organisms that depend on other organisms for food.
Decomposers are organisms that degrade the dead remains of plants and animals.
3. Hydrophytes are plants which grow in watery places or places which remain very wet throughout the year. Some aquatic plants remain submerged in water, For example, hydrilla and vallisnaria.
Xerophytes are the plants which survive in desert habitats or dry places where there is scarcity of water. For example, cactus, asparagus, euphoria and yucca.
4. Animals living in water are called aquatic animals. For example, fish, octopus, whale, crabs and lobster.
Animals which can survive in the extreme hot and dry climate of deserts are known as xeric animals. For example, lizards, snakes, insects, camels, etc.

E. Very Short Answer Questions :

Ans. 1. A place where an organism lives in nature is called its habitat.
2. Fish, octopus, whale, crabs, lobster.
3. The presence of specific features or certain habits, which enable a plant or an animal to live in its surroundings, is called adaptation.

4. Camel is known as the ship of desert.
5. Two examples of habitat : Terrestrial habitat and aquatic habitat.

F. Short Answer Questions :

Ans. 1. Two adaptive features of fish are :
- The fish have gills for breathing in water.
- They have fins and tails for swimming.

2. **Herbivores :** Some animals eat only plants are known as herbivores. Eg: Dear, horse, elephant, zebra etc.
Carnivores : Some animals eat only flesh of animals they are known as carnivores. Eg: Tiger, Lion, wolf etc.
Omnivores : Some animals eat both plants at flesh of animals are known as omnivores. Eg: Human beings, crow, bear etc.
3. A camel is adapted to life in a desert because it has bumps in which camel store water. In shortage of water the camel can use the stored water. Camel also has pad like structure in the foot to easily move in the desert.
4. Animals like squirrel, bear and dornmouse store food as fat in their body during summer. In winter, when food is not available, they simply go off to sleep. This is known as hibernation.
5. **Modification in cactus :**
   (i) Cactus have long and extensive root systems which penetrate deep into the soil to absorb water.
   (ii) In cactus stem is fleshy and green to store water and make food by the process of photosynthesis.
   (iii) Leaves get modified into spines to reduce loss of water through transpiration.
   (iv) Leaves have a layer known as cuticle to prevent loss of water.
   (v) Stomata are few in number and remain sunken or are covered with fine hairs

G. Long Answer Questions :

Ans. 1. **The habitats are of two types :**
- **Aquatic Habitat—** The three-fourths part of Earth is covered with water. So it provides a habitat for many organisms. On the basis of the types of water, types of aquatic habitats are there. They are fresh water habitat and marine water habitat.
  ♦ **Fresh Water Habitat—** The fresh water habitats include lakes, ponds, rivers and streams. It is further divided into two types : running water habitat and still water habitat.
  ♦ **Marine Water Habitat—** This habitat is stretched over a vast area, and has different levels of habitats for different organisms. The sea provides a variety of products, including food and minerals. Sea water has two zones : coastal and open sea.
- **Terrestrial Habitat—** The one-fourth surface of Earth is land. At some places, the land is covered with a layer of fertile soil, but at other places it is bare and rocky. Some part of it is also covered with forests. So it provides a variety of habitats for organisms. Terrestrial hebitat is of following types.

♦ **Forest Habitat**— A forest is a dense growth of trees and shrubs covering a large area of land. Forests provide a home for a large number of organisms.

Basically, forests are of the following types : tropical forests, temperate deciduous forests and coniferous forests.

♦ **Desert Habitat**— In dry or desert areas, whether it is hot or cold, conditions are very difficult for both plants and animals. There is scarcity of water due to which a few varieties of plants and animals are found in this region. Camels are very well adapted for this type of habitat. Spiders, scorpions and snakes are also found in deserts. Among plants cacti are mainly found in this type of habitat.

♦ **Grasslands**— Grasslands are regions dominated by grass with moderate rainfall ranging from 50 cm to 90 cm.

Here, the temperature varies from 20° C to 30° C. Organism living in these habitats include zebras, giraffes, lions, elephants, gazelles and grasses.

♦ **Mountains and Polar Habitats**— Mountains are regions that rise much higher than the land surrounding them. They are cold and windy. Organisms found here include mountains goats, sheep, yaks, beetles, pines and spruce.

2. a. **Fish :** The fishes have gills for breathing in water. They have fins and tails for swimming. They have streamlined body for swimming.
   b. **Camel :** It has a hump where fat is stored. This provides it with water in times of shortage. It can, therefore, live without water for several days. It can drink a very large quantity of water at a time.
   It can increase its body temperature when the temperature of the surroundings rises.
   c. **Cactus :** The stem is fleshy and green to store water and make food by the process of photosynthesis. Leaves get modified into spines to reduce loss of water through transpiration.
   d. **Lotus :** Roots and root hairs are poorly developed. Stems are long and narrow to withstand water currents without getting damaged. Leaves are bread and swim on the water body.
3. All living organisms show adaptations. They show adaptation to survive, multiply and generate their offsprings.
4. Penguins live in very cold places. They have oily, waterproof feathers and a thick lager of skin to maintain body temperature in the cold climate. They also have a thick layer of fat under the skin known as blubber which acts as an insulator and does not allow the body heat to escape.

H. HOTS Questions :

Ans. 1. If there were no microorganisms then it would be difficult for life to exist on Earth. They are a part of our life. Though they cause diseases, there are few microorganisms which are important to us. They maintain the ecological balance in nature.
2. Some insects are green as leaf-like to protect themselves from their predators.

THINGS TO DO

Do it yourself.

EXERCISE

A. Tick (✓) the correct answer :

Ans. 1. d. cubit 2. d. Football
3. d. random motion 4. c. Rectilinear motion

B. Fill in the blanks :

Ans. 1. **Wooden** planks were also used to make boats.
2. The distance between our two feet while walking forms a **pace.**
3. The standard unit of length in the SI system is **metre.**
4. **Rest** and **motion** are relative terms.
5. Heartbeat is a **periodic** motion.

C. Classify the following motions into different types of motion :

Ans. 1. Circular motion 2. Linear motion 3. Periodic motion
4. Oscillatory motion 5. Oscillatory motion 6. Random motion

D. Very Short Answer Questions :

Ans. 1. Spacecraft.
2. The length between the tip of the middle finger and that of the elbow is called cubit.
3. Second.
4. Periodic motion—Heartbeat, motion of the moon round the earth.
Non-Periodic motion—Swinging arms during walking, a ball rolling at the ground.

E. Short Answer Questions :

Ans. 1. The comparison of an unknown quantity with some known quantity is known as measurement.
2. To avoid parallax error, keep your eye vertically above the point where the measurement is to be taken.
3. Given below are some precautions that should be kept in mind for accurate measurement of length.
   - The scale must be placed properly from one end to the other end of the table to be measured.
   - To measure length between A and B the scale must be placed between A and B.
   - The table must be measured from zero (0) mark of the scale.
   - In case the edge of the scale showing '0' is broken, some other digit can be taken as the initial reading. But we must remember to subtract initial reading from the reading at the other end to get the accurate length of the table.
4. An object is said to be in motion if its position changes with time with respect to its surroundings.

F. Differentiate between each of the following :

Ans. 1. **Oscillatory motion :** The 'to and fro' motion or vibrations of an object about its position of rest is called oscillatory motion. For example, the movement of a pendulum and swing.
Vibratory motion : The vibratory motion actually is a very fast 'to and fro' motion. The movement of strings in a musical instrument like guitar

or the movement of the surface of drums and table when played are the examples of vibratory motion.

2. **Handspan :** The length between the tip of the thumb and that of the little finger is called handspan.
   Cubit : The length between the tip of the middle finger and that of the elbow is called cubit.
3. **Translatory motion :** The motion in which all the particles of a body move the same distance in the same interval of time is known as translatory motion. Most of the moving objects around us show this type of motion.
   Rotatory motion : The motion in which a body moves about a fixed axis without changing its position is known as rotatory or circular motion, for example a moving fan, spinning top, wheel of a sewing machine, a giant wheel, etc.
4. **Rectilinear motion :** Motion along a straight line is called rectilinear motion. An apple falling from a tree, a bullet shot from a gun, athletes running a 100 m flat race, a batsman running to get a run, a train moving on a straight track, etc. are some common examples of rectilinear motion.
   Curvilinear motion : When an object moves along a curved line, it is said to be in curvilinear motion. The movement of a ball thrown upward at an angle and that of a car moving along a curved track shows curvilinear motion.

G. Long Answer Questions :

Ans. 1. In our day to day work, various types of measuring devices are used. We just studied that the use of units such as handspan, cubit, etc. have been replaced by metres, centimetres, etc. It is important for us to know about the measuring tools with the help of which we can measure the length. Given below are some well known devices or tools for measuring length and their common users :

Measuring Tools or devices and their Uses

Measuring Tools	Common Users
Scale/Rule	Student
Metre rod	Cloth merchant
Measuring tape	Tailor

2. Given below are some precautions that should be kept in mind for accurate measurement of length of the table top :
   - The scale must be placed properly from one end to the other end of the table to be measured.
   - To measure length between A and B the scale must be placed between A and B.
   - The table must be measured from zero (0) mark of the scale.
   - In case the edge of the scale showing '0' is broken, some other digit can be taken as the initial reading. But we must remember to subtract initial reading from the reading at the other end to get the accurate length of the table.
3. Straight line; it exhibits uniform motion, for example an aeroplane

flying in a particular direction at a constant speed and a train moving in a particular direction at a constant speed show uniform motion.

4. The 'to and fro' motion or vibrations of an object about its position of rest is called oscillatory motion. For example, the movement of a pendulum and swing.
5. The motion which repeats itself after a fixed interval of time is known as periodic motion. Both oscillatory and vibratory motions are said to be periodic, since they are repeated at regular intervals of time. Heartbeat is also a periodic motion.
   The movement of planets round the Sun, motion of the moon round the Earth and the hands of a clock exhibit periodic motion.

H. HOTS Questions :

Ans. 1. A tailor use a measuring tape not a meter scale or a meter rod for taking measurement.This is so because human body has many curves and by meter scale or meter rod he cannot take correct measurements.
2. The movement of the body is called motion.
   A common characteristic of all moving bodies is that they change their position with time.
   Time and motion coexists. If time does not exist, there would be no change.
   If motion does not exist, there need not to be the concept of time.
   Therefore, time and motion must coexist because when a body moves, its position changes with time. For example, a wrist has three hands : a seconds hand, a minute hand, and hours hand. Which moves round and round on the dial of the watch.

THINGS TO DO

Do it yourself.

11 Light

EXERCISE

A. Tick (✓) the correct answer :

Ans. 1. c. transmitted 2. b. Translucent
3. a. the position of the source of light 4. d. all of these

B. Fill in the blanks :

Ans. 1. The **Sun** and the **stars** are examples of natural sources of light.
2. Light can pass totally through **transparent** objects.
3. A shadow is always **black** in colour.
4. The image in a mirror cannot be formed on a **screen.**
5. Light gets **reflection** from a mirror.

C. State True or False :

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

D. Very Short Answer Questions :

Ans. 1. The Moon.
2. The objects which do not emit their own light but are visible due to reflection of light falling on them, are called non-luminous objects.
3. Yes, the flame of a gas stove emit light.

4. A source of light; an opaque object that obstructs as comes in the way of the source of light; and a screen.
5. Pinhole camera is very simple device which at one time was used to take photographs of stationary objects.

E. Short Answer Questions :

Ans. 1. **Characteristics of light :**
- Light is an electromagnetic wave.
- Light shows reflection, refraction, interference etc.
- Light exhibits particle like properties while interacting with matter.
- Light is comprised of a spectrum of various colours arranged in the order of their wavelength.
- Light is a form of energy.

2. Yes, because transparent objects have edges, and nothing can ever be so transparent to not have a shadow.
3. The objects or materials through which light can pass totally are called transparent objects. Materials such as glass, water and air are example of transparent objects.
   Through oily paper the object could be seen dull and faded. This is because light passes through it but only partially and the remaining is scattered. Such objects are known as translucent objects. Materials such as oily/butter paper, tissue paper, ground smoked glass, muddy water are translucent.
   Through cardboard nothing can be seen. This is because the cardboard absorbs all light falling on it and does not allow any light to pass through it. Such objects are known as opaque objects. Wooden plank, a book, brick, wall are example of some opaque objects.
4. **Making of a Pinhole Camera :** It consists of a rectangular cardboard box, such that its one side is made of ground glass screen. The side opposite to ground glass has a hole in the middle, whose size is equal to the pin head of a common pin. The box is blackened from inside so as to absorb any light which falls on its walls directly or indirectly.
   Working of a Pinhole Camera : Consider a lighted candle AB, in front of the pinhole camera. The rays starting from different points of the candle, travel in all directions. A ray of light starting from point A, along AH, after passing through the pinhole, falls on ground glass screen at point A_1. Similarly, another try starting from point B, along BH, after passing through the pinhole, will fall on the ground glass screen at point B_1. Thus, all the rays starting in between the points A and B, after passing through pinhole will meet the screen in between points A_1B_1. Thus, A_1B_1 is the image of object AB.
5. To show that light travels in a straight line
   Materials Required : An aluminium tube of about 30 cm length, a candle, a table and a matchbox.
   Procedure : Light the candle and place it on the table. See the candle through the tube. Candle is visible. Now, give a small bend to the tube. Place it in between the candle and one of your eyes, keeping the other eye closed. This time candle is not visible.

Observation : The candle is visible through the straight tube but it is not visible through the bent tube.

Conclusion : This is because light travels in a straight line.

F. Long Answer Questions :

Ans. 1. **Four Characteristics of shadow are :**

- The length of a shadow changes with the change in the position of the object with respect to the sources of light.
- A shadow can be seen only on a screen. Walls of rooms, ground, building and any other such surface acts as a screen.
- The colour of the shadow does not change with the change in the colour of opaque objects and the colour of light falling on them. The shadow formed is always black in colour.
- A shadow is a region without light that forms behind the opaque object. The opaque object blocks the light, therefore, the shadow is dark.

2. The length and the shape of the shadow changes greatly with the position of the source of the light. With respect to the object as the greater the distance of the source of the light from the object the bigger the length of the shadow. As we move the source of the light away from the shadow the length of the shadow will increase in the similar ratio.

3. To prove that light travels in a straight line we do the following activity.

Materials Required : An aluminium tube of about 30 cm length a candle, a table and a matchbox.

Procedure : Light the candle and place it on the table. See the candle through the tube. Candle is visible. Now, give a small bend to the tube. Place it in between the candle and one of your eyes, keeping the other eye closed. This time candle is not visible.

Observation : The candle is visible through the straight tube but it is not visible through the bent tube.

Conclusion : This is because light travels in a straight line.

4. Pinhole camera is very simple device, which at one time was used to take photographs of stationary objects.

Following are the nature of the image :

(i) It is real, i.e., it is formed on the screen.

(ii) It is inverted.

(iii) It is generally smaller than the size of the object.

5. No, because an image is formed in a mirror when the light coming from an illuminated (lighted) object is reflected by the surface of the mirror. In this case no light is coming from anywhere, so we can not view our reflection in the mirror.

G. HOTS Questions :

Ans. 1. No, the number of shadows from will not remain unchanged if the number the source of light increase or decrease. The more number of lights the more shadows will be there.

2. 'AMBULANCE' is written a 'ƎƆИAJUBMA' in vehicles used to transport patients. The main reason behind this is the property of rear-view mirror which shows the appearance of left into right and right into left, this in turn helps the driver in the front to appear to word

'AMBULANCE' correctly in his rear view mirror and give the ambulance side.

THINGS TO DO

Do it yourself.

12 Electricity and Circuits

EXERCISE

A. Tick (✓) the correct answer :

Ans. 1. b. a battery 2. c. heat energy
3. c. Leather 4. b. switch

B. Fill in the blanks :

Ans. 1. We cannot imagine life without **electricity.**
2. Today, we have a variety of **cells.**
3. A **switch** is also known as a key.
4. A **closed circuit** is a circuit with a closed switch.
5. An LED can emit **red**, **yellow** or **green** light.

C. State True or False :

Ans. 1. False 2. True 3. False 4. True

D. Give one word for the following.

Ans. 1. Closed circuit 2. Insulator 3. Switch
4. A cell 5. Solar cells

E. Very Short Answer Questions :

Ans. 1. We need electricity for various purposes like for cooking and heating food, washing clothes, lifting water, transportation, etc.
2. The combination of two or more cells is called a battery.
3. Silver, iron, steel, brass, carbon, etc.
4. Those materials which do not allow electric current to pass through them, are called insulators.

F. Short Answer Questions :

Ans. 1. We need a switch in a circuit to on or off the electric circuit.
2. An electric circuit can be defined as a closed path through which electric current can flow.
3. A circuit with an open switch is called an open circuit
4. We cannot use water in case of fire in electric wires because water is a good conductor of electricity. If we use water to douse an electric fire, we are causing another short circuit, causing the current to spike back up, the increase in current, means more energy which will result in a stronger fire.

G. Long Answer Questions :

Ans. 1. Take a used (waste) dry cell. Observe carefully the appearance and shape of the cell. Its top has a metallic cap in the centre. This is the positive terminal of the cell. The metal disc-shaped bottom-end of the cell is its negative terminal.

Now carefully break open the cell. Note the kind of things and materials present inside it. The black substance present inside is the waste remain

of the chemicals. The thick black rod placed in the centre of the cell is the carbon rod whose end acts as the positive terminal. The zinc container acts as the negative terminal of the cell. The cylindrical side of the cell is covered with a plastic sheet.

2. Electric conductors have many uses in our life. Electrical wires are usually made of copper. Though silver is a better conductor but, it is not used because it is too expensive. Aluminium is also used to make wires. Switches, terminals, plugs, filaments, and so on, are made of various metals. You have already come across one use of carbon in the cell. It is used in many other electrical devices.
3. No, the bulb will not glow because it can't make its connection so it won't make any light.
4. Take 4 small length electric wires, scrape about 3-4 cm of plastic covering from both the ends of each wire, so that the metal wires are exposed at the ends. Now rub the exposed ends of metal wires with the sand paper.
   Take a torch bulb and fix one metal end each of two electric wires to the terminals of the bulb. Use electrician's tape to fix the wires. Now you have two more free metal ends. Wrap one of the free metal ends to one leg of the aluminium clip.
   Now take the other two wires and connect one metal end of each of them to the two terminals of the cell and wrap around the electric insulation tape. Again we have two free metal ends of two wires.
   Join the free metal end of a wire of the bulb with one of the free ends of a wire with the cell by twisting the two ends together.
   As soon as you will connect the only free metal end left with the aluminum clip, the bulb will glow.

H. HOTS Questions :

Ans. 1. This is so because the wire he is holding in his hand is neutral wire that does not have electric current in it.
2. The current can not pass through open circuit because of air resistance at the open junction.

THINGS TO DO

Do it yourself.

13 Fun with Magnets

EXERCISE

A. Tick (✓) the correct answer :

Ans. 1. c. Soft iron 2. c. Brass spoon 3. d. Navigational

B. Fill in the blanks :

Ans. 1. **Magnes** discovered the first magnet.
2. Ferrite is a mixture of **barium oxide** and **ferric oxide.**
3. A magnet can **attract** or **repel** another magnet.
4. The **north** of the compass needle always points towards north.
5. **Magnets** should be stored properly.

C. Very Short Answer Questions :

Ans. 1. The magnetic strength is maximum on the poles in a magnet.

2. We can increase the strength of an electromagnet by electric energy.
3. Yes, magnetite is a natural magnet.
4. Yes, magnets lose magnetism on hammering.

D. Short Answer Questions :

Ans. 1. Any substance which attracts small pieces of iron towards it is called a magnet. We find magnets in the rocks called magnetite.

2. Artificial magnets are those magnets which have been imparted the properties of a magnet by artificial means.

3. • Magnets lose their magnetic properties if they are hammered, heated to red hot or dropped from some height.
   • Magnets should be stored properly. Bar magnets should be kept in pairs with opposite poles on the same side. They must be separated by a piece of wood and the two pieces of soft iron should be placed across their ends. A piece of iron should be kept across the poles of horse-shoe magnet.
   • Magnets should be kept away from mobiles, television, music system, cassettes, compact disks (CDs) and the computer.

E. Long Answer Questions :

Ans. 1. To find the direction using a bar magnet.
Materials required : A bar magnet, thread, a stand.
Method : Tie the magnet in the centre with a piece of thread and hang it alongside. Rotate the magnet and leave it for some time. The magnet will come to rest pointing in the north-south direction. Thus we can know the direction by using a bar magnet.

2. Earth behaves as a huge magnet. The Earth is round in shape but its magnetic field can be represented by a huge bar magnet We know that unlike poles of magnets attract each other, so when we suspend any magnet free, its north pole gets attracted by Earth-magnet's south pole. But Earth's magnetic south pole is near the geographical north pole. As a result, north pole of any magnet aligns itself in north direction. It happens when the magnet is suspended freely, and it is not near any magnetic material or in any other magnetic field. This is the reason the north pole of the magnet is called north-seeking pole.

3. A few uses of magnet are as follows :
   • It is used in factories for lifting heavy masses of iron like scrap iron.
   • It is used by surgeons in hospitals to remove steel splinters from the wounds.
   • It is used in the construction of telephones, electric bells, etc.
   • It is used to separate iron and steel from non-magnetic materials like brass, aluminium, etc.

F. HOTS Questions :

Ans. 1. No, we cannot make a magnet without using a magnetic material. Magnets are made from magnetic materials like iron, nickel, cobalt, etc. with the help of magnetic induction.

2. When a magnet is brought near a compass needle, the compass needle will align with the magnet. If there is no magnet near the compass needle, it will align in the North-South direction.

THINGS TO DO

Do it yourself.

14 Water

EXERCISE

A. Tick (✓) the correct answer :

Ans. 1. d. all of these 2. c. precipitation
3. b. water cycle 4. a. heavy rain

B. Fill in the blanks :

Ans. 1. We need **water** for our way of life.
2. **Rainwater** is considered to be the purest form of natural water.
3. Water cycle helps regulating the **temperature** on the Earth.
4. Lack of rain may cause **drought.**
5. **Rooftop rainwater harvesting** is a traditional technique of rainwater harvesting.

C. Circle the odd one. Give the reason for your choice :

Ans. 1. **Transportation** : All are methods of water purification except transportation.
2. **Motion** : All are associated with the change of state in water except motion.
3. **Stem** : Stem is a part of plant whereas rest of three are associated with water and gas.
4. **Ice** : All are the forms of precipitation except ice.

D. Very Short Answer Questions :

Ans. 1. The Earth is known as a watery planet because more than 71% of its surface is covered with water.
2. Some of the rainwater that falls on surface seeps through the soil and goes down under the surface. Ultimately, this water is stopped by some hard non-porous rocks and collects there. This reservoir of water collected over the hard non-porous rock below the surface of soil is called ground water.
3. Our clothes dry up when left out under the sun because the water present in wet clothes evaporates when it receives heat from the sun (or when it receives air) and form water vapour.

E. Short Answer Questions :

Ans. 1. Plants take water from the soil through their roots. The excess water is released by plants into the air as water vapour through stomata. This process is called transpiration.
2. Absence of rain in a particular region for a long time, leading to severe shortage of water is called drought.
3. (i) Rain brings relief by cooling the environment, especially after hot summer days.
(ii) Farmers in India depend on the arrival of monsoon for sowing their crops in their fields.
(iii) Rain fills lakes, ponds and streams and raises the water table. So, it maintains the supply of water on land.

F. Long Answer Questions :

Ans. 1. a. water b. ice c. water vapours.

2. Due to heavy rain the organism which mostly affected is earthworm, because earthworm breath through their skin. When there is more of heavy rain the water fills up the space occupied by the air (oxygen) as a result of this earthworms come out of the water logged soil for their respiration process.
3. The advantages of rainwater harvesting are :
   - Rainwater harvesting requires very small amount of maintenance. It provides free water which can be used for various purposes at a very low cost.
   - Rain water thus collected can be used for various domestic purposes such as drinking, cooking, bathing, washing, laundry etc.
   - This water can also be used for irrigation and provides regular water supply in drought prone areas.
   - Rainwater harvesting also reduces the risk of flooding of roads in cities as collecting of rainwater reduces excess of water to get wasted.

G. HOTS Questions :

Ans. 1. During droughts and severe floods the agriculture lands gets affected. As result, crops are damaged and very less fresh crop is available for use. Therefore farmers have to sell it in an high price. So that they don't go in loss.

2. During exhalation (or breathing out), carbon dioxide is released along with water vapours. If one breathes out onto glass, the released water vapours collide with the surface of the glass, thereby making it cooler. As a result, the water vapours present in the air surrounding the glass condense and get attached to the glass surface. Consequently, the glass becomes wet.

THINGS TO DO

Do it yourself.

15 Air Around Us

EXERCISE

A. Tick (✓) the correct answer :

Ans. 1. b. Nitrogen 2. c. stomata 3. a. Troposphere

B. Fill in the blanks :

Ans. 1. **Atmosphere** is the blanket of air around the Earth.
2. The exosphere leads to open space.
3. Burning can only occur in the presence of **oxygen.**
4. When unwanted particles mix with air, it is called **air pollution.**
5. The atmosphere acts as a **protective layer** around the earth.

C. Short Answer Questions :

Ans. 1. Nitrogen, oxygen, argan.
2. The blanket of air around the Earth is called atmosphere.
3. Oxygen.

4. When air moves, it is called wind.

D. Short Answer Questions :

Ans. 1. Air mainly contains about 78 per cent nitrogen, 21 per cent oxygen, about 0.9 per cent argon and other noble gases, 0.03 per cent carbon dioxide, traces of some other gases along with varying quantity of water vapours.

2. The force of gravity holds the atmosphere to the Earth's surface.
3. When air moves, it is called wind. It is the one which makes ships, sailboats, aeroplanes, and windmills move, and hot air balloons fly.
4. The components of air are Oxygen, Nitrogen, Carbon dioxide, water vapour, dust and smoke.

E. Long Answer Questions :

Ans. 1. The different layers of air are :

Troposphere : Troposphere, stratosphere, mesosphere, thermosphere and exosphere.

The troposphere is the lowermost layer of the atmosphere. It is the most dense part of the atmosphere. Formation of clouds and weather changes take place in this layer.

Stratosphere : The stratosphere is the second layer from Earth. Aeroplanes and weather balloons fly in this layer. The ozone layer which protects us from harmful ultraviolet radiations coming from the sun is in the stratosphere.

Mesosphere : The mesosophere is the third layer of the atmosphere. It is the coldest layer. Meteors burn in this layer when they enter Earth's atmosphere.

Thermosphere : The thermosphere is the fourth layer from Earth. The satellites move in their corresponding orbit in this layer. This layer is very thin and very hot.

Exosphere : The exosphere is the uppermost layer of the atmosphere and it leads to open space.

2. Air is a mixture of many gases and these gases can be identified separately. Air mainly contains about 78 per cent nitrogen, 21 per cent oxygen, about 0.9 per cent argon and other noble gases, 0.03 per cent carbon dioxide, traces of some other gases along with varying quantity of water vapours.
3. Plants take in carbon dioxide persent in the air to manufacture food by the process of photosynthesis and release oxygen in the atmosphere. Thus a balance of carbon dioxide and oxygen is maintained in the nature.
4. When unwanted particles mix with air, it is called air pollution. Large particles of dust, smoke from chimneys and vehicles cause pollution. When fuels like petrol, diesel or coal are burnt, they give out very harmful gases. These gases may damage our respiratory system and cause skin disorders. It is important that these gases should not be allowed to go into atmosphere.
5. The atmosphere around Earth is a protective layer. It maintains the optimum temperature of the Earth and always keeps it conducive for

living beings. The atmosphere prevents the sunlight which reaches the surface of Earth from escaping and thus it keeps the Earth warm. Therefore, it acts as a protective blanket around Earth.

The atmosphere has an ozone layer around it. it protects us from harmful ultraviolet rays which come from the sun. Exposure to ultra-violet rays causes skin cancer.

All weather changes like rainfall, snowfall, cyclones, storms, etc., are caused due to the atmosphere.

6. When fuels like petrol, diesel or coal are burnt, they give out very harmful gases. These gases may damage our respiratory system and cause skin disorders. It is important that these gases should not be allowed to go into atmosphere.

F. HOTS Questions :

Ans. 1. It is simple, if you take an object out of the refrigerator which is cold, you will see that its surface becomes wet and accumulates droplets of water. This water is from the water vapour present in air, which condenses when it comes in contact with cold surface.

2. Yes, I agree with this statement, because a person cannot sleep under the tree during night because trees release only caron dioxide at night and humans need oxygen to breathe. Due to lack of oxygen, there would be a lot of suffocation which would not allow person to breathe properly. Thus one cannot sleep under the tree at night.

THINGS TO DO

Do it yourself.

16 Waste Management

EXERCISE

A. Tick (✓) the correct answer :

Ans. 1. c. paper 2. b. Nylon 3. a. Rainwater harvesting

B. Fill in the blanks.

Ans. 1. We generate a large amount of **waste** in our daily life.
2. **Non-biodegradable** wastes do not decompose in the environment.
3. In **Vermicomposting** worms are added to the compost.
4. Plastic is both a **boon** and a **curse** for us.
5. We should conserve natural resources like **trees** and **metals.**

C. Very Short Answer Questions :

Ans. 1. Those materials which are of no further use and are therefore thrown away are called waste.
2. Earthworm.
3. Biodegradable waste is taken to a low lying open area called landfill.
4. When biodegradable wastes are compost with the help of redworms, it is known as vermicomposting.

D. Short Answer Questions :

Ans. 1. Solid waste includes vegetable peels, packing materials, containers, cans, tins, boxes, newspapers, magazine, books, leather, clothes, etc.

2. Vegetable peels, fruits peels, clothes, wood, paper etc.
3. Non-biodegradable wastes are those which do not decompose in the environment. These include polythene, plastic, rubber and metal.
4. Composting is a biological process in which microorganisms, mainly fungi and bacteria, convert degradable organic wastes into humus like substance. This finished product, which looks like soil, is high in carbon and nitrogen content and is an excellent medium for growing plants. The process of composting ensures that the waste that is produced in the kitchens is not carelessly thrown out and left to rot. It recycles the nutrients and returns them to the soil as nutrients. Apart from being clean, cheap, and safe, compositing can significantly reduce the amount of disposable garbage.
5. Vermicomposting has become very popular in the last few years. In this method worms are added to the compost. These help to break the waste and the added excreta of the worms makes the compost very rich in nutrients. Vermicomposting is a fast process as compare to composting and vermicomposting provides more nutrient than the composting.

E. Long Answer Questions :

Ans. 1. **To prepare vermicompost**

Materials required : Some agricultural/kitchen waste, Chicken mesh, Old newspaper sheets, Redworms.

Procedure : Dig a pit about 30 cm deep at a place which does not get direct sunlight. Spread a net/chicken mesh or about 2 cm thick layer of sand at the floor of the pit.

Now spread the vegetable/plant waste over the chicken mesh/sand layer,

Dried animal dung and pieces of paper, etc. may also be placed in the pit.

Do not press the layer of the waste in the pit.

Moisten this layer by sprinkling some water over it.

The pores in the loose layer permit the required air and moisture to reach the waste material.

Put some redworms into the pit, and cover it with a gunny bag or a layer of grass.

Observations : After about a month, the content of the pit is found to be a loose soil-like material. This is vermicompost.

2. Collection and piling up of waste in our surrounding is a matter of concern in today's life. We have to think of the safe disposal to save our environment and thus save ourselves. Now imagine if every household produces the same amount of waste over a month then what would be the amount of waste collected in our environment over a month's time? It is going to be amazingly high and hence, needs special attention.

A major step in dealing with this problem related to accumulation of waste is to develop methods to either reuse or recycle the waste. Composting and vermicomposting are two method.

Composting

Organic matter constitutes 35 to 40 per cent of the municipal solid waste generated in India. This waste can be recycled by the method of compositing, one of the oldest forms of disposal. It is the natural process

of decomposition of organic waste that yields manure or compost, which is very rich in nutrients.

Vermicomposting has become very popular in the last few years. In this method worms are added to the compost. These help to break the waste and the added excreta of the worms makes the compost very rich in nutrients.

3. To make our life easy and comfortable, we use things made of plastic. Toys, bags, pens, combs, toothbrushes, buckets, bottles, water tanks, water pipes the list is very long. Some parts of a bus, car, radio, television, refrigerator and scooter are made of plastic. It is very difficult to imagine life without plastic. This makes plastic a boon for us.

Favour of plastic :

- Plastics are used in making bottles, jars and packaging.
- Plastics are used in making plumbing pipes, curtains, furniture etc.
- Plastics are involved in making electronic equipment cases, eye glasses etc.

Against Plastic :

- We often use plastic bags to store cooked food items. Sometimes these bags may not be suitable for keeping eatables. Consuming food packed in such plastic bags could be harmful to our health.
- All types of plastics give out harmful gases on heating or burning. These gases may cause many health problems, including cancer.
- Some people fill household garbage in plastic bags and throw them away. When stray animals look for food in those thrown bags, they eat up the bags along with the rotting food the eating of plastic bags harms the stray animals and sometimes kills them.

F. HOTS Questions :

Ans. 1. It will create an atmosphere of smell all over the place. There would be less place for the people and the animals to live. To deal with such a situation would try to decompost them in any way as possible.

2. The depletion of ozone layer in the atmosphere is dangerous as ozone layer absorbs all the UV rays (ultraviolet rays) from the Sun which causes skin problems and eye damage. The depletion of this layer causes the UV rays to enter the Earth's atmosphere and causing damage of human life.

THINGS TO DO

Do it yourself.

1 Nutrition in Plants

EXERCISE

A. Tick (✓) the correct answer :

Ans. 1. (b) Cuscuta 2. (b) insectivorous plant 3. (c) Rhizobium
4. (d) starch 5. (a) Stomata 6. (d) Nitrogen
7. (b) symbiotic

B. Fill in the blanks :

Ans. 1. Green plants are called **autotrophs**, because they synthesise their own food.
2. The small pores on the lower surface of a leaf are called **stomata**.
3. The mode of nutrition in lichens is **heterotrophic**.
4. Plants show **autotrophic** and **heterotrophic** modes of nutrition.
5. The leaves of cactus are reduced to spines or thorns, to reduce loss of water by **transpiration**.

C. Write true or false :

Ans. 1. True 2. False 3. True 4. False 5. True 6. False

D. Very Short Answer Questions :

Ans. 1. The phenomenon of providing nutrients to the body is called nutrition.
2. Nutrients in the soil are replenished by adding manure or fertilizer in it.
3. Symbiosis is the association between two organisms in which both the partners mutually benefit from each other.
4. Exchange of gases takes place in leaves through minute pores called stomata. They take in carbon dioxide through them and releases oxygen as waste product in the air.
5. The first step in photosynthesis is taking in of carbon oxide from the air by the leaves.

E. Short Answer Questions :

Ans. 1. Organisms need to take food to derive energy for their maintenance and growth. Food provides them materials for maintaining the body functions.
2. There are some green plants which obtain their nourishment partly from soil and atmosphere, and partly from small insects. These are known as insectivorous plants. Common examples of such plants are pitcher plant, bladderwort and venus fly trap. These plants trap insects, kill them, consume them and throw out the waste.
3. In a pitcher plant, a pitcher-like structure is the modified part of leaf. The apex of the leaf forms a lid that can open and close the mouth of the pitcher. Hair-like structures are present inside the pitcher which are directed downwards. When an insect gets attracted towards the pitcher and lands on it, the lid closes. The pitcher secretes digestive juices which digest the trapped insect.
4. Total parasites are these plants which derive all of their nutrition from

other plants. They cannot prepare their food at all. For example, *Cuscuta* and *Rafflesia*. On the other hand, partial parasites are these plants which can prepare their own food but depend on other plant for the need of water and minerals. For example, mistletoe.

F. Long Answer Questions :

Ans. 1. We can prove this with the help of following activity.

Aim : To prove that green plants produce food or starch by photosynthesis (or chlorophyll is essential for photosynthesis)

- Take a variegated croton leaf which contains green coloured patches. (Variegated means some parts of the leaves are white due to absence of chlorophyll).
- Boil it in alcohol in water bath to dissolve out green pigment and decolourise the leaf.

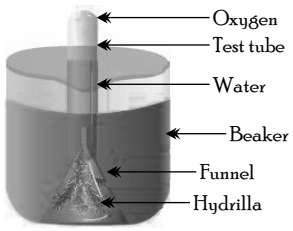
Variegated leaf After testing for starch

- Remove the leaf from boiling alcohol and dip it in hot water.
- Spread the decolourised leaf flat on a white tile and drop iodine solution on it. The parts containing starch will turn blue-black but the parts without starch will stain brown or yellow with iodine.

2. We can demonstrate with the given activity.

Aim : To prove that light is necessary for photosynthesis

- Take some twigs of an aquatic plant like Hydrilla in beaker filled with water.
- Invert a funnel over the twigs. Invert a test tube filled with water on the stem of the funnel.
- Keep this set-up in sunlight for sometime.
- What do you observe?
- You will notice air bubbles (oxygen gas) coming out from the twigs. If this set-up is kept in the dark, no air bubbles come out. This shows that sunlight is necessary for photosynthesis.



Light is necessary for photosynthesis

3. Rhizobium, the bacterium living in association with root nodules of leguminous plants in an example of symbiotic relationship. It derives its nutrition from the roots and in turn converts atmospheric nitrogen into nitrogenous compounds. These compounds are used by the plants for synthesizing proteins. In this way the soil is replenished with nitrogen naturally.

G. Distinguish between the following :

Ans. 1. **Parasite :** These are those organisms that derive nutrition from the body of other organism. For example : Mistledoe, Cuscuta, dodder.

Saprophyte : These are those organisms that cannot manufacture their own food through the pores of photosynthesis but obtain nutrition from dead and decaying plant and animal matter. Most common examples of

saprophytes are mushrooms, moulds and certain types of fungi and bacteria.

2. **Autotrophs :** These are those organisms which synthesise their own food using inorganic materials such as carbondioxide, water and minerals. All green plants are autotrophs.
   Heterotrophs : These are those organisms which do not prepare their own food but are directly or indirectly dependent on plants for food. All non green plants and animals including human beings are heterotrophs.

H. HOTS Questions :

Ans. 1. The algae and fungi mutually benefit each other and in the process fulfil all their needs. The alga is an autotroph. It makes food, which is also used by the fungus.
We all know alga survives in water. Its need for water is fulfilled by the fungus which in turn consumes the food made by alga. The fungus in turn gives to the alga, water and minerals it obtains from the substratum on which it lives. This association of algae and fungi makes them look as if they are one single organism.

2. Leaves grow in different patterns due to adaptations. Because plants are found in different places and different climate they need special shapes, sizes and texture.

3. Even if the plant is not green coloured, it will photosynthesise if it had chlorophyll.

THINGS TO DO

Do it yourself.

2 Nutrition in Animals

EXERCISE

A. Tick (✓) the correct answer :

Ans. 1. a. Incisors 2. b. small intestine
3. a. Large intestine 4. c. The liver

B. Fill in the blanks :

Ans. 1. **Digestion** is the process of taking in of food.
2. Incisors are also called **tearing teeth.**
3. The living of the small intestine has finger-like projections called **villi.**
4. **Fatty acid** and **glycerol** act as energy reserve.
5. All true ruminants have a distinct **four-chambered** stomach.

C. Write true or false :

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

D. Give one example for the following :

Ans. 1. Outgrowths on the body of *Paramaecium* that help taking in food. **Cilia**
2. Digestive juice that acts only on carbohydrates. **Salivary amylase**
3. Digestive juice that acts only on fats. **Lipase**
4. Digestive juice acts only on proteins. **Trypsin**
5. An animal that has a rumen. **Cow**

E. Very Short Answer Questions :

Ans. 1. Mosquito and lice. 2. Food vacuole. 3. Enamel.

4. Absorption. 5. Plaque.

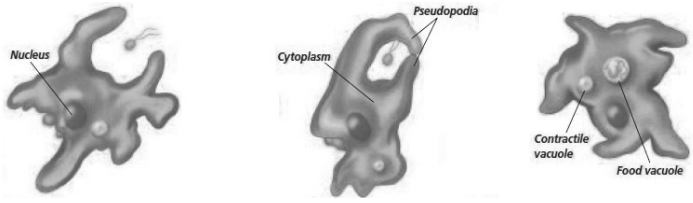
F. Short Answer Questions :

Ans. 1. The salivary glands, liver and pancreas are the digestive glands present in the digestive system.

2. The main function of the large intestine is to absorb water and to remove undigested solid wastes from the body in the form of faeces through the rectum (anus).

3. Stomach in ruminants are divided into 4 compartments :
i. Rumen ii. Reticulum iii. Omasum iv. Abomasum

4. 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 juice 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

5. Two suggestions for the proper care of teeth and gums are as follows :
- Brush your teeth daily in the morning and at night before going to bed.
- Use a dental floss for removing matter from places where toothbrush cannot reach.

G. Long Answer Questions :

Ans. 1. The various steps involved in the process of nutrition are as follows :

(i) Ingestion : This is the process of taking in of food. It includes two steps : capturing of food and eating it.

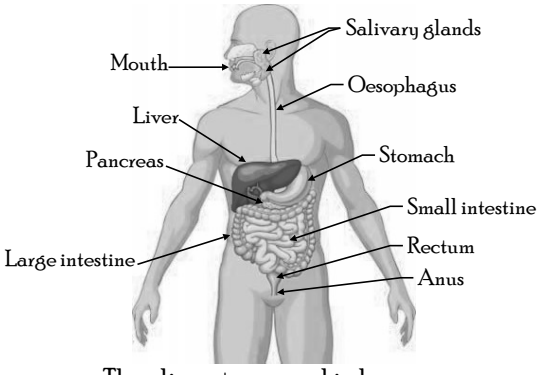
(ii) Digestion : The ingested food is required to be broken down into small units to obtain energy for maintaining life processes. This process of the breaking down of the bigger constituents of food into simpler and smaller units, is known as digestion. In most of the animals, the process of digestion includes both physical and chemical digestion. In physical digestion, the big-sized food particles are broken down into smaller units. In chemical digestion, the complex substances are converted into simple and absorbable substances.

(iii) Absorption : The simple substances resulting from the process of digestion are absorbed by the cells of the body. This process is done into small intestine.

(iv) Assimilation : The cells of the body make use of absorbed substances in the formation of some constituents and in obtaining.

(v) Ejection : In this process the undigested food is removed or eliminated from the body. This process is done in the last part of large intestine.

2. There are four different types of teeth. They are incisors, canines, premolars, and molars.
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 n 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. The process of digestion starts in the mouth itself where the food is mixed with saliva. Saliva, secreted by the salivary glands, contains digestive juices which help in the breakdown of starch into sugar. The saliva also makes the food slimy so that it can be easily swallowed.
The food passes from the mouth into a long tube called the oesophagus (also called food pipe). The walls of the oesophagus contracts and relaxes to produce wave-like movements (called peristaltic movements). This movement helps to move the food down into a large sac-like muscular organ called the stomach.
Further digestion of food takes place in the stomach. The inner wall of the stomach secretes digestive juices, hydrochloric acid, and mucus. The digestive juices help in the breakdown of proteins into simpler forms. The hydrochloric acid kills microorganisms and provides an acidic medium for effective digestion.
After digestion in the stomach, the semi-digested food called the chyme passes into the small intestine. Further digestion of food takes place in the small intestine where the secretions of the liver and pancreas are released.
The liver secretes bile which plays an important role in the digestion of fats. Bile is stored in an organ called gall bladder before being released in the small intestine. The secretions of the pancreas called pancreatic juice help in the breakdown of carbohydrates into sugars, proteins into amino acids, and fats into fatty acids and glycerol. Thus, the digestion of various components of food is completed in the small intestine.
4.



The alimentary canal in humans

5. The grass-eating animals digest cellulose because of their distinct four-chambered stomachs.
These animals mainly chew grass that contains cellulose. The half chewed grass travels from the mouth to the first chamber of the stomach, the rumen. In this first chamber, bacteria and other micro-organisms act upon the food. This half digested grass is sent to second compartment, the reticulum and from here it is sent back to the mouth to be chewed again.

H. HOTS Questions :

Ans. 1. It is necessary for our food to be digested because it provides us energy to do different works.
2. This is so because heavy food requires a long period of time to be digested and this may slows down our physical activities.

THINGS TO DO

Do it yourself.

3 Fibre to Fabric

EXERCISE

A. Tick (✓) the correct answer :

Ans. 1. b. Rayon 2. c. mulberry leaves 3. a. grading 4. d. Wooly dog

B. Fill in the blanks :

Ans. 1. A wide variety of animals provide **natural** fibres for cloth.
2. The process of washing removes **grease**, **dust** and **dirt.**
3. The **curls** provide holding ability to the fibres.
4. Wild silk grow wildly in **India** and **China.**
5. Silk is used as **non-absorbable sutures** in surgery.

C. Match the following :

Ans.

1.	Fleece	(a)	Wool-yielding animal
2.	Yak	(b)	Hair of sheep
3.	Shearing	(c)	Cover of pupa
4.	Cocoon	(d)	Removal of fleece

D. Write true or false :

Ans. 1. False 2. True 3. False 4. False

E. Very Short Answer Questions :

Ans. 1. We get wool from sheep, goat and yak.
2. Shearing, washing or scouring, sorting, carding, dyeing, spinning, and weaving are the steps employed for obtaining wool.
3. As silkworms are feed on mulberry leaves, muberry tree plays an important role in the production of silk.

F. Short Answer Questions :

Ans. 1. **a. Woollen system :** In this system, woollens are spun from fibres which vary in length and are mixed together.
b. Worsted system : Worsted are spun from combed wool. Combing removes the shorter fibres and leaves the longer ones lying parallel to make yarn.
2. Sericulture is the rearing of silk moths for obtaining silk.

3. The best quality of silk is obtained from the cocoons of silk moth, Bombyx mori.

G. Long Answer Questions :

Ans. 1. Wool is processed by the following methods.

i. Shearing— Once the sheep have developed thick coat of hair, the process begins with the removal of the hair (fleece) along with thin skin layer. This is called shearing. Shearing is done annually in summer months, so that by the time it is winter, a new coat of hair grows to protect the sheep from cold. It is done manually with a large razor or with an automatic shearing machine. Shearing can be compared to our hair cuts, so it does not hurt the sheep. The outermost layer of the skin that is sheared is dead tissue.

ii. Scouring— The sheared skin with hair is washed by simply dipping it in warm water or it may involve complicated industrial process using alkali and a detergent. Scouring removes dust, dirt, dead cells, grease and vegetable matter. Some of the lanolin is left intact. It provides the water proof property of wool.

iii. Sorting— This process involves grouping of wool according to its textures into categories of fleece which forms the bulk, Pieces, Bellies, Crutching and Locks. It is the quality of fleece that decides the grade of the wool according to its length, texture, colour, scale structure and fineness. The outer four categories are packaged and sold separately.

iv. Dyeing— The fibres are dyed in various colours according to dictates of fashion and demand.

v. Final Processing— The fibres are straigthened by putting them through rollers which are then stretched and twisted into yarns. These yarns are wound to form balls of wool used for knitting or weaving woollen cloth.

2. Many factors determine the quantity (and value) of wool. These include fibre diametre, crimp, yield, colour, purity and staple length and strength. Fibre diametre, also called fineness is the actual measurement of the thickness of the wool fibre. It is measured in microns, which is one millionth of a meter. Crimp is the natural waviness or bend of the wool fibre. It varies with the diameter of the fibre and can be used as a predictor of fineness. Yield is the amount of wool left after scouring. Bulkness of fleece generally indicates a high yield. Staple length is masured from base to the tip of the unstretched fibre. Longer-stapled wools are more valuable.

3. The female silk moth lays hundreds of tiny eggs on the mulberry leaves. The larvae, that hatch out of the eggs are called caterpillars. They feed on mulberry leaves vigorously and grow in size. When a caterpillar is ready to enter the pupal stage, it stops feeding and its salivary gland secretes fibre around the pupa. The fibre is made of a protein, which hardens on exposure to air and forms a cover around the pupa. This cover around the pupa is called cocoon. It is ball-shaped and is formed of silk fibre.Further development of silk moth continues inside the cocoon. At the end of pupal stage, moth cuts the silken fibre of the cocoon and the young moth flies out.

4. Uses of wool and silk are as follows :

Uses of Wool

i. Wool is used for making fabrics, shawls, blankets, carpets, felt (compressed wool) and upholstery.

ii. Wool felt is used to cover piano hammers. It is also used to absorb noise in heavy machinery and stereo speakers.

iii. **Shoddy** is made from the used wool. To make shoddy, the existing wool fabric is cut into small pieces and then carded. The carded wool is then respun into yarn. Such a yarn is inferior to the fresh wool and is used or making cheap woollen garments and blankets.

Uses of Silk

i. Silk fabric is light weight, lustrous, soft, elastic and highly strong in tensile strength. It keeps warm in winter and cool in summer.

ii. Silk is commonly used for making expensive dresses for men and women, which are worn on special occasions. In India, most of the silk is used in making sarees and scrafs.

iii. In addition to clothing, silk is used for items such as parachutes, bicycle tyres, bullet proof vests and non-absorbable sutures in surgery.

H. HOTS Questions :

Ans. 1. It is necessary to do so because this ensures that the silk fibre obtained is long and complete.

2. This is done to ensure that the sheep is not infected by germs while shearing.

THINGS TO DO

Do it yourself.

4 Heat and Temperature

EXERCISE

A. Tick (✓) the correct answer :

Ans. 1. d. human body 2. a. 32°F

3. b. conduction 4. d. all of these

B. Fill in the blanks :

Ans. 1. **Heat** is a form of energy which makes any object hot or cold.

2. **Temperature** is the measure of the degree of hotness or coldness of body.

3. **Conductor**, **convection** and **radiation** are the three modes of transfer of heat.

4. Land and sea breezes are actually **convection** currents.

5. Black bodies are good absorbers of **heat** energy.

C. Very Short Answer Questions :

Ans. 1. Heat causes some changes in the substances which are heated. It can increase the temperature of that substance or can change its shape.

2. A substance expands on heating due to the spread of its molecules.

3. Iron and silver.

4. Radiation is the process of transfer of heat without an intervening medium.

D. Short Answer Questions :

Ans. 1. People wear white clothes in summer because white colour absorbs heat in a very less quantity as it reflects most of it.

2. We are suggested to wear dark colours in winter. This is so because dark colours are very good absorbers of heat. They would absorb whatever heat is available.

3. Transfer of heat is the flow of heat from one place to another, from one body to another or from one part of a body to another part.

E. Long Answer Questions :

Ans. 1. During the day, land gets heated up faster than water. As a result, the air over the land becomes warm and, as hot air is lighter, it rises up. An upward current of air is set up over the land. The cool air blowing over the sea, rushes towards the land to fill the space left by the hot air. Therefore, the breeze that blows from the sea towards the land during the day is known as sea breeze.

At night, land cools down faster than the water in the sea. The air over the sea remains comparatively warmer than the air over the land. So the cool air over the land rushes towards the sea, setting up land breeze.

2. Ventilators and exhausts are critical to home comfort. Proper ventilation prevents air pollutants from affecting the health of you and your family. Not only that, having airflow in your home can get rid of any unwanted smells, such as from cooking or pets. It is also good to have an airflow that is uniterruptede, as anything blocking the airflow in your home can cause damage to both your home and your health.

One of the reasons ventilation and proper exhaust system is so important is because it controls how much moisture is langering in your home. If you have adequate airflow throughout your home, your walls, floors and all the wood in your home will stay dry and not collect moisture.

3. A thermos flask is a double-walled glass vessel with silvered inner surfaces. The gap between the two walls encloses vacuum. It is completely sealed at the top. The flask is placed on a support of cork in a metal case and is provided with a plastic cork with a ring of rubber or a pad.

The vacuum that lies between the walls prevents loss of heat by convection. Its outer shiny surface is a poor radiator of heat, hence, it prevents loss of heat by radiation.

The glass is itself a bad conductor of heat. The air, cork and rubber between the flask and the metal case all being bad conductors of heat do not allow loss of heat by conduction or convection. The cork in the neck and the cap covering it also check the loss of heat by convection. In the same way, the vacuum between the glass walls and the rubber cork on the flask does not let the heat from the atmosphere enter the flask by the process of conduction, convection or radiation. Thus, the flask can keep a hot liquid hot and cold liquid cold for a long time. A typical domestic thermos flask will keep a liquid cool up to 8 hours.

F. HOTS Questions :

Ans. 1. This is done so to prevent the loss of heat through conduction or convection.

2. This is because only the top layer of the lake or river freezes.

Underneath the frozen upper layer, the water remains in its liquid form and does not freeze. Also, oxygen is trapped beneath the layer of ice. As a result fish and other aquatic animals find it possible to live comfortably in the frozen lakes and ponds.

THINGS TO DO

Do it yourself.

5 Acids, Bases and Salts

EXERCISE

A. Tick (✓) the correct answer :

Ans. 1. a. lactic 2. c. hydrochloric acid 3. d. orange

B. Fill in the blanks :

Ans. 1. Acids are **sour** in taste whereas bases are **bitter.**
2. Acids turn **blue** litmus to **red**; whereas bases turn **red** litmus to **blue.**
3. When an acid reacts with a base, **salt** is formed along with water.
4. Turmeric is an example of a **natural** indicator.
5. Litmus is a dye which is extracted from **lichen.**

C. Write true or false :

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

D. Very Short Answer Questions :

Ans. 1. Acetic acid, citric acid, malic acid, tartaric acid, lactic acid, tannic acid, carbonic acid, formic acid, and amino acid.
2. Sodium hydroxide, Potassium hydroxide, Magnesium hydroxide, Ammonium hydroxide, Baking soda solution, Calcium hydroxide.
3. Turmeric.
4. Antacid is used to neutralize acidity caused due to too much secretion of hydrochloric acid in stomach.

E. Short Answer Questions :

Ans. 1. An acid is a type of compound that contains hydrogen and dissociates in water to produce positive hydrogen ion.
2. A base is a compound which combines with an acid to form a salt.
3. **Acid :** Acetic acid in vinegar; malic acid in apple and tannic acid in tea.
Base : Ammonium hydroxide in glass cleaner; calcium hydroxide in lime water and sodium hydroxide in soap.

F. Long Answer Questions :

Ans. 1. Uses of acids are as follows :

Hydrochloric acid

Hydrochloric acid is one of the strongest acid medium. This acid has different uses in different industries. For example, it is used to clean boilers (this process is called descaling). It is also used in purification of salts and in manufacturing other chemicals like ferric chloride, etc. It is used in oil industry to dissolve oil-bearing rocks and in preparing aqua regia (three parts of concentrated hydrochloric acid and one part of concentrated nitric acid).

Nitric acid

Nitric acid is mainly used in manufacturing fertilisers such as ammonium nitrate. It is essential for the production of explosives such as TNT (Trinitro toluene) and RDX (Research Developed Explosive). It is widely used in extraction of precious metals such as silver and gold from their natural forms. Nitric acid is a component of aqua regia.

2. It all depends on the pH level of the acids! Strong acids having pH 0-3 on a scale of 14 are highly corrosive like HCl, H_2SO_4, H_2S.
   Weak acids having pH 3-7 are less corrosive and mild. Some don't even cause any harm like Acetic acid (CH_3COOH).
3. The mixing of an acid with a base or vice versa is called neutralisation and such reactions are called neutralisation reactions.

   Acid + Base ⟶ Salt + Water

   Suphuric acid + Sodium hydroxide ⟶ Sodium sulphate + Water

   When an acid is mixed with a base, both the solutions neutralise the effect of each other. When a acid solution and a base solution are mixed in optimum amounts, both the acidic nature of the acid and the basic nature of the base are destroyed. The resulting solution is neither acidic nor basic and such a solution is called a neutral solution. In a neutralisation reaction, but is always evolved. The evolved heat raises the temperature of the reaction mixture and it becomes hot. Also, in neutralisation reaction, a new substance, salt is formed along with water. Salt formed may be acidic, basic or neutral in nature depending on which type of acid and base is used. For example, in the reaction given below, magnesium nitrate is the new substance formed along with water. Magnesium nitrate is a salt.

   Nitric acid + Magnesium hydroxide ⟶ Magnesium nitrate + Water
4. Most plants need a neutral soil for proper growth. Sometimes excessive use of fertilizers makes the soil acidic. To neutalize the acidic soil, slaked lime (calcium hydroxide, $Ca(OH_2)$, is added. If the soil is too basic, organic matters, i.e., fertilizer derived from animal or vegetable is added, as they release acids.

G. HOTS Questions :

Ans. 1. Basic.
2. Soaps contain acids and when turmeric came into contact with acids, it turns yellow.

THINGS TO DO

Do it yourself.

6 Physical and Chemical Changes

EXERCISE

A. Tick (✓) the correct answer :

Ans. 1. c. Burning of petrol 2. c. Dipping in water
3. b. hydrogen

B. Fill in the blanks :

Ans. 1. Burning of a coal is a **chemical** change.
2. Most chemical changes are **permanent** whereas most physical changes are **temporary.**
3. Rusting of iron is a **chemical** change, whereas boiling of milk is a **physical** change.
4. Mixing of iron and sulphur is a **physical** change whereas heating of iron and sulphur is a c **chemical** change.
5. The new substance, that is formed when magnesium oxide is dissolved in water, is called **Magnesium hydroxide.**

C. Write true or false :

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

D. Very Short Answer Questions :

Ans. 1. A physical change is the change in which no new substance is formed. It is usually a reversible change.
2. A chemical change is the one in which a new substance is formed. It is usually an irreversible change.
3. Crystallisation is the process of forming crystal of a solid substance from its solution.
4. Painting.

E. Short Answer Questions :

Ans. 1. A physical change involves a change in shape, size or physical state.
2. Water and oxygen are the things essential for rusting to take place.
3. Galvanisation is a process of prenting rusting to take place. In it a layer of metal like chromium or zinc is deposited on iron surface.
4. Yes, burning of magnesium is a chemical change. In it a new substance is formed.

F. Long Answer Questions :

Ans. 1.
- In a physical change, no new substance is formed.
  In a chemical change, new substance is formed.
- Most physical changes are reversible.
  Most chemical changes are irreversible.

2. Rust is a reddish-brown substance that appears on the surface of iron articles when they are left exposed to moist air.
3. The three methods by which rusting can be prevented are as follow :
   - **Coating an iron article with grease :** Applying a coat of grease on an iron article cuts off its contact with air and moisture. This prevents the iron article from getting rusted.
   - **Galvanisation :** This is the process of depositing a layer of zinc on iron. The coating of zinc does not allow the iron article to come in contact with air and moisture and, thus, prevents it from getting rusted.
   - **Alloying :** Have you ever noticed that some articles like scissors, blades and utensils do not get rusted at all? What are these made of stainless steel. Stainless steel is a special substance which is made by mixing some carbon and metals like chromium, manganese and magnesium with iron. This process of mixing metals (or nonmetal) is called alloying. The new substance formed by mixing is called an alloy. Alloying prevents rusting.

4. By the following activity it can be shown that burning of magnesium ribbon is a chemical change.
Take a magnesium ribbon about 10 cm long. Rub it with a sand paper to expose brightly shining metal. Hold the magnesium ribbon in the fire-tongs and heat its other end in bunsen flame, till it catches fire. Hold the burning magnesium ribbon over a glass plate.
You will observe that magnesium ribbon burns with a dazzling white flame and forms a white residue which falls in the glass plate.
Actually, the magnesium ribbon enters a chemical reaction with oxygen present in the air to form magnesium oxide.
Magnesium oxide + Oxygen ⟶ Magnesium oxide
Now take a test tube and put the powdery white ash (magnesium oxide)formed on it. Add little water to the test tube and shake well. On mixing magnesium oxide with water, a new substance called magnesium hydroxide is formed this can be represented as :
Magnesium oxide + Water ⟶ Magnesium hydroxide

G. HOTS Questions :

Ans. 1. This happened because of the chemical reaction between perfume present in the bottle and the air. The molecules present in the perfume reacted the molecules present in the air and changed their formed completely.
2. The quality of air does affect the rusting process. If the air is devoid of any moisture, than the rusting will take place very slowly. Similarly if the water has more iron or salt in it, rusting will take place in a short time.

THINGS TO DO

Do it yourself.

7 Weather, Climatic Changes and Adaptations

EXERCISE

A. Tick (✓) the correct answer :

Ans. 1. d. None of these
2. d. Polar bear
3. b. climate
4. b. hot and most

B. Fill in the blanks :

Ans. 1. The average weather taken over a long time is called **climate.**
2. Animals have certain special characteristics that enable them to live in a particular climate successfully, which are called **adaptations.**
3. Mammals like **polar bear** have fat deposits called blubber to keep themselves warm.
4. Some animals in extremely cold climates go off to a state of dormancy called **hibernation.**
5. A place receives very less rainfall and the temperate is high throughout the year, the climate of that place will be **hot** and **dry.**

C. Write true or false :

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

D. Match the following :

Ans.

1.	Polar bear	(a)	Long tail
2.	New world monkey	(b)	Polar region
3.	Icy area around the poles	(c)	Tropical rainforest
4.	Humid and wet climate	(d)	Thick white fur

E. Very Short Answer Questions :

Ans.
1. The weather changes from day to day.
2. Climate is the average weather condition of a place over a long period of time.
3. No, weather does not remain same everyday.
4. The maximum temperature usually occurs after midday and the minimum temperature usually occurs a little while after sunrise.
5. Penguins have very small ears which help them to retain as much heat as possible.

F. Short Answer Questions :

Ans.
1. The elements that determine the weather at a place are—temperature, air pressure, humidity, rainfall and conditions of sunshine.
2. The four factors on which the climate of a place depends on are :
   (i) Distance from the Equator. (ii) Height above the sea level.
   (iii) Distance from the sea. (iv) Direction of the winds.
3. As weather is the sum total of atmospheric conditions for a short time, it changes often in comparison of climate.
4. The climate is the common, average weather conditions at a particular place over a long period of time (for example, about 25 to 30 years). Example - hot climate, cold climate, moderate climate.
5. Some features which are possessed by animals living in the polar region are as follows :
   - They have a very thick layer of fat deposits that keep their bodies warm.
   - They take on the temperature of the water which is usually stable.
   - Some large fish and mammals keep their bodies warm and insulated from the cold.

G. Long Answer Questions :

Ans.
1. Weather is the day conditions of the atmosphere at a particular place at a given time. The factors or elements determining the state of atmosphere at a place include temperature, air pressure, humidity rainfall and conditions of sunshine. Weather conditions are temporary and can change over short periods of time.

   Weather forecasting is based on the readings made by the Meteorological Department which studies various aspects of weather scientifically. Today, there is access to pictures from satellites with special remote sensing instruments that are continuously surveying the earth. Computer programmes analyse the data quickly and make enormous number of calculations.
2. The body of penguins is white coloured from underside and merges well with the white background of snow. It also has thick skin and a thick layer of fat under the skin. These features protect it from cold. The body

of penguins is streamlined and the feet have webs. Both these features help them in swimming. Penguins are good swimmers. Penguins have very small ears which help them to retain as much heat as possible. Penguins usually huddle together. This they do to keep warm.

3. The tropical rainforests are very thick. The climatic conditions are very supporting to animals, hence an enormous variety of animals live in these forests. Because of this factor there is extreme competition among the animals for food. Many animals live on trees. They are adapted to live on trees and move swiftly from one tree to another. Another important feature is the well developed sense of smell, enemies or prey. This helps the animals to protect themselves from large number of carnivorous animals and also to smell them.
4. The tropical rainforest has a large population of animals because it experience continuous warmth and rain throughout the year. Such climatic conditions in rainforests are highly suitable for supporting an enormous number of variety of animals.

H. HOTS Questions :

Ans. 1. Yes, deforestation can lead to changes in weather. This is because trees cools the weather and ensures proper rainfall.
2. This is so because the air surrounding the coastal areas is always wet and full of moisture.

THINGS TO DO

Do it yourself.

8 Respiration

EXERCISE

A. Tick (✓) the correct answer :

Ans. 1. c. inhalation 2. a. alveoli
3. a upward and outward 4. b. body surface

B. Fill in the blanks :

Ans. 1. Breathing in is called **inhalation** and breathing out is called **exhalation.**
2. Exchange of gases in the lungs takes place in the **alveoli.**
3. **Carbon dioxide** and **ethyl alcohol** are released as by-products during anaerobic respiration.
4. Lungs are enclosed in an airtight cavity called **thorax.**
5. Gaseous exchange in earthworms takes place through their moist **skin.**

C. Write true or false :

Ans. 1. False 2. True 3. True 4. False

D. Very Short Answer Questions :

Ans. 1. Living organisms obtain energy for their activities through respiration.
2. All organisms respire to obtain energy for their life processes.
3. The products formed as result of aerobic respiration are energy, carbon dioxide and water.
4. Gills are the respiratory organs found in fish.

E. Short Answer Questions :

Ans. 1. Anaerobic respiration is the process of respiration that takes place in the absence of oxygen.

Sugar ⟶ Ethyl alcohol + Carbon dioxide + Energy

2. Oxygen is the most important part of respiration. Cells of the body utilise oxygen to produce energy by breaking down the food molecules into carbon dioxide and water.
3. Lungs are the organs of respiration in human beings. They are present in the thorax (chest) and are protected by the rib cage.
4. Trachea is a network of tubes present in the body of insects that help in the gaseous exchange.

F. Long Answer Questions :

Ans. 1. The two main processes of respiration are as follows :

Aerobic Respiration : The process of respiration that takes place in the presence of oxygen is called aerobic respiration. This results in the release of energy, and in the formation of carbon dioxide and water.

Aerobic respiration is represented by the equation :

Sugar + Oxygen ⟶ Energy + Carbon dioxide + Water

Aerobic respiration is the most efficient form of respiration. The reaction involved in this process is similar to that of combustion of burning. However, there are some differences between the two.

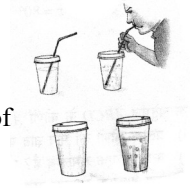
Anaerobic Respiration : The process of respiration that takes place in the absence of oxygen is called anaerobic ("an" means "without") respiration. This results in the release of energy, and in the formation of carbon dioxide and ethyl alcohol (an organic compound). It is represented by :

Sugar ⟶ Energy + Carbon dioxide + Ethyl alcohol

2. We can show this with the help of following experiment.

Aim : To show that exhaled air has more carbon dioxide.

Materials needed : Two disposable glasses with covers and a hole on top, two straws, and lime water.



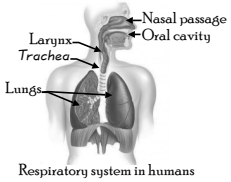
Method :

- Fill both the glasses with limewater.
- Put straws in both the glasses. Let air enter one of them through the straw.
- In the second, blow out some air (exhaled air).

Observation : The limewater in glass one is only slightly, milky, while in glass two it is very milky.

Conclusion : Carbon dioxide has the property of turning limewater milky. From the observation, it is true that the exhaled air has more carbon dioxide.

3. In humans, several organs take part in the process of respiration. Shows the different organs of respiration. These different organs together form the respiratory system.



Respiratory system in humans

Organs of the Respiratory System

- Nostrils
- Nasal cavity or passage
- Windpipe (trachea)
- Bronchi (singular bronchus)
- Lungs

Air enters our body through the nostrils. From the nostrils, the air containing oxygen is taken into the nasal cavity. From here it goes down the windpipe or trachea; from trachea it goes to two smaller tubes called bronchi (singular bronchus). One bronchus enters each lung. Inside the lungs, each bronchus divides repeatedly into a large number of small branches called the bronchioles. Each bronchiole ends in a number of air sacs known as alveoli (singular alveolus). The walls of the alveoli have a large number of very thin blood capillaries.

Lungs are present in the chest cavity. This cavity is surrounded by ribs on the sides. Ribs form a cage-like structure, called the rib cage. A large muscular sheet called diaphragm forms the floor of the chest cavity.

4. **(a) Fish :** Fish breathe under water. They possess a special organ known as gills for breathing. Gills are extensions of the skin. They are made up of a large number of thread-like structures known as filaments. They are richly supplied with blood vessels.

   The water, which enters the body of a fish, flows over the gills. The blood vessels absorb the oxygen dissolved in water and transport it to the rest of the tissues in the body of the fish. The blood vessels also bring back carbon dioxide from the cells of the gills. This carbon dioxide is released into the surrounding water.

   (b) Cockroach : Cockroach have small openings in their body known as spiracles. There is a network of tubes called tracheae that help in the gaseous exchange. Air, that is rich in oxygen, enters the insect's body through the spiracles and is carried to all parts of the body through the tracheal tubes.

   From here it reaches the cells of the body tissue. Now the reverse process starts. The carbon dioxide rich air enters the tracheal tubes and escapes through the spiracles.

   (c) Earthworm : Earthworms breathe through their skins. The skin of an earthworm feels moist and slimy on touching. Gases can easily pass through them. Though frogs have a pair of lungs like human beings, they can also breathe through their skin, which is moist and slippery. This method of exchange of gases through skin is known as cutaneous respiration while the method of exchange of gases through lungs is known as pulmonary respiration.

G. HOTS Questions :

Ans. 1. This is so because the nostrils are smaller then the mouth, air exhaled through the nose creates back pressure when one exhales. It slows the air escape so that the lungs have more time to extract oxygen from them.

2. This is to inhale more oxygen to get more energy to improve his physical stamina.

THINGS TO DO

Do it yourself.

9 Transport of Substances in Animals and Plants

EXERCISE

A. Tick (✓) the correct answer :

Ans. 1. 1. c. RBCs 2. a. transpiration
3. a. bean-shaped 4. c. Aorta

B. Fill in the blanks :

Ans. 1. The red blood cells have red colour due to the presence of **haemoglobin.**
2. **WBCs** are called soldiers of the body.
3. **Ventricles** veins carry oxygenated blood.
4. **Arteries** have thick walls and narrow lumen.
5. Urine contains nitrogenous wastes in the form of **urea.**

C. Write true or false :

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

D. Match the following :

Ans.

1. Cells that fight against germs	(a) Kidney
2. Tissue that translocates food	(b) Leucocytes
3. Tissue that transports water and minerals	(c) Stomata
4. Excretion	(d) Phloem
5. Transpiration	(e) Xylem

E. Very Short Answer Questions :

Ans. 1. The circulatory system is very important because it carries the blood from the heart to different parts of the body and brings it back to the heart.
2. The three kinds of blood vessels are—arteries, veins and capillaries.
3. Three kinds of blood cells are—white blood cells, red blood cells and blood platelets or thrombocytes.
4. Sweat is the fluid that comes out of the pores of the body as the part of excretion process.

F. Short Answer Questions :

Ans. 1. The main functions of blood are :
- Blood is the vehicle for metabolic communication between the organs of the body.
- Blood transports nutrients from small intestine to the liver and other organs. It also transports waste products to the kidneys for excretion.
- Blood transports oxygen from the lungs to the tissues and CO_2 generated during the respiratory metabolism to lungs for excretion.

2. Excretion is the process of removing toxic waste from the body.
3.

Artery	Vein
Thick-walled with narrow lumen.	Thin-walled with wide lumen.
Blood flows from heart to other body parts.	Blood flows from body organs to the heart.

Supplies blood to body organs.	Collects blood from body organs and brings it back to heart.
Situated deeper under the skin.	Situated just under the skin.
Carries oxygenated blood (except pulmonary arteries).	Carries deoxygenated blood (except pulmonary veins).

4. The functions of circulatory system in animal body is the delivery of oxygen, nutrient molecules and hormones and the removal of carbon dioxide, ammonia and other metabolic wastes.

G. Give reasons for the following :

Ans. 1. This is so because they are the distributing chambers of the heart. They need to keep the oxygenated blood and distribute it to the whole body.
2. This is to control the direction of blood flow on the heart and into the blood vessels.
3. This is because they carry blood away from the heart.
4. This is so because they protect our body from infections by producing antibodies in our body.
5. Plants absorb water and minerals from the soil. These are required by all the parts of the plant. As such they are pulled upwards and thus they show upward movement.

H. Long Answer Questions :

Ans. 1. Blood is circulated throughout the body by the pumping action of heart.
It is circulated because blood is essentially an aqueous solution containing electrolytes, organic molecules, having suspended particles.
- **Red blood cells**— (RBC; erythrocytes)
- **White blood cell** — (WBC; leukocytes)
- **Blood platelet** — (thrombocytes)
- **Blood plasm**— the solution-part of the blood (blood minus the particles).
- **Blood serum**—when a protein called fibrinogen is removed from the plasma, blood serum is obtained.

2. Sweat glands in the skin remove water, salts, urea, etc. from the blood flowing through blood capillaries in the skin. They open on the surface of skin by tiny pores. The fluid that comes out of the body through these pores is called sweat.
In summer, when we feel hot due to external heat, sweating and evaporation of sweat makes the body cool. Sweat evaporates from the body surface. Evaporation needs heat which is obtained from the body. So we sweat in summer and also feel more thirstier.
3. Contraction of atria chambers and then ventricular chambers are the two phases of the heart beat. These two phases of heart beat can be heard as lub and dub sounds. The heart beat sound is caused by the contraction of muscles and shutting down of valves.

- In the lub phase, the ventricles contract and cuspid valve close.
- In the dub phase, the pulmonary and aortic valves close. We can hear it by placing our ear on the left side of the chest of our friend.

4. Demonstration of transpiration.
   - Take a potted plant.
   - Cover it by polythene so that its roots along with soil get completely covered. This will prevent evaporation of water from the soil.
   - Put a bell jar over the potted plant. Apply vaseline on the rim of the jar, this will prevent air from entering the jar from outside.
   - Keep this set up in the sunlight for sometime. You will find drops of water on the inner side of the bell jar.
   - These drops are the water vapour due to the process of transpiration.

I. HOTS Questions :

Ans. 1. Left half of heart has oxygenated blood and right half has deoxygenated blood.
2. Ventricles have much thicker walls than auricles because they are required to distribute blood to all the other parts of body.

THINGS TO DO

Do it yourself.

10 Multiplication in Plants

EXERCISE

A. Tick (✓) the correct answer :

Ans. 1. d. Rose 2. b. Zygote 3. c. Unisexual flowers
4. a. wings 5. a. Fragmentation

B. Fill in the blanks :

Ans. 1. In **asexual reproduction** a new individual develops from a single parent.
2. Seedless plants can be raised through **spore formation.**
3. **Spores** have thick walls.
4. Pollen grains have a tough **protective** coat which prevents them from drying up.
5. Animals help in seed dispersed by eating the **succulent** fruits.

C. Write true or false :

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

D. Match the following :

Ans.

1. Bud	(a) Spirogyra
2. Eyes	(b) Yeast
3. Fragmentation	(c) Potato
4. Spores	(d) Rose
5. Sugar cane	(e) Cutting

E. Very Short Answer Questions :

Ans. 1. Budding is a type of asexual reproduction, in which a bud grows out from the parent's body, ditches itself from the parent, undergoes a series of changes, and finally develops into an adult individual.

2. The function of vegetative bud is to give rise to new plants.
3. Asexual reproduction is a type of reproduction in which a new individual develops from a single plant.
4. Spores are usually covered by a hard protective coat to survive adverse conditions in the environment, like high temperature, scarcity of water and lack of food.
5. Fragmentation means that an organism breaks up into two or more pieces called fragments. These pieces or fragments grow into new individuals.

F. Short Answer Questions :

Ans. 1. The production of new individuals from the parents is known as reproduction.
Plants reproduce by various methods. These methods can be divided into two types : i. asexual reproduction and ii. sexual reproduction.
Asexual reproduction includes—binary fission, budding, vegetative propagation and spore formation.

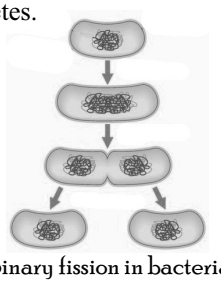
2. In asexual reproduction, the new individual is produced by a single parent. Seeds are not produced, there is no union of gametes (sex cells). The new individual is identical to the parent. In sexual reproduction, fusion of two types of gametes take place. Two parents take part in the formation of gametes, and new individuals are produced from these. The new individual is not identical to either of the parents. It has features of both the parents.

3. **(a) Potato :** In potato vegetative propagation takes place by stems. It has scars called 'eyes' on its surface. The eyes on germination give rise to new plants.
(b) Mint : In mint vegetative propagation occurs by suckers. The roots of mint form a cluster of adventitious roots. These give rise to new plants.
(c) Sugar cane : In sugar cane vegetative propagation takes place by stem cutting. Their stems have buds that give rise to new plants.

4. Syngamy is the fusion of male and female gametes.
5. Zygote is fusion product of male and female gametes.

G. Long Answer Questions :

Ans. 1. Bacteria reproduces by binary fusion. It is the simplest method of asexual reproduction. In this process, the nucleus of the cell first divides into two (Karyokineiss). This is followed by the splitting of the cytoplasm across the middle resulting in the formation of two identical daughter cells (Cytokinesis).


Binary fission in bacteria

2. **Self-Pollination**
When the pollen grains from the anther of a flower are transferred to the stigma of the same flower or of another flower borne by the same plant, it is termed as self-pollination. Mirabilis, potato, rice, wood sorrel, pansy, etc., are self-pollinated flowers.

Cross-Pollination

When the pollen grains are transferred from anther of one flower to the stigma of another flower of the same type borne on another plant, it is termed as cross-pollination. For example, papaya, palm, mulberry, etc.

3. After the pollen grains are transferred from anther to the stigma of the flower, then pollen tube is formed through which the male gametes enter into the ovary and fuse with the eggs in ovules. This process is referred to as fertilization.

   Fertilization is the process in which fusion of nuclei of male and female gametes takes place which lead to the formation of zygote." This fusion of male and female gametes is called syngamy.

   Thus after fertilization has taken place, the fertilized ovule is known as zygote. The zygote develops into an embryo and fertilized ovule into seed.

4. The dispersal of seeds take place through different mechanisms.

   Wind— Many seeds get dispersed by wind and therefore they may develop hair-like structures that offer air-resistance so that they are carried over long distances before falling to the ground. Common examples of such seeds are that of dandelion, sycamore, drumstick, cotton seeds and seeds of maple (oak).

   Water— The seeds may also get carried away by water. Seeds of water plants such as the water lily, lotuss, coconut, etc. may even develop a spongy outer coat that keeps the seeds afloat.

   Animals— In many cases, the seeds, like those of Xanthuim, stick to bodies of animals passing by through tiny hooks in their coat and travel to far off places. Animals also help in seed dispersal by eating the succulent fruits. The seeds of such fruits may pass through guts of animals undigested and may get deposited in the soil along with excreta.

   Explosion— Another means of seed dispersal takes place through explosive mechanisms employed by the plant itself. Sometimes as observed in case of pea, jasmine, etc., the pod splits open due to unequal drying and seeds are flicked out. In Impatiens, a flowering plant, the pressure exerted from within causes it fruit to burst open, flinging out the seeds.

5. The flowers are the reproductive parts of a plant. The stamens are the male reproductive part and the pistil is the female reproductive part of the flower.

   The flowers which contain either only the pistil or only the stamens are called unisexual flowers. The flowers which contain both stamens and pistil are called bisexual flowers. Corn, papaya and cucumber produce unisexual flowers, whereas mustard, rose and petunia have bisexual flowers.

   Both the male and the female unisexual flowers may be present in the same plant or in different plants.

   Anther contains pollen grains which produce male gametes. A pistil consists of stigma, style and ovary. The female gamete or the egg is

formed in an ovule. In sexual reproduction, a male and a female gamete fuse to form a zygote.

H. HOTS Questions :

Ans. 1. The seeds dispersed by animals have spines and looks so that they can stick to the fur of animals and carried away.

2. This represents the binary fission (fragmentation) of algae.

THINGS TO DO

Do it yourself.

11 Motion and Speed

EXERCISE

A. Tick (✓) the correct answer :

Ans. 1. a. second 2. c. Quartz watches 3. a. m per second

4. a. oscillatory motion 5. d. 20 m/s

B. Fill in the blanks :

Ans. 1. A **sand glass** consists of two round glass bulbs.

2. A stop watch can measure time up to **one-tenth** of a second.
3. A simple pendulum shows **oscillatory** motion.
4. A **clock** has a balance wheel.
5. The motion is said to be **uniform** when a object travels equal distances in equal intervals of time.

C. Write true or false :

Ans. 1. True 2. True 3. False

4. False 5. False 6. True

D. Name the types of motion in each case :

Ans. 1. A car travelling on a busy road **non-uniform motion**

2. The motion of the Earth round the Sun **uniform motion**
3. The motion of the hands of a watch **uniform motion**

E. Very Short Answer Questions :

Ans. 1. Time is the lapse between the regularly recurring events.

2. A sand clock is a device used by the Romans to measure time.
3. A simple pendulum consists of a small metallic ball tied to a thread suspended with a rigid support.
4. A uniform motion is a motion in which a body covers equal distances in equal intervals of time.
5. Second.

F. Short Answer Questions :

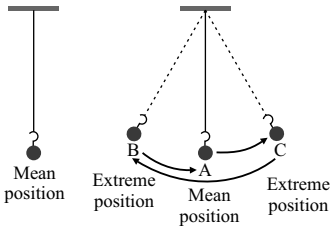
Ans. 1. Motion is a change in the position of a body with respect to time.

2. Oscillatory motion can be termed as the repeated motion in which an object repeats itself from point a to point b and to point a.
3. **Speed :** Speed is the distance travelled by an object in a unit time.
   Time : Time is the lapse between the regularly recurring events.
4. Quartz crystal clocks are the modern clocks used for measuring time. Quartz crystals are subjected to an alternating electric field which

produces an extremely fixed oscillation. These steady oscillations make the time pieces very accurate.

G. Long Answer Questions :

Ans. 1. **Length of a simple pendulum :** The distance *'l'* between the point of suspension and the centre of the bob.



Simple pendulum

Oscillation : One complete vibrational motion (to and fro motion). When the bob of the pendulum moves from one position and comes back to the same position, i.e., in the given figure from A to C, C to B and B to A.

Amplitude : The maximum displacement of the bob on either side from its mean position, i.e., from A to C or from A to B. AC is equal to AB.

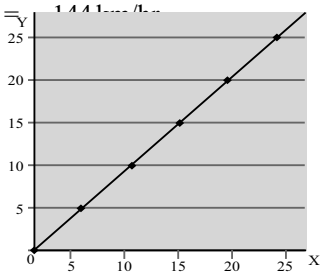
Time period : The time taken to complete one oscillation. Time period depends upon the length of the string from which the bob is suspended. Greater the length of the pendulum, greater will be the time needed for one complete oscillation. Time period does not depend on the extent to which the bob of the pendulum is displaced (i.e. the amplitude) nor on the mass of the bob used. So for a particular pendulum length, the time period does not change and it is taken as constant.

2. Rest and motion are considered relative terms because an object may be in motion with respect to an object, and may be stationary or at rest with respect to a third object. For example, suppose we are travelling in a train and we pass a person standing along the track. The person standing along the track will see us and everyone else in the train as being in motion. But the person sitting next to us in the train will be at rest with respect to us.

3. Speed (in m per second) = $\frac{400\text{ m}}{10\text{ s}}$ = 40 m/s

(in km per hour) = $\frac{40 \times 18}{5}$ km/hr = 8 × 18 = 144 km/hr

4.



5. Different units of a speed are :
metre per second (m/s)
and km per hour (km/hr)
Its S.I. unit is m per second m/s.

H. HOTS Questions :

Ans. 1. It will have a uniform motion.
2. The time period will remain same.

THINGS TO DO

12 Electric Current and Its Effects

EXERCISE

A. Tick (✓) the correct answer :

Ans. 1. d. Silver 2. a. Copper and tin 3. c. Rubber

B. Fill in the blanks :

Ans. 1. A circuit with an open switch is called an **open circuit.**
2. The combination of two or more cells in an electric circuit is called **battery.**
3. The **higher** the resistance of a material, the **lower** the current that can pass through it.
4. The heating effects of electric current is the conversion of **electric** energy in to **heat** energy.
5. Electric fires caused as a result of overloading may be prevented by the proper use of a **fuse.**

C. Write true or false :

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

D. Very Short Answer Questions :

Ans. 1. Electric current is the flow of electric energy or electricity.
2. Electric circuit is the path along which electric current can flow.
3. A battery is a combustion of two or more cells in an electric current.
4. Insulators are materials which show high resistance or conduct almost no electric current through them.
5. Fuse is a safety device in an electric circuit when prevents short circuit.

E. Short Answer Questions :

Ans. 1. When the electric path, which starts from the positive terminal of a cell or battery, is broken at some point, then such an electric circuit is called open electric circuit. Electric current does not pass in this case because the path is not completed.
2. A nichrome wire gets heated in an electric circuit because it has a very high resistance power.
3. Copper and tin is used to make fuse wire. No, any metallic wire cannot be use as a fuse wire. This is so because a fuse wire should have low melting point so that it can melt away in case of overheating.
4. Short circuit and overloading are the causes of fire in electric circuits.

F. Long Answer Questions :

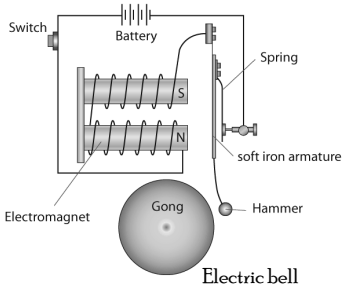
Ans. 1. By the given activity one can make an an electromagnet in the laboratory.
Aim : To make an electromagnet.
- Take an iron nail of about 6-10 cm in length and wind an insulated copper wire on it.
- Now connect the ends of the copper wire to the two terminals of a dry cell via a switch.

- Switch on the current through the circuit and bring a few pins near the wounded nail.
- Now switch off the current and see what happens.

The iron nail behaves like a magnet as long as current flows through the circuit. The pins cling to the nail when the switch is 'on', while they drop as soon as the switch disconnects the electric circuit.

You can see an enhanced magnetic field (more pins cling to the nail) if you use a battery in place of a cell.

2. The diagram alongside shows the different parts and the electric circuit due to which the bell rings. Study the diagram given alongside carefully.



   - When the bell is pressed the contact screw touches the iron strip and the circuit is completed. The current starts flowing through the coil.
   - The electromagnet becomes magnetised and the soft iron armature is attracted towards the electromagnet. The movement of the iron causes the hammer to hit the gong.
   - This movement breaks the circuit at point P, so that the current stops flowing and switches off the electromagnet.
   - The spring pulls the armature back to its original position, the circuit is remade and the process starts over again. This is how the bell rings.

   The 'make-and-break contact screw at P is adjustable to give the best sound. If the gong is removed, the bell becomes a buzzer.

3. Some substances allow the flow of current with more ease than others. When current flows through metals, the electrons can move through them easily. Electrons while moving through any substance come across imperfections within the material which cause opposition to their movement. This hindrance in the path of moving electrons is termed as resistance offered by that particular substance. All materials, including metals, show some level of resistance or hindrance to the flow of current. Thus, electrical resistance of a material is a measure of its hindrance to the flow of electric current. The unit of resistance is ohm (W). The higher the resistance of a material, the lower the current that can pass through it.

   This is used in an electric bulb in the following way.

   An electric bulb has a thin coiled wire made up of tungsten known as a filament. The bulb is filled with an inert gas at low pressure to prolong the life of the filament. Tungsten has high resistance to current. When a current is passed through the filament, it gets heated to such a high temperature that it starts glowing. Since tungsten has very high melting point, it does not melt even when white hot.

4. Some substances like metals conduct electricity well and are called good conductors or simply conductors. They offer very less resistance to the flow of electric current, but not all metals are good conductors. This

property of different resistance offered by different materials towards flow of electric current is used in various applications of electricity.

G. HOTS Questions :

Ans. 1. When we charge the battery in our mobile phone we degrade the environment as they consume a lots of energy.

2. Electric cars, to some extent does not waste energy or cause pollution.

THINGS TO DO

Do it yourself.

13 Winds, Storms and Cyclones

EXERCISE

A. Tick (✓) the correct answer :

Ans. 1. c. New Delhi 2. d. all of these

3. c. Storm arising from strong rising currents 4. a. over 100 km/h

B. Fill in the blanks :

Ans. 1. **Air pressure** is the force exerted on us by the weight of tiny particles of air.

2. The movement of air is known as **wind.**

3. Too much of **rains** may result in floods.

4. The warm rising winds carry droplets of water **upwards.**

5. The centre of a **storm** is known as its eye.

C. Write true or false :

Ans. 1. False 2. True 3. True 4. False

D. Match the following :

1.	Wind	(a)	Expand on heating
2.	Gases	(b)	Hot and humid tropical regions
3.	Equator	(c)	Always present and moving
4.	Thunderstorms	(d)	Philippines and Japan
5.	Typhoon	(e)	Direct rays of the Sun

E. Very Short Answer Questions :

Ans. 1. Air pressure is the force exerted on you by the weight of tiny particles of air (air molecules).

2. Thunderstorms are storms accompanied by heavy rain and lightning.

3. The uneven heating of land surface causes the generation of wind currents.

4. The centre of a cyclone is known as its eye. It is a calm area.

5. In the US and West Indies, cyclone is called hurricane, in Philippines and Japan it is known as typhoon, and willy-willy in Australia.

F. Short Answer Questions :

Ans. 1. The two examples are as follows :

- When we ride a bicycle against the direction of wind, we have to use extra energy to ride.
- When we row a boat in the direction opposite to that of wind, we have to put extra efforts.

2. Thunderstorms develop when warm, humid air near the ground receives an initial upward push from converging surface winds and rises rapidly

in an unstable atmosphere. The rising winds carry water droplets upwards, where they freeze and fall down again. The fast movement of the falling water drops and the rising air creates lightning and sound. This phenomenon is known as thunderstorm.

3. Storms are caused when different types of air masses meet. This could be a dry air mass meeting a moist air mass, or a cold air mass meeting a warm air mass.
4. A cyclone is an area of low atmospheric pressure characterised by inward spiralling winds that rotate counter-clockwise in the northern hemisphere and clockwise in the southern hemisphere.
   The cyclone winds travel at a very high speed. They can be extremely destructive. They can damage houses, uproot trees, telephone and other communication systems leading to the loss of life and property.

G. Long Answer Questions :

Ans. 1. **Aim :** To show that air exerts pressure.

- Take a tin can with a lid and fill it two-thirds with water.
- Heat the water on a burner till the water starts boiling.
- Now put off the burner, cover the mouth of the can with its lid tightly and pour cold water on the hot can as shown in the given figure.

You will observe that the tin loses its shape.

When the water in the can is heated, it changes into vapour form. When cold water runs over the tin can containing hot water, some of the steam in the can turns back to its liquids state, reducing the amount of air inside. This reduces the air pressures inside the can compared to the air pressures outside. As a result, the can gets compressed or deshaped.

2. Winds currents are generated because of the following two reasons :

Uneven Heating of the Equator and the Poles

You know that the regions lying close to the Equator receive direct rays of the sun. Thus, the air in these regions is warmer.

This warm air rises up and thus a zone of low pressure is created. The cool air from the 0°–30° latitude belt present on either side of the Equator moves towards the low pressure area. These winds blow from the north and the south to reach the equator.

The polar regions are colder than their surrounding latitude belts. The warmer air from these latitude belts rises and the cooler air from the polar regions rushes towards these regions. Such movements of air from the warmer to the cooler regions and vice- versa set up wind currents on the Earth.

Uneven Heating of Land and water

Land and sea breezes are convection currents. During summer, the land gets heated up faster than the water and the seas. The warm air above the land rises and the cool winds from the sea blow towards the land to take its place. The winds blowing from the sea are laden with moisture. They bring rain. Such winds are known as monsoon winds. In winter, the winds blow from land to sea, i.e., the reverse happens.

3. Following safety measures should be taken during a storm :
   - Remove any dead trees or overhanging branches, loose roofing

materials, etc., that could blow away.

- Stay indoors at far as possible and move to a shelter agreed upon.
- Secure windows and stay away from them.
- You will not be able to outrun a tornado in your car, so please don't try to do it.
- Do not take shelter under a tree, as trees can be uprooted due to heavy rain and strong winds. Watch out for flying debris and loose objects that may fall.
- Avoid anything that may touch electricity lines. Wet ground or puddles of water will conduct electricity.
- People in low-lying areas and near the coastline should be evacuated.
- Fishermen should not go out to sea after a cyclone warning.
- Enough food, water, and emergency medicines should be kept in the house as it may be necessary to stay indoors for a few days.
- A good supply of candles, lanterns, or a battery-operated torch lights with lots of spare batteries should be kept in the house as you may have to go without electricity for a day or two during a cyclone.

4. **Mechanism of the Formation of a Thunderstorm**

The warm rising winds carry droplets of water upwards.

At higher altitude, the water droplets freeze and fall towards the Earth due to gravity. During downward journey, the frozen droplets melt to form water droplets. These water droplets fall down as heavy rain. This falling water alongwith the rising warm air and lightning give rise to a thunderstorm.

Precautions to be Observed During a Thunderstorm

During a thunderstorm, observe the following precautions :

When you are in open

- Do not take shelter under an isolated tree. While in a forest take shelter under a small tree.
- Do not take shelter under an umbrella having a metallic handle.
- Get out of pond or swimming pool, if you are there. That is, keep away from water bodies.
- Sitting inside a car/bus is safer. So if you are driving, park your vehicle and stay inside.

When you are inside

- Do not sit near the open window. Close windows and doors properly.
- Do not touch/operate any electrical appliance or telephone.
- Do not watch TV.

H. HOTS Questions :

Ans. 1. Air pressure does help the birds to fly. It is so because air pressure helps in the formation of wind.

2. A vacuum cleaner works with the help of air pressure.

THINGS TO DO

Do it yourself.

EXERCISE

A. Tick (✓) the correct answer :

Ans. 1. d. path of light 2. b. cannot be obtained on a screen
3. c. Enlarged

B. Fill in the blanks :

Ans. 1. Light travels in a **straight** line.
2. The narrow path of light, represented by a straight line, is called a **ray** of light.
3. A **plane** mirror reflect a greater part of light.
4. The image formed by a plane mirror is as **far** behind the mirror, as the **object** is in front of it.
5. The colour of the **reflected** light gives the object its colour.

C. Write true or false :

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

D. Very Short Answer Questions :

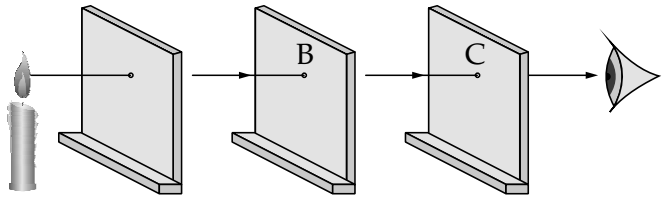
Ans. 1. Light is a form of energy which produces sensation of light.
2. Spherical mirror is a slice taken out from a hollow sphere, made up of glass and polished silver on one side.
3. The centre of the hollow sphere, from which the mirror has been taken out, is called its centre of curvature. It is denoted by capital 'C'.
4. An image is formed when light falls on mirror.

E. Short Answer Questions :

Ans. 1. Travelling of light in a straight light is called the rectilinear propagation of light.
2. The mid point of the pole and centre of curvature of the spherical mirror is called its focus. It lies on the principal axis and is denoted by capital 'F'.
3. The lens, which is thin at the centre and becomes thick as you move towards the edges, is called a concave lens.
4. Some elderly people, who have both the defects in their eyes, use both the types of lenses in their spectacles. Such spectacles are known as bifocal spectacles.
5. The seven colours of rainbow are—violet, indigo, blue, green, yellow, orange and red.

F. Long Answer Questions :

Ans. 1. **Aim :** To show that light travels in a straight line.
Take three cardboards and label them as A, B and C. Make a small hole at the centre of each cardboard. Keep the cardboards vertically so that the three holes are in a straight line. Place a lighted candle near the hole of cardboard A. Bring the eye near the hole of cardboard C.
The flame of the burning candle is seen clearly. In this case, light from the candle is passing through the holes in a straight line.
Now place the cardboard B in such a way that the boards are not in a straight line anymore. The flame is not visible. This shows that light is not able to travel through zig-zag path. So it can be concluded that light travels in a straight line.



To show that light travels in a straight line

2. A convex mirror is used as a rear view mirror because it diminishes the image. It allows the driver to see the image of the vehicle running behind it.
3. The left and the right sides of the image get interchanged, as compared to those of the object. This behaviour is known as lateral inversion. The image formed is called laterally inverted.
   To understand lateral inversion, let us perform one more activity.
   Take a 5 cm x 15 cm strip of white paper and a sketch pen and stand in front of a plane mirror. Hold the strip against your forehead with your left hand and write your name on it with the sketch pen using your right hand, continuously looking at it into the mirror. After writing, remove the strip and hold it in front of you. Can you read it? To make it legible, hold it in front of the mirror and read it into the mirror. Can you read it now?
4. The image characteristics of a plane mirror are :
   - a plane mirror produces an upright, virtual image
   - the image is of the same size as that of the object, and
   - the distance of the image formed on the mirror equals the distance of the object in front of the mirror.

G. HOTS Questions :

Ans. 1. Its light will travel to a very small distance.
2. By seeing our image in them. A convex mirror increases the size of image whereas a concave mirror diminishes it.

THINGS TO DO

Do it yourself.

15 Water

EXERCISE

A. Tick (✓) the correct answer :

Ans. 1. a. Rain water 2. c. Heavy rainfall
3. c. water table 4. a. Ground water

B. Fill in the blanks :

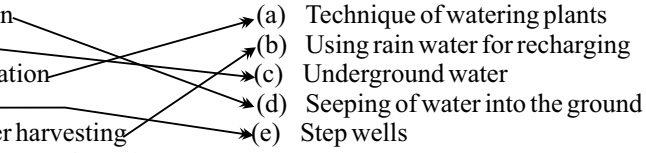
Ans. 1. **Water** is a renewable natural resource.
2. The top level of underground water is called **water table.**
3. We obtain groundwater through **wells** and **hand pumps.**
4. **Well water** and **spring water** are two types of groundwater.
5. Hard water does not lather with **soap.**

C. Write true or false :

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

D. Match the following :

Ans.



E. Very Short Answer Questions :

Ans.

1. Groundwater is the part of precipitation that seeps down through the soil until it reaches rock material that is saturated with water.
2. Water cycle is the continuous movement of water on the surface of earth.
3. Water table is the upper limit of the earth's layer where water is found or the upper layer or ground water.
4. Infiltration is the process of seeping of water into the ground.
5. Oceans.

F. Short Answer Questions :

Ans.

1. Sea/ocean water is not fit for domestic use because it is saline in nature.
2. Some of the causes responsible for the depletion the water table are increase in population, industrial and agricultural activities. Scanty rainfall is another factor affecting may deplete the water table. Yet another factor affecting water table could be deforestation and decrease in the effective area for seepage of water.
3. Due to this in the long term the water table will go down significantly.
4. In the absence of right amount of water, our body would not be able to perform its functions.

   All living things have a lot of water in their bodies. Water makes up almost 72% of human body weight. The human brain is made up of 95% water, blood is 82% and lungs 90%. A decrease of 2% in our body's water supply can cause dehydration. All the cells and organs that make up our entire body depend on water for their functioning.

   Similarly, you may have noticed that when plants are not regularly watered, they wilt and ultimately dry up. This is because the plants need water to get nutrients from the soil to prepare their food. In the absence of water all the plants of the Earth wilt and dry up leading the Earth to be without plants.
5. Water conservation is a method to save water for the future generations. In other words not wasting water is water conservation.

G. Long Answer Questions :

Ans.

1. Water can exist in three forms, in the solid form as ice, in the liquid form as water and in the gaseous form as vapours.

   All of these three states of water are interchangeable, i.e., we can change one state into another and vice-versa. This change in the three states of water is a physical change, i.e., the properties of water does not change and remains the same.
2. Groundwater is present in between the various layers of soil and

impervious rock. It is actually rain water which mainly comes from seepage of water accumulated under the ground. The process of seeping of water into the ground is called infiltration. The groundwater thus gets recharged by this process. When water-bearing rocks readily transmit water to wells and spring, they are called aquifers.

3. The level of water table is not stable. It goes down when large quantity of ground water is taken out for various purposes. In certain areas of our country like Punjab, Haryana, etc, the level of water table has gone down to a large extent due to excessive use of ground water for irrigating crops like paddy.

   Let us see how. Water drawn from under the ground gets replenished by seepage of rainwater. This is called recharging. The water table does not get affected as long as we draw as much water as is replenished by natural processes. However, It goes down if the water is not sufficiently replenished.

   This has many causes. Some of these causes are increase in population, industrial and agricultural activities. Scanty rainfall is another factor that may deplete the water table. Yet another factor affecting water table could be deforestation and decrease in the effective area for seepage of water.

   Increasing population has put a greater demand for construction of houses, shops, offices, roads and pavements. Construction of pavements, cementing of paths and grounds of different places does not allow seepage of water into the ground. As a result the water table does not get recharged easily.

   Water is used by all the industries. In almost all processes of industry we use water. The number of industries is increasing continuously. Water used by most of the industries is drawn from the ground. This lowers the water table further.

4. Some ways of conserving water are as follows :

   In the Bathroom

   - You must turn off the tap while brushing your teeth.
   - Request your father to turn off the tap while shaving.
   - Leaky taps must be repaired immediately.
   - The high capacity toilet tanks must be replaced by ultra-low flush models.
   - Shorten your showers. This saves a lot of water.

   In the Kitchen

   - While washing the dishes, do not leave the water running for rinsing.
   - Use the least amount of detergent while washing dishes. This will minimise the water needed for rinsing the dishes.
   - Do not wash the vegetables under running water. Instead, wash them in a container filled with water. Reuse this water for watering plants.

   In General

   Water your lawn/garden only when required and do not overwater the plants. Putting a layer of mulch (leaves, barks, etc.) around the plant and trees slows down evaporation of water and enriches the soil. This helps more water to seep underground. Do not water your plants during rains.

H. HOTS Questions :

Ans. 1. Dams are built to conserve water.

2. It is so because all the seas are interconnected.

THINGS TO DO

Do it yourself.

16 Forests

EXERCISE

A. Tick (✓) the correct answer :

Ans. 1. b. Renewable natural resource 2. b. humus

3. d. Grass, rabbit, fox, lion 4. b. Fox

B. Fill in the blanks :

Ans. 1. The distribution of natural forests in India is governed principally by **rainfall.**

2. The **forest** is the home of unique flora and fauna.
3. Forests serve as a source of **tourism** and **recreation.**
4. All the interlinked food chains form a **food web.**
5. **Grazing** of animals should be controlled.

C. Write true or false :

Ans. 1. False 2. True 3. True 4. False

D. Very Short Answer Questions :

Ans. 1. A forest is a biotic community spread over a large tract of uncultivated land and is predominantly composed of trees, shrubs, herbs and climbers.

2. A chain in which one organism eats another one is called a food chain. This is a process of eating and being eaten.
3. All food chains are linked together. Interlinked food chains form a food web.
4. Forests are being depleted because they are cutting down in large numbers.
5. Afforestation is the large-scale planting of trees on lands where there were no forests previously.

E. Short Answer Questions :

Ans. 1. Forests are a renewable natural resources as they grow on their own naturally.

2. The canopy is the uppermost levels of a forest formed by the crowns of trees and shrubs. The crown of a tree is the branched part of the stem and leaves above the main trunk.
3. Forests provide us timber, firewood(fuel), Fibre (clothing), paper, rubber, spices.
4. Plants and animals are interdependent in many ways. Plants provide food and oxygen to animals. On the other hand animals provide nutrients and carbon dioxide to plants.

F. Long Answer Questions :

Ans. 1. Forests play a major role in our life. Early humans gathered food and

were dependent on forests for all their basic needs such as food, clothing, and shelter.

We depend on forests for several other things directly or indirectly.

- Forests prevent soil erosion and floods. Roots of trees bind the soil particles together and prevent the soil from being washed or blown away.
- Trees help to regulate the climate of a place. They absorb water from the ground through their roots, and then release some of it as water vapour. In this way, they manage to keep the surrounding air cool. By raising the water vapour content of the atmosphere, trees are responsible for bringing the rains, too. Trees also help in keeping a check on global warming by using carbon dioxide, the main greenhouse gas for photosynthesis.
- Some trees, such as coconuts and palms, help to break strong winds in coastal areas. They act as shields or windbreakers against incoming storms or strong tidal waves.
- We get timber from more than a thousand species of trees such as sal, mahogany, teak, and rosewood. Several timber-based industries such as those of plywood, sawmills, paper and pulp, and cardboards are all dependent on these trees. We get firewood from trees.
- We get several nuts and spices from plants growing in forests.
- Plants such as *neem*, eucalyptus, and *amla* (Indian gooseberry) are used to make several *Ayurvedic* medicines. *Cinchona* trees provide quinine, which is an important medicine for treating malaria. Many varieties of grasses such as lemon grass, vanilla, *kewra*, and *khus* are the sources of several kinds of essential oils. Sandalwood, eucalyptus, and pine also give us oil, which can be extracted from these trees.
- Forests are a source of resins (used to make varnish and paint), latex (used to make rubber), bamboo (useful as fodder, and serves as an important raw material for the manufacture of paper and pulp, basket and other small-scale industries), and cane (used to make walking sticks, furniture, baskets, picture frames, screens, and mats).

2. When mountains lose their forest cover, rainwater rushes down very fast. This makes the rivers in the plains fell up suddenly. Unable to hold so much water, they overflow, causing floods. Forests slow down the flow of water, which helps control floods. The slow release of water stops rivers downstream from overflowing. And since water is held by the forests, it gets a change to seep into the soil and recharge groundwater. This prevents water scarcity after the monsoon.
3. The following are some measures of forest conservation.
   - Establishment of new forest on a previously cleared land is called reforestation. Massive reforestation work should be undertaken to cover large areas of land with appropriate types of trees.
   - Felling of trees in forests should be stopped.
   - Cutting and uprooting of forests should be made a punishable offence.
   - Every piece of barren land should be planted with trees.

- Forests should be protected from fire.
- Grazing of animals should be controlled.
- Nurseries should be established for forest trees on a large scale.
- Forest land should be used protected from fire.
- If felling of trees becomes essential for every single tree cut, two trees should be planted in a planned manner.
- People should be made aware of the impact of forests on their lives, through publicity, radio, television, etc.

G. HOTS Questions :

Ans. 1. Forests provide enough food for our survival. Also water and oxygen is available in plenty. So survival shall not be a problem.

2. In the absence of decomposers everywhere there would be remains of animals.

THINGS TO DO

Do it yourself.

1 Crop Production and Management

EXERCISE

A. Tick (✓) the correct answer :

Ans. 1. c. June to July 2. d. applying fertilizers 3. b. threshers
4. d. sprinkler system 5. b. Rhizobium

B. Fill in the blanks :

Ans. 1. In India, there are **two** main crop seasons.
2. A **seed drill** is used for the sowing of seeds.
3. Manures are **natural** substances.
4. Harvesting is manually done by a **sickle**.
5. **Weeds** are undesirable plants which grow with the crops.

C. Write True or False :

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

D. Match the following columns :

Ans.

1. Digging soil	**(e)**	**Spade**
2. Tilling soil	**(a)**	**Plough**
3. Breaking soil crumbs	**(d)**	**Leveller**
4. Weeding	**(b)**	**Khurpi**
5. Harvesting	**(c)**	**Sikcle**

E. Name the following :

Ans. 1. Ploughing 2. Winnowing 3. Irrigation
4. Harvesting 5. Silos

F. Very Short Answer Questions :

Ans. 1. The process of loosening and turning of the soil is called ploughing.
2. A leveller is used to break the crumbs (big pieces of soil).
3. The process of supplying water to crops is called irrigation.
4. The cutting of crop after it is matured is called harvesting.
5. The process of separating grain from chaff is called winnowing.

G. Short Answer Questions :

Ans. 1. A crop is a plant grown and cultivated at one place on a large scale.
2. Kharif crops are those crops which are generally planted in June and harvested in October. Rice and maize are kharif crops.
3. Rabi crops are planted in November as they require less water for their growth. On the other hand, kharif crops are planted in June an they need more water during their growth period.
4. Plough, hoe and leveler are the three tools that are used in preparing soil before sowing seeds.
5. Fertilizer is different from manure in the following ways :
Fetilizers
(i) They are inorganic chemicals prepared in factories.
(ii) They do not provide any humus to the soil.
(iii) They are rich in nitrogen, phosphorus and potassium.

Manures

(i) They are natural substances obtained by the decomposition of cattle dung, human waste and plant residues prepared in the fields.
(ii) They provide a lot of humus to the soil.
(iii) They are less rich in such nutrients.

H. Long Answer Questions :

Ans. 1. Ploughing is the process of loosening and turning the soil. It has the following advantages.
- It loosens the soil, allowing deeper penetration of roots.
- It helps to mix manure with the soil.
- It improves circulation of air in the soil, thus, helping root cells to respire.
- It helps in the growth of worms and microbes, thereby increasing soil fertility.
- Ploughing Increases the water retention capacity of soil.
- It also removes undesirable plants, called weeds.

2. Weeds are the unwanted plants which grow along with the crops. Weeds are removed manually with the help of a trowel or a harrow. Also certain chemicals called weediaides, such as 2, 4-D and MCPA are used to control weeds.
3. The benefits of sowing seeds using a seed drill are many. It ensures the sowing of seeds at proper distances and depths and that seeds are covered properly with soil. This prevents damage of seeds by birds and enhances the productivity.
4. Crop rotation is the practice of growing two or more dissiamlar crops in the same field, one after the other. This is done keeping in mind the nutrient requirements of a particular crop. For example, crops like wheat and paddy use up a lot of nitrogen from the soil. This lost nitrogen can be replaced naturally if leguminous plants like pea, soya bean, or green beans are sown after wheat or paddy.
5. Drip irrigation is the best method of watering plants because of following reasons.
   - It is good for watering fruit plants, gardens, etc., where availability of water is poor.
   - The drip system is a better manager of water. The drip will slowly penetrate the soil, saving water. A sprinkler can deliver too much water for the soil to hold and runoff can occur.
   - The drips can be focused exactly where they need to go.
   - Fungal diseases are less likely to grow in soil that is not saturated.
   - The ground is not soaked and there is less likelihood of soil erosion in this slow release of water.
6. The green revolution became possible by the collective efforts of government agencies, scientists and farmers. The food production was enhanced to such an extent that our country became self-sufficient in food production.

   During green revolution, high-yielding dwarf varieties of wheat were

introduced from Mexico and Australia. New varieties of wheat with desirable characteristics were developed by cross-breeding methods. Mexican wheat was a high-yielding variety. It was resistant to pests and disease-causing microorganisms. It was dwarf and required less irrigation and pesticides. Duration of crop maturity was also shorter.

Similarly, highly-yielding varieties of rice, maize, bajra, sugar cane, etc., were also developed by Indian scientists that were well suited to the Indian conditions.

The great success of green revolution in India can be attributed to the efforts of Prof. M.S. Swaminathan. He introduced high-yielding varieties of foreign origin in Indian agriculture, developed new varieties of all Indian crops and evolved new methods and techniques of raising agricultural production.

I. HOTS Questions :

Ans. 1. Earthworms are called the friends of farmers because of the multitude of services they provide that improve soil health and consequently plant health… The soil, in addition to being the habitat for crops, also nurtures other organisms, some of which can cause devastating diseases to plants.

2. The seeds that sank should be used for cooking. This is so because floating seeds may be defective, damaged or eaten by pests.

3. It is recommended to use manure instead of chemical fertilizers because of following reasons :
   - It enhances the water-holding capacity of the soil.
   - It makes the soil porous due to which exchange of gases becomes easy.
   - It improves the texture of the soil.
   - It is eco-friendly.
   - It is cheap and pollution free.

THINGS TO DO

P	H	E	R	B	A	R	I	U	M	F
Q	R	S	U	V	W	X	R	Y	Z	E
S	T	O	R	A	G	E	R	C	M	R
S	T	W	A	B	F	G	I	R	K	T
D	E	I	C	I	H	J	G	O	L	I
M	A	N	U	R	E	S	A	P	N	L
P	Q	G	R	S	T	U	T	V	O	I
M	N	O	W	E	E	D	I	N	G	Z
P	L	O	U	G	H	E	O	W	X	E
G	H	I	J	K	L	Z	N	V	V	R

2 Microorganisms

EXERCISE

A. Tick (✓) the correct answer :

Ans. 1. c. microbes
2. b. nitrogen
3. b. Plasmodium vivax
4. a. Fermentation

B. Fill in the blanks :

Ans. 1. **Microorganisms** exist in almost all kinds of environment.
2. One of the important functions of bacteria is fixing **nitrogen.**
3. **Fungi** cannot synthesise their own food by photosynthesis.
4. Preservation of food by adding salt is called **salting.**
5. **Nitrogen assimilation** is the conversion of inorganic compounds into organic compounds.

C. Very Short Answer Questions :

Ans. 1. Microorganisms are the living organisms that we cannot see with naked eyes.
2. Bacteria, viruses, algae, fungi and protozoa.
3. Lactobacillus and Pseudomonas.
4. Measles, chicken, pox and polio.
5. Fungi are a large group of organisms. They are plants-like heterotrophs. They are found in moist food material, damp clothes and dampshoes.

D. Short Answer Questions :

Ans. 1. Viruses are different from other microrganisms in the sense that they have the characteristics of both the living and non-living things. Also all the viruses are harmful to us.
2. When the boiled milk is mixed with curd, the Lactobacillus bacteria starts growing to convert milk sugar into lactic acid. The milk turns thicker. Finally curd is formed.
3. A gummy substance called *algin*, obtained from kelp, is used to thicken ice creams, cosmetics and shaving cream. *Agar*, a jellylike substance, in which microorganisms and tissue are cultured, or grown in the laboratory, is made from certain red algae.
4. **Useful effects of Bacteria :**
   - The curdling of milk is facilitated by using the bacteria named *Lactobacillus.*
   - Bacteria are important decomposers that help in the breakdown of dead remains of plants and animals.

   Harmful effects of Bacteria :
   - The action of bacteria on vegetables, fruits and other food products results in the spoilage of food.
   - The most harmful bacteria are disease-causing bacteria. They cause diseases in human, plants and animals.
5. Viruses are found everywhere namely, air, water, soil and even in the living things. Inside the body of living organisms they behave as living beings but when they are outside the living body they behave as non-living things.
6. Different methods of food preservation are as follows :
   - Drying and dehydration
   - By pickling.
   - By Pasteurisation.
   - By using chemicals.
   - Salting.
   - By heating and canning.
   - Preservation by deep freezing.
   - By vacuum packing.
   - By using sugar.

E. Long Answer Questions :

Ans. 1. Microorganisms exist in almost all kinds of environment. They are found in the soil, mud, water, sea, air, plants, animals, food products and

various utensils. They are also found on dead weeds, leaves, clothes, books, jams, pickles, dung, shoes, etc.

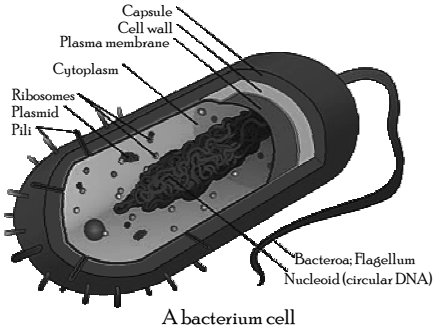
In human beings, they are found on skin, mouth cavity, gastrontestinal tract, respiratory tract, eyes and urinogenital organs.

In animals, they are found in or on feathers, hooves, skin, eyes of domestic and wild animals such as cats, dogs, horses, buffaloes, sheep, calves, snakes, etc.

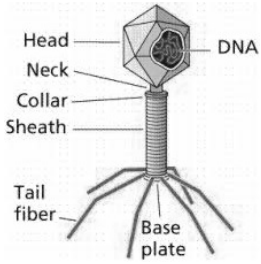
In plants, they are found in or on underground and aerial parts. We can see them in almost all groups of plants.

2. **Structure of Bacteria—** Bacteria are single-celled microorganisms. The cell is covered by a protective layer called cell wall. Because of the presence of cell wall bacteria were earlier classified under plants. A bacterial cell does not have a well-defined nucleus. There is no nuclear membrane. The nuclear matter is present in the cytoplasm.

Bacteria move with the help of flagella, which are hair-like structures. The number of flagella is different in different types of bacteria.



A bacterium cell



3. Viruses do not have a cellular structure like other microoragnisms. A virus consists of a single strand of nuclear matter (DNA or RNA) surrounded by a protein coat. They multiply or replicate only in the host cells. Viruses can be crystalized and stored for many years. Viruses obtain nourishment from their host cells.

4. Protozoa (singular, *protozoan*) are considered to be the most primitive living organisms. In fact, living organisms seem to have been evolved from *Cynobacteria* to protozoans and then to higher organisms.

Uses of Protozoans— The small protozoans, also known as zooplanktons, complete the food chain by feeding on algae, the producers, and being eaten up by the larger aquatic consumers. By feeding on fungi and bacteria they breakdown the organic matter.

Some of the protozoans live in the digestive system of animals and help them to digest cellulose in the their food.

Harmful Protozoans— Some protozoans live as parasites and cause diseases to the human beings. Some of these are mentioned below :

- Entamoeba lives in the bloodstream of human beings and cattle and causes the disease known as sleeping sickness.
- The malarial parasite, plasmodium lives in the red blood corpuscles of human blood and causes malaria.

5. Food can be preserved in a condition safe for consumption in the following ways :

Drying and Dehydration : This is the oldest method of food preservation. Some fruits and vegetables are dehydrated either by drying in the sun or by heating. Spinach Cauliflower, Methi and Mint leaves are dried in the sun. Peas are preserved by heating. Fish and meat are preserved by smoke and heat (smoking).

Salting : Preservation of food by adding salt is called salting. The meat and fish are covered with salt to drain out water from their cells. Raw Mango, Lemon, Amla, Tamarind and other fruits and vegetables are preserved by salting. Bacterial cells also lose water by the addition of salt. This inhibits the growth of bacteria.

By Using Sugar : Sugar syrup containing 68 per cent sugar is used for the preservation of fruits and vegetables. The high concentration of sugar reduces moisture contents and thus prevents the growth of microbes. Jams, jellies and squashes are preserved by using sugar. Carrots, Plums, Ripe Mangoes, Amla, Apple, etc. are preserved by making jams and jellies.

By Pickling : Oil and vinegar are used to make pickles because bacteria cannot survive in highly acidic contents of the medium. Vegetables and fruits like raw Mangoes, Lemons, Chillies, etc. are preserved as pickles. Salt or sugar is added to the pickle to enhance its taste.

By Heating and Canning : Canned food items available in the market are free from microorganisms. The food is heated at 110°C for about 30 minutes and then canned under vacuum.

By Pasteurisation (Heating and Cooling) : Pasteurisation is the process of heat and cold treatment to which milk is subjected to make it bacteria-free. The milk is heated to 62°C to 30 minutes or to 70°C for about 15-30 seconds and then chilled suddenly. The milk treated this way is called pasturised milk. Such milk does not spoil for a longer time.

Preservation by Deep Freezing : Storing food at subzero temperature in deep freeze or in cold storage at a temperature about –18°C (i.e., 18° C below zero) is also a safe method of food preservation. This method is used for preserving Fish, Meat, Fruits and Vegetables. Deep freezing prevents bacterial growth and inactivates the enzymes. Therefore, deep-frozen food retains its flavour as well as freshness.

By Using Chemicals : Citric acid is added to pickles and some squashes while sodium benzoate and potassium metabisulphite are used as preservatives to preserve squashes, jams and jellies.

By Vacuum Packaging : Most dry food items oils, etc. are marketed in sealed and airtight packaging. These contain nitrogen gas which does not cause oxidation of fatty acids.

6. The conversion of free atmospheric nitrogen into useful nitrogen compounds is called nitrogen fixation or fixation of nitrogen.

Methods of Nitrogen Fixation

Nitrogen fixation occurs by following methods :

(i) Atmospheric Nitrogen Fixation : During lightning in the sky when

temperature is high, the nitrogen gas present in the atmosphere reacts with oxygen to produce oxides of nitrogen which gets reacts with oxygen to produce oxides of nitrogen which gets dissolved in rainwater forming dilute nitric acid. This reacts with alkalies of the soil to form nitrates.

(ii) Biological Nitrogen Fixation : Atmospheric nitrogen is converted into nitrogen compound by living organisms. Nitrogen fixing bacteria like Rhizobium and Clostridium, which lives in the root nodules of legumnous plants convert atmospheric nitrogen into nitrates.

F. HOTS Questions :

Ans. 1. It is so because of the process of farmentation. Yeast causes fermentation of the dough (mixture of all ingredients) and liberated carbon dioxide (during respiration of yeast) makes the dough to rice.

2. This is so because in summer the temperature is more, that enable *bacterium Lactobaciallus* to multiply more and in short time.

THINGS TO DO

Do it yourself.

3 Synthetic Materials

EXERCISE

A. Tick (✓) the correct answer :

Ans. 1. a. Nylon 2. b. cotton 3. c. bakelite

B. Fill in the blanks :

Ans. 1. Polymers can be **linear** or **cross-linked.**

2. Nylon is used for making **fishing nets** and **parachute ropes.**

3. Synthetic fibres **melt** and **burn** easily.

4. **Plastics** are resistant to weather conditions.

5. We generate a lot of **waste** of various kinds.

C. Match the following :

Ans.

1.	Biodegradable	a.	Synthetic fibres
2.	Quick drying	b.	Natural fibre
3.	Acrylic fibre	c.	Synthetic Wool
4.	Cellulose	d.	Cotton

D. Very Short Answer Questions :

Ans. 1. Synthetic fibres are man-made fibres made from synthetic polymers.

2. Terylene with cotton.

3. Leo Backeland, a US Chemist.

4. Thermosetting plastics.

E. Short Answer Questions :

Ans. 1. Linear and cross-linked polymers are two types of polymers.

2. Monomers can combine to form long chains. It is called a linear polymer. Monomers can also have a cross-linked arrangement.

3. Nylon is used

- for manufacture of tyre cords, fabrics and ropes.
- for making fishing nets and parachute ropes.
- for making sarees, socks, neckties.

4. Two properties of synthetic polymers which make them acceptable to the users are as follows :
   - Plastics can take the wear and tear of daily life and they do not get broken easily.
   - Things made of plastics do not rust or corrode and also they do not become dull with time.

F. Long Answer Questions :

Ans. 1. Synthetic polymers are made because of the following advantages :
   - Polymers do not corrode or rust.
   - They can be produced in various colours.
   - They can be given different shapes.
   - They are strong.
   - They are inexpensive.

2. Thermoplastics can soften and get deformed when heated. They can bend easily. Thermoplastics can be remounded (reshaped) as many times as desired. The common examples of thermoplastic are PVC, polystyrene and polythene.
   Thermosetting plastics do not get deformed on heating, instead they harden. Once set, these plastics cannot be reshaped even on heating. Bakelite and melamine are examples of thermoseting plastics.
3. A few problems associated with the excessive use of plastics are as follows :
   - Plastics are not at all ecofriendly. Some plastics can be recycled but recycled plastics are inferior in quality.
   - Plastics burn slowly and release toxic fumes.
   - Plastics are nonbiodegradable and keep accumulating in landfills.
   - Plastics and polythene bags choke the drains and create a lot of drainage problems. This also leads to eutrophication causing harm to aquatic life.
   - Inferior quality plastics prove to be hazardous if used in food packing or eatables.

G. HOTS Questions :

Ans. 1. Thermosetting platics are called unbreakable. One of them is Bakelite. Its chemical formula is $(C_6H_6O.CH_2O)_n$.
2. Handles of kitchen utensils are made of bakelite because it is an unbreakable plastic and also a bad conductor of heat.

THINGS TO DO

Do it yourself.

4 Metals and Non-Metals

EXERCISE

A. Tick (✓) the correct answer :

Ans. 1. a. Sodium
2. b. Bad conductors of electricity and heat
3. c. zinc sulphate and hydrogen
4. d. Gold

B. Fill in the blanks :

Ans. 1. **Sodium** and **potassium** can be cut with a knife.
2. Non-metals cannot be drawn into **wires.**
3. Most metals combine with **oxygen** to form metal oxides.
4. Non-metals do not react with **water.**
5. **Copper** is used for making electrical wires.

C. Very Short Answer Questions :

Ans. 1. Metals : Iron, copper, silver. Non metals : Diamond, graphite, oxygen.
2. Metals are chemical substances that are usually hard and conducts heat and electricity and melts when they are heated.
3. Metals are used for making electrical wires and cables because they are good conductors of electricity.
4. Only aluminium, zinc and lead react with bases.

D. Short Answer Questions :

Ans. 1. Most of the metals have the property of shiny surface. They have the ability to shine and reflect light. That is why they are found suitable for making jewellery.
2. Metals are good conductors of heat and electricity. They allow electricity to pass through them. Due to this property metals are used for making electrical cables.
3. Rusting of iron is an undesirable change because it makes iron objects unfit for our use.
4. Copper vessels turn green with passage of time because when copper reacts with water, carbon dioxide and oxygen present in moist air to form a green coating on the copper object.

E. Long Answer Questions :

Ans. 1. **Ductility**

Metals : Most metals can easily be drawn into thin wires, which have a wide range of applications. The property by virtue of which metals can be drawn into thin wires is called ductility. Gold and silver are two of the most ductile metals known. Other metals that can be drawn into wires include copper, aluminium and tungsten.

Non-metals : Non-metals are brittle and cannot be drawn into wires.

Thermal Conductivity

Metals : Metals allow heat to pass through them. That is the reason that pans used for cooking are coated with copper at the bottom.

Non-metals : Non-metals are poor conductors of heat.

Electrical Conductivity

Metals : Metals are good conductors of electricity and are, therefore, used for making electrical wires and cables.

Non-metals : Non-metals are generally poor conductors of electricity. Graphite, which is a good conductor of electricity, is an exception.

2. a. Zinc reacts with sulphuric acid to form zinc sulphate and hydrogen gas.

$$\underset{\text{Zinc}}{Zn} + \underset{\text{Sulphuric acid}}{H_2SO_4} \longrightarrow \underset{\text{Zinc sulphate}}{ZnSO_4} + \underset{\text{Hydrogen gas}}{H_2}$$

b. Magnesium reacts with sulphuric acid to form magnesium sulphate and hydrogen gas.

$$\underset{\text{Magnesium}}{Mg} + \underset{\text{Sulphuric acid}}{H_2SO_4} \longrightarrow \underset{\text{Magnesium sulphate}}{MgSO_4} + \underset{\text{Hydrogen gas}}{H_2}$$

c. Aluminum reacts with hydrochloric acid to form aluminum chloride and hydrogen gas.

$$\underset{\text{Aluminium}}{2Al} + \underset{\text{Hydrochloric acid}}{6HCl} \longrightarrow \underset{\text{Aluminium chloride}}{2AlCl_3} + \underset{\text{Hydrogen gas}}{3H_2}$$

3. Displacement reaction is a reaction in which a more reactive metal displaces a less reactive metal from its salt solution.

(a) Reaction of Iron Metal with Copper Sulphate Solution. When a strip of iron metal (or an iron nail) is placed in copper sulphate solution for some time, then the blue colour of copper sulphate solution fades and a red-brown coating of copper metal is deposited on the iron strip (or iron nail). This reaction can be written as :

$$\underset{\substack{(CuSO_4)\\ \text{(Blue solution)}}}{\text{Copper sulphate}} + \underset{\substack{(Fe)\\ \text{(Grey)}}}{\text{Iron}} \longrightarrow \underset{\substack{(FeSO_4)\\ \text{(Greenish solution)}}}{\text{Iron sulphate}} + \underset{\substack{(Cu)\\ \text{(Red-brown)}}}{\text{Copper}}$$

In this case the solution turns greenish due to the formation of iron sulphate. We know that iron metal is more reactive than copper metal. So, in this reaction, a more reactive metal ‘iron' is displacing a less reactive metal ‘copper' from its salt solution, copper sulphate solution. The products of this displacement reaction are ‘iron sulphate solution' and ‘copper metal'. Please note that the blue colour of copper sulphate solution changes to greenish due to the formation of iron sulphate (which is green in colour). The copper metal produced in this displacement reaction forms a red-brown coating over the iron strip (or iron nail). In the above displacement reaction, iron metal displaces copper from copper sulphate solution. This displacement reaction takes place because iron is more reactive than copper. The displacement reaction between iron metal and copper sulphate solution can be performed as follows.

But if we place a strip of copper metal in iron sulphate solution for some time, then no displacement reaction takes place. That is

$$\underset{(FeSO_4)}{\text{Iron sulphate}} + \underset{(Cu)}{\text{Copper}} \longrightarrow \text{No displacement reaction}$$

This displacement reaction does not occur because copper metal is less reactive than iron metal.

F. HOTS Questions :

Ans. 1. This is so because both wood and plastic are non-conductor of heat and do no allow heat to pass to our body.

2. This is so because metals have the property of sonority that is they make sound when struck. But in contrast to this, wood lack this property. A ball made of wood not make any sound when struck.

THINGS TO DO

Do it yourself.

EXERCISE

A. Tick (✓) the correct answer :

Ans. 1. c. Petrol 2. a. methane 3. d. 90%

B. Fill in the blanks :

Ans. 1. The **inexhaustible** resources can be used again and again.
2. **Coal** is used as a fuel to cook food.
3. Petroleum may contain impurities like **sulphur.**
4. **Natural gas** releases more energy than any other fuel.
5. We should switch off the engine at **traffic** light.

C. Write True or False :

Ans. 1. False 2. False 3. True 4. False

D. Very Short Answer Questions :

Ans. 1. Coal gas, coal tar and coke.
2. Fossil fuels are natural fuels formed from the remains of living organisms buried under the earth long, long ago.
3. Carbonisation is the slow conversion of dead trees and other plants into coal.

E. Short Answer Questions :

Ans. 1. Coal is useful to us in the following ways :
Coal is used :
- as a fuel to cook food.
- primarily for generating electricity in thermal power plants.
- as a source of energy in various industries like cement, paper, steel, iron, etc.
- coal was also used to power steam engines.

2. Coke is used as a fuel. It is also used for making fuel gases like water gas and producer gas.
3. Coke is a tough and porous black solid substance. It is prepared by heating coal in the absence of air. When coal is heated in the absence of air, then coal gas and coal tar is eliminated and coke is left behind as a black residue.
4. The advantages of using natural gas as fuel are as follows :
   (i) It burns easily and produces a lot of heat. It burns with a smokeless flame and causes no air pollution.
   (ii) It is a complete fuel in itself and can be used directly for heating purposes in homes and industry.
   (iii) Its great advantage is that it can be supplied to homes and factories through a network of underground pipes and thus eliminates the need for additional storage and transport.

F. Long Answer Questions :

Ans. 1. Those natural resources which are present in unlimited quantity in nature and are not likely to be exhausted by human activities are called inexhaustible natural resources. The examples of inexhaustible natural resources are : Sunlight, Air and Water. There is a never ending supply of inexhaustible resources in nature. The inexhaustible resources can be

used again and again. They last forever.

Those resources which are present in a limited quantity in nature and can be exhausted by human activities, are called exhaustible natural resources. The examples of exhaustible natural resources are : Coal, Petroleum, Natural gas, Minerals, Forests and Wildlife, etc. The exhaustible natural resources do not last forever.

2. The destructive distillation of coal gives a number valuable products such as coal gas, ammoniacal liquor, coal tar and coke.

Coke is a tough and black substance. It is almost pure form of carbon. Coke is used as a fuel. It is also used for making fuel gases like water gas and producer gas.

Coal tar is a black, thick and opaque liquid with unpleasant smell. It is a mixture of about 200 substances. On further distillation it gives many useful organic compounds such as benzene, toluene, phenol, and napthalene. These compounds are used to make various substances such as synthetic dyes, drugs, perfumes, paints, plastics, naphthalene balls, and roofing materials. Naphthalene balls are used to repel moths and other insects.

3. Natural gas is a gas that occurs deep under the crust of earth either alone or alongwith oil above the petroleum deposits. It is considered as a clean fuel because it burns with a smokeless flame and causes no air pollution. It also does not produce any poisonous gases on burning. Natural gas also, does not leave behind any solid residue on burning.

G. HOTS Questions :

Ans. 1. If all the coal and petroleum reserves are depleted than we would find it extremely difficult to run our machines and vehicles.

2. Using natural resources is better as it does not pollutes our environment.

THINGS TO DO

Do it yourself.

6 Combustion and Flame

EXERCISE

A. Tick (✓) the correct answer :

Ans. 1. d. all of these 2. c. flame 3. all of these

B. Fill in the blanks :

Ans. 1. **Fuel** is a substance that burns to produce energy.

2. Carbon burns in the presence of oxygen to produce **carbon dioxide.**

3. **Fire** is the heat and light that come from burning materials.

4. Solid fuels have a low calo **calorific** value.

5. The **middle** zone of a candle flame is yellow.

C. Write True or False :

Ans. 1. True 2. False 3. True 4. False

D. Very Short Answer Questions :

Ans. 1. Fire is the heat and light that come from burning materials.

2. This is so because the ignition temperature of a wet paper is much more than that of a dry paper.
3. A candle flame has three zones—outermost zone, middle zone and innermost zone.
4. Petrol does not catch fire on its own at room temperature because it has a high ignition temperature which we cannot found at room temperature.

E. Short Answer Questions :

Ans. 1. There are three conditions required for combustion to take place :
- Presence of a combustible substance (a substance which can burn)
- Presence of a supporter of combustion (like air or oxygen)
- Attainment of ignition temperature

2. A goldsmith uses the outermost zone of a flame for melting gold and silver because it is the hottest part of the flame.
3. Calorific value of a fuel is the heat produced by burning 1 kg of fuel. Now,

Heat produced by burning 4.5 kg fuel = 180000 KJ

So, heat produced by burning 1 kg fuel = $\frac{180000 \times 1}{4.5}$

= 40000 KJ

Thus, the calorific value of the given fuel is 40000 KJ/Kg.

4. Ignition temperature is the lowest temperature at which a substance catches fire. No, a substance cannot catch fire below its ignition temperature.

F. Long Answer Questions :

Ans. 1. Combustion is a chemical process in which a subtance reacts with the oxygen (of air) to give heat and light.

Combustion depends on the following factors :

The Presence of a Combustible Substance— A substance which burns readily is called combustible substance. So, for combustion to take place a combustible substance should be present.

The Presence of a Supporter of Combustion— A combustible substance continues to burn only if there is a continuous supply of a supporter of combustion. *For example*, coal/charcoal or a candle burns only in the presence of air (or oxygen). If the supply of oxygen/air is cut off, the combustion/burning stops.

Initial Heating to Bring the Combustible Substance to its Ignition Temperature— A substance cannot be burned until it reached its ignition temperature. It is the lowest temperature at which a substance catches fire.

2. **Qualities of a good fuel**

A good fuel should :
- have a high calorific value
- have a definite ignition temperature (well above the room temperature and not too high)
- be least polluting
- be easy and safe to handle
- have low content of noncombustible substances and burn completely or leave no residue

- be easy to transport
- require less space for storage
- be cheap and should be easily available

Gaseous fuels have many advantages over the solid fuels.

- Gaseous fuels can be easily stored in containers and are easily transportable.
- Gaseous fuels have no residue due to complete combustion and cause less pollution.

G. HOTS Questions :

Ans. 1. We should try to conserve energy because it is very important for us and is limited in nature.

2. Carbon dioxide gas is heavier than oxygen and as such it settles down below the layer of oxygen. As oxygen is an essential condition for fire, it cuts off the supply of oxygen and hence fire extinguishes.

THINGS TO DO

Do it yourself.

7 Conservation

EXERCISE

A. Tick (✓) the correct answer :

Ans. 1. a. endangered plants and animals 2. c. destruction of natural habitats
3. a. IUCN 4. c. Jim Corbett National Park

B. Fill in the blanks :

Ans. 1. Forests provide **home** and **food** to wildlife.
2. **Global warming** is also considered to be a major threat to biodiversity.
3. **Desertification** is the conversion of the fertile land into desert.
4. A biosphere reserve is divided into **three** zones.
5. The Gir Lion Project was started in **1972** to protect **Asiatic lion.**

C. Write True or False :

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

D. Very Short Answer Questions :

Ans. 1. Red Data Book is a book that contains a record of all those species of plants and animals which are under the threat of extinction or are rare and vulnerable for extinction.

2. A forest is a large area where plants and trees are grown naturally and without any human intervention.
3. Afforestation is the planting of plants where earlier there was no forests.
4. Endemic species are those which are restricted to a particular geographic region and are not found all over the world.

E. Short Answer Questions :

Ans. 1. Biodiversity is the variety and variability among living organism on the Earth.

2. Deforestation has following two effects on environment.
   - Deforestation increases level of carbon dioxide in the atmosphere causing global warming and greenhouse effect.
   - Deforestation increases temperature, reduces rainfall and increases

wind velocity. These changes lead to climate changes.

3. Animals from their place of residence to some other place along well defined routes. Migration is linked to seasonal factors, breeding, shortage of food, etc.
4. Project Tiger was launched in 1973 CE to save tiger from poaching. Under this project, 23 tiger reserves have been established in India.

F. Differentiate between each of the following pairs :

Ans. 1. **Flora :** It refers to all the naturally growth plant life in any particular region.
Fauna : It includes all animals that exist in the natural surrounding and are not domesticated or looked after by man.

2. **Deforestation :** It is the clearing of forests for using the land for other purposes.
Afforestation : It is the replanting of trees in forests.

3. **Wildlife Sanctuary :** A sanctuary is a protected land aera reserved for the conservation of wild animals, birds and plants. Hunting is strictly prohibited there.
Biosphere reserve : A biosphere reserve is a specified land area in which multiple use of land is permitted for preserving biodiversity.

4. **Endemic Species :** Endemic species are those which are restricted to a particular geographic region and are not found all over the world.
Exotic Species : Animals and plants which do not belong to a place originally and are introduced from elsewhere, are known as exotic species.

G. Give reasons for the following :

Ans. 1. Biodiversity needs to be conserved because it is the basis of life on Earth. Absence of biodiversity will badly affect the possibility of life on this planet.

2. Some areas of the Earth are called mega biodiversity centres because there we can find the presence of large number of different elements related to biodiversity such as forests, endemic species, flora and fauna etc.
3. As India is very rich in the diversity of plants and animals, so it is called as a mega diversity centre.
4. Deforestation leads to depletion of wildlife as it disturbs the life, growth and reproducing timing of wild animals.
5. Birds migrate to :
   - escape the inhospitable winter conditions.
   - find plenty of food.
   - lay eggs at a warm place where they can incubate early.

H. Long Answer Questions :

Ans. 1. Deforestation has a big effect on wild life. As we know, forests are the natural habitats of many wild animals and birds. When forest trees and other forest plants are cut down, the natural habitat of wild animals and birds gets destroyed. These homeless wild animals fall pray to human beings and get killed. Moreover, in the absence of forest trees and plants, the wild animals and birds do not get enough food and starve to

death. In this way, many animal and bird species become extinct (or vanish) from that area.

2. Biosphere reserves are protected areas in which multiple use of land is permitted by dividing it into zones, each for a particular activity. They are important for conserving wildlife because they are meant for preserving genetic diversity in representative ecosystems (of natural biomes and biological communities) by protecting wild populations, traditional life style of tribals and domesticated plant/animal genetic resources. They conserve genetic resources, species, ecosystems and landscapes without uprooting inhabitants. Rather the traditional life style and traditional resources of local people are maintained.
3. The loss of species and ecosystems can be attributed to the growing human population. More than half of the forests have been lost with increase in human population. The population of Earth has reached to seven billion and is increasing exponentially. There is an unprecedented demand on our ecosystems for fresh water, food, space and fuel. Excessive demand and over consumption is thus depleting the biological and natural resources of the Earth.
4. The government has taken steps to conserve biodiversity in India. Some of these are as follows :
   - **Creation of protected areas :** Government has established certain protected areas so as to conserve biodiversity. These areas provide undisturbed habitats for wildlife. These include national parks, sanctuaries and biosphere reserves. These protected areas allow animals to live and breed in their natural habitat.
   - **Strict Laws to Regulate Hunting :** The government has enacted strict laws to protect animals from hunting. Now, nobody is allowed to hunt wild animals in forests.
   - **Captive Breeding Programmes :** The Government of India has launched different projects and programmes such as *Project Tiger, Nature Camps and Jungle Lodges* to promote wildlife awareness among the masses. These projects help to conserve our natural heritage.

     In 1973, the World Wide Fund, with the help of the Indian Government, launched Project Tiger to protect tigers. This project has been very successful in preserving the tiger population at the tiger reserves of Bandhavgarh, Pench, Panna, Corbett, Kanha, Ranthambhore, Bandipur, Dudhwa and the Sunderbans.

     Project Elephant was launched in 1992 to provide financial and technical support for the protection of elephants and their habitats. This project is being implemented in 13 states of the country and involves 25 elephant reserves across the various states.

I. HOTS Questions :

Ans. 1. Raifall in Cherapunji has reduced due to large scale deforestation. Large scale exploitation of forests have left this hills barren. Due to which the climatic conditions are altered to a great extent.

2. Overgrazing causes change in the physical property of soil. The water

holding capacity of soil changes and level of subsoil water is lowered making the topsoil layer dry. It is removed by strong winds causing soil erosion. Gradually, the fertile land gets converted into desert. In this way overgrazing leads to desertification.

THINGS TO DO

Do it yourself.

8 The Cell

EXERCISE

A. Tick (✓) the correct answer :

Ans. 1. a. Lysosome 2. c. Brain 3. a. Plastids

B. Fill in the blanks :

Ans. 1. **Compound microscope** has a magnification of 400 times.
2. The control centre of a cell is the **nucleus.**
3. The largest cell is of **an ostrich.**
4. Yeast is **unicellular** organism.
5. **Blood** cells are the smallest cell.

C. Match the following :

Ans.

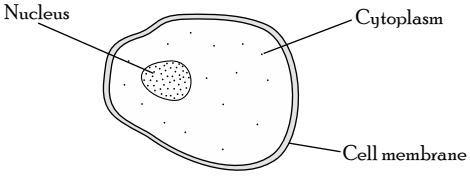
1. Mitochondrion	• **Powerhouse of the cell**
2. Chloroplasts	• **Green plastids**
3. Organ	• **Contains more than one type of tissues**
4. Amoeba	• **Unicellular organism**
5. Protoplasm	• **Living substance of the cell**

D. Very Short Answer Questions :

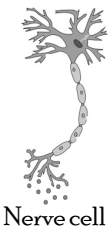
Ans. 1. Robert Hooke discovered the cell.
2. In an organism, cells are usually grouped together to make tissues, organs and organs systems.
3. Protoplasm is the living substance of the cell. It includes the cytoplasm and the nucleus.
4. Organelles are present in the cytoplasm.

E. Short Answer Questions :

Ans. 1.

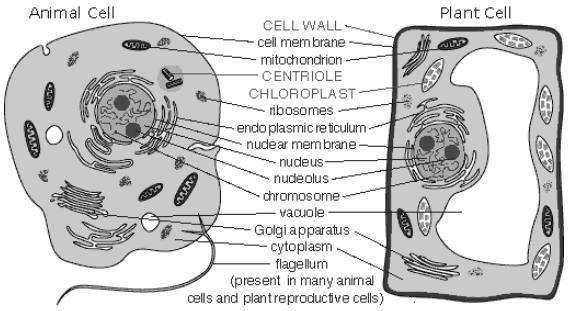


2. Nerve cells are long because they must be able to transmit impulses over long distances. Nerves pick up to transmit impulses from all over the body, and these impulses must travel along an unbroken path to reach brain.



Nerve cell

3.



An animal cell A plant cell

F. Long Answer Questions :

Ans. 1. **Mitochondria :** Mitochondria are oval or rod shaped organelles are commonly called 'Powerhouse of the cell' because the production of energy from food takes place here. In other words they provide energy to the cell.

Cell wall : Cell wall is the most rigid, protective, outermost covering found in plant cells only. It provides shape and rigidity to the plant cell.

Chromsome : Chromosomes carry a number of genes. The chromosomes and the genes help in the inheritance of characters from the parents to their children.

2. The nucleus is the largest and most important part of a cell. It is a dense and spherical body, usually located near the centre of the cell. It may be oval or irregularly shaped or lobed, e.g., leucocytes. Most of the cells have a single nucleus, but cells of mushrooms and the human lives have two or more nuclei (plural of nucleus). Human RBC (Red Blood Cell) contains no nucleus.

   The nucleus is the control centre of the cell and thus is considered the brain of the cell. It is separated from the rest of the body by a porous nuclear membrane. Certain materials must cross this membrane when they pass between the nucleus and the cytoplasm. Some larger molecules may pass through the pores.

3. Table below gives a comparison of cells found in plants and animals

Plant and animals cells-a comparison

Structure	Plant cell	Animal cell
Cell membrane	✓	✓
Cell wall	✓	✗
Cytoplasm	✓	✓
Nucleus	✓	✓
Mitochondria	✓	✓
Chloroplasts	✓	✗
Golgi body	✓	✓
Endoplasmic reticulum	✓	✓
Ribosome	✓	✓

Vacuole	A large vacuole present	Absent, smaller in size if present
'×' indicates absence of the structure		

G. HOTS Questions :

Ans. 1. Cells of different shapes and sizes are found in the body because different cells perform different functions.

2. Living organisms are made up of different types of cells performing different functions. The cells have different shapes, sizes and structures, designed to perform specific tasks. This allows living organism to function efficiently as a whole.

THINGS TO DO

Do it yourself.

9 Reproduction in Animals

EXERCISE

A. Tick (✓) the correct answer :

Ans. 1. c. Fertilization 2. b. Metamorphosis
3. a. Binary fission 4. d. Toad

B. Fill in the blanks :

Ans. 1. The type of reproduction resulting from the fusion of male and female gametes is called **Sexual reproduction.**

2. Ovary produces female gametes called **ova.**
3. The fertilized egg is known as **zygote.**
4. The stage of the embryo in which all the body can be distinguished easily is called a **foetus.**

C. Write True or False :

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

D. Match the following :

Ans.

1. Internal fertilization	(a) Ovum
2. External fertization	(b) Sperm
3. Male gamete	(c) Hen
4. Female gamete	(d) Hydra
5. Budding	(e) Frog

E. Very Short Answer Questions :

Ans. 1. The process of reproduction ensures that a plant or animal species will not disappear from the Earth.

2. One nucleus.
3. A zygote is the first cell of a new individual. It has no proper shape and body parts cannot be identified. On the other hand in a foetus most of the body parts can be identified.
4. Human beings reproduce by sexual method.

F. Short Answer Questions :

Ans. 1. In asexual reproduction new individual is produced by a single parent. In it gametes (sex cells) are not produced. Unlike it, in sexual

reproduction usually two parents, take part. In it, two types of gametes are produced, which fuse to form a zygote.

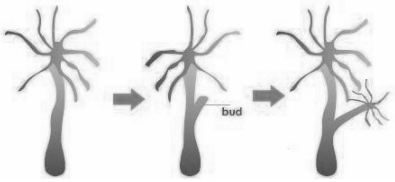
2. Metamorphosis is the drastic change which takes place during the development of an animal. During this change there is complete transformation from larval stage to an adult form. Some animals that undergo metamorphosis are frog and butterfly.
3. Internal fertilization takes place inside the female body. This type of fertilization occurs in insects, birds, reptiles and mammals.
   External fertilization is the one in which the fusion of a male and a female gamete takes place outside the body of the female. This type of fertilization occurs in aquatic animals like fish, starfish and frogs.
4. Cloning is the production of an identical cell or any other living part or a complete organism. Gametes are involved in cloning.

G. Long Answer Questions :

Ans. 1. In case of human beings, this fertilisation takes place in the fallopian tubes. The male parent produces male gametes (male sex cells) called sperms in his testes each day. The female parent produces the female gamete (female sex cells) called ova (or eggs) in her ovaries. Each ovum is a round structure, of the size of a pin's head. It is many times larger than a sperm, having a lot of cytoplasm. One ovum or an ege cell is released from one of the ovaries approximately every 28 days.
   The sperms (or male gametes) in the testes of a man are introduced into the vagina of the woman through penis during copulation (or mating). In this way, millions of sperms are released into the vagina at one time. The sperms are motile, so these come up through cervix into the uterus and then pass into the oviducts. The oviduct contains an ovum or egg cell released by the ovary during ovulation. Only one sperm fuses with the ovum (or egg) in the oviduct. The sperm nucleus and the egg nucleus fuse together. This fusion of a male gamete and a female gamete is called fertilisation.
   The fertilisation results in the formation of a zygote.

2. Asexual reproduction is a type of reproduction that only involves single parent to produce new individuals. Since only one parent is involved, the offspring is similar to the parent. There are two common methods of asexual reproduction.
   Binary Fission : In this method, the parent organism splits (or divides) to form two new organisms. When this happens, the parent organism ceases to exist and two new organisms come into existence. The unicellular organism (or unicellular animal) called *Amoeba* reproduces by the metohd of binary fission.
   Budding : In budding, a small part of the body of the parent organism grows out as a 'bud' which then detaches and becomes a new organism. The asexual reproduction by budding is observed in animals like *Hydra*, sea-anemones, sponges and corals.
3. In each hydra, there may be two or three bulges. These bulges are the developing new individuals and they are called buds. Such presence of buds can also be seen in the yeast.

The bud so formed slowly enlarges/and detaches itself from the body and grows into a new young organism.



Budding in Hydra

H. HOTS Questions :

Ans. 1. If eggs are left open and not incubated by hen, they will not hatch as incubation is a necessary condition for them to hatch.

2. Frogs and toads move to ponds or lakes during rainy season to ensure fertilization.

THINGS TO DO

Do it yourself.

10 Reaching the Age of Adolescence

EXERCISE

A. Tick (✓) the correct answer :

Ans. 1. a. Menstruation starts 2. b. Chapatti, dal, vegetables
3. c. Secondary sexual characters 4. a. Ovulation

B. Fill in the blanks :

1. The changes which occur at adolescence are controlled by **hormones.**
2. The endocrine system is made up of **ductless** glands.
3. Once puberty is reached in girls, ovaries begin tos produce the **eggs** or **ova.**
4. The testes and ovaries secretes **hormones.**
5. Stoppage of menstruation is termed **menopause.**

C. Write True or False :

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

D. Very Short Answer Questions :

Ans. 1. Adolescence is the period of life when the body undergoes changes, leading to reproductive maturity. On the other hand, puberty is the period during which adolescent boys and girls reach maturity and become capable of reproduction.

2. Development of Secondary Sexual characters is the most conspicuous change during puberty.
3. During puberty in boys, the voice box or the larynx begins to grow.
4. Endocrine glands are called so because they release their secretions directly into the bloodstream.

E. Short Answer Questions :

Ans. 1. Hormones is the term used for secretions of endocrine glands responsible for changes taking place in the body.

2. **(i) Puberty :** It is stage of life when the human body becomes capable of reproduction.
(ii) Adolescence : It is the period of transition from childhood to adulthood. It is characterised by changes such as development of breasts in girls, and facial hair, i.e., moustaches and beard in boys.

3. Mensuration is the shedding of the uterine, living and blood along with

the unfertilised ovum from the vagina of a female.

4. Following changes take place in the body at puberty :
   - Increase in Height Change in voice
   - Increased activity of sweat and sebaceous glands
   - Reaching mental, intellectual and emotional maturity
   - Development of sex organs.
   - Development of secondary sexual characters
5. Hormones are chemical substances which are secreted from endocrine glands. Their role in our body is to regulate most of the metabolic activities inside our body.

F. Long Answer Questions :

Ans. 1.

S.No.	Name of the Gland	Location	Function
1.	Pineal gland	Within the brain	The functions of this gland are not fully known, but it seems to have a part in a person's sexual development.
2.	Pituitary gland	At the base of the brain	This gland has many regulatory functions and therefore, also referred to as the "master gland".
3.	Parathyroid gland	Four small glands embedded in the thyroid.	The more secretion of thyroxine causes underweight, protruding eyes, restlessness and mental instability. They regulate the calcium and phosphorus balance in the body.
4.	Adrenal glands	Two adrenal glands are located at the top of each kidney.	Adrenal glands secrete hormones which maintain the correct salt balance in the blood. Adrenals also produce the hormone adrenalin termed 'stress hormone' because it helps to calm down when one is very angry or embarrassed or worried.
5.	Pancreas	Situated below the stomach.	It contains cluster of cells called islets of langerhans which produce two secretions

			affecting the metabolism of glucose (blood sugar) : Insulin : It lowers the blood sugar level Glucagon : It raises the blood sugar level.

2. Testosterone (in males) and estrogen (in females) are sex hormones. They are called so because they are related with the sexual characters in male and female respetively. The function of testasterone is to control the development of secondary sexual characteristics like facial hair, in males. The function of oestrogen is to control the development of secondary sexual characteristics, like development of breasts, in females.
3. **(a) Exocrine glands :** These are those glands which have ducts that carry their secretions to specific places in the body.
   (b) Target site : A particular site, that may be an organ, tissue or cell for which endocrine glands releases hormone into the bloodstream. The target site responds to the hormone.
   (c) Menarche : The first menstrual flow that is termed as the beginning of puberty in girls.
   (d) Monopause : Stoppage of menstruation that signifies the end of reproductive phase.
4. The 23rd pair of chromosones in human beings are known as the sex chromosome. The sex chromosomes contain genes that determine the sex of a child. There are two types of sex chromosomes—x chromosomes and y chromosomes. They are different from other chromosomes in the sense that not only they are different in males and females but also they decide whether the offspring would be male or female.

G. HOTS Questions :

Ans. 1. In this case he may develop a deformity known as goitre.
2. Acme and pimples appear during adolescent period because of the increased activity of sweat and oil glands.

THINGS TO DO

Do it yourself.

11 Force and Pressure

EXERCISE

A. Tick (✓) the correct answer :

Ans. 1. a. muscular force 2. c. gravitational force
3. b. newton

B. Fill in the blanks :

Ans. 1. The direction in which a body is pushed or pulled is called **force.**
2. **Gravity** is the force with the Earth attracts objects towards itself.

3. The force exerted by a **magnet** is called magnetic force.
4. The SI unit of force is **Newton.**
5. **Pressure** is defined as the force acting on a unit area.

C. Write True or False :

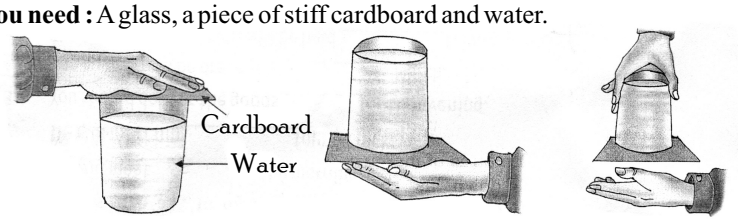
Ans. 1. False 2. True 3. False 4. False 5. True

D. Very Short Answer Questions :

Ans. 1. A force is a pull or push acting on a body which tends to change its state of rest or of motion.
2. Atmospheric pressure is the pressure exerted by the weight of the air on an object.
3. A simple barometer measures atmospheric pressure in terms of height of mercury column. At sea, level, the height of mercury column in a simple barometer is 760 mm or 76 cm.
4. Atmospheric pressure (or air pressure).

E. Short Answer Questions :

Ans. 1. Muscular force is the force exerted by the muscles of a human or animal body. Lifting a weight is an example of muscular force.
2. Pascal's law states that—Pressure applied to a liquid is transmitted equally in the directions. This can be demonstrated by the following experiment :
Fill a thick polythene bag with water. Make several holes in the bag with a fine pin. Squeeze the bag gently. What do you see? Water streams out in all directions with equal force.
This shows that the pressure applied at any point on an enclosed liquid gets transmitted equally in all directions.
3. The reason common to all these is that it allows pressure to be distributed to a large area and thus helps in better movement.
4. **To show the existence of atmospheric pressure.**
You need : A glass, a piece of stiff cardboard and water.



Procedure :
1. Fill the glass with water. The water level should touch the brim.
2. Cover the mouth of the glass with the piece of cardboard.
3. Now, pressing the piece of cardboard with your palm, quickly turn the glass upside down.
4. Gently, remove your palm from the cardboard.

Observation : The piece of cardboard remains stuck to the mouth of the glass and water does not fall from the glass.

Conclusion : The outside atmospheric pressure acts on the cardboard and hence it remains stuck to the rim of the glass.

F. Long Answer Questions :

Ans. 1. Force is a 'push' or 'pull' which is applied on a body to bring about some change in its position and form.

We use force to perform various activities. Force has the following effects on objects.

- ***Force can make a stationary object move or make a moving object more faster.*** A toy car can be made to move by giving it a little push. Similarly, a stationary football can be made to move by giving it a small push (i.e., by kicking it). If we have an already moving toy car or ball, we can make it move faster by giving it a push in the direction in which it is moving. Thus, a force can make a stationary object move, and it can also make an already moving object move faster.
- ***Force can slow down or completely stop a moving object.*** A moving toy car can be made to stop by applying a force. A bicycle can be stopped or slowed down by applying the brakes. In football, the force applied by the goalkeeper stops the ball hit towards the goal. In order to stop or slow down a moving body, we need to apply a force in a direction opposite to the direction of motion of the moving body.
- ***Force can change the direction of a moving object.*** In cricket, when a batsman hits the ball that is bowled at him, the direction in which the ball is moving changes. In football, the players can change the direction of the moving ball by kicking it in a different direction. In these examples, force changes the direction of a moving object.
- ***Force can change the shape or size of an object.*** While making chapattis, we change the shape of the dough by applying force with our hands. The shape of a rubber band changes when it is pulled. You can also break things by applying a force. Materials that break easily when we apply a force are termed brittle. For example, objects made of glass and clay break easily when we apply force on them.

2. (a) Pressure in a liquid increases with depth. This is so because the farther down we go, the greater the weight above. Also, pressure at the same depth acts equally in all directions.

   (b) Pressure does not depends on the amount of a liquid. It is same in all conditions.

3. Force is defined as a 'push' or 'pull' acting on a body.

Contact Force : For an object to be pulled or pushed, there should be a contact between the two objects.

For example,

- When a coiled spring is stretched (pulled), the two ends of the spring must be in actual contact with the hands of the person.
- Kicking of a football, pulling a cart also require a contact with the object.

Such a force is called contact force.

Contact force is a force which acts only when the objects are in physical contact with each other.

Some typical contact forces are described below :

(a) Muscular Force

The force exerted by the muscles of a human or animal body is called muscular force.

We use our muscular force during walking, running, kicking and lifting certain objects.

Animals exert muscular force to do heavy works such as, pulling a cart, ploughing, carrying heavy loads etc.

(b) Frictional Force

Frictional force or simply friction is also an example of contact force.

The force acting between two surfaces in contact, which opposes the motion of one body over the other, is called the force of friction.

Non-Contact Force (or action-at-a distance force) : The force which can act even without any actual contact between the two objects is called a non-contact force (or action-at-a-distance force).

Some typical non-contact forces are described below :

(a) Magnetic Force

- A magnet attracts nails and pins made from iron even from some distance.
- A magnet attracts another magnet when the unlike-poles are brought nearer.
- A magnet repels another magnet when the like-poles are brought nearer.

These examples show that a magnet exerts some force on the objects made of iron as well as other magnets when brought nearer to them.

The force exerted by a magnet is called magnetic force. The magnetic force acts from a distance.

(b) Electrostatic Force

The force exerted by an electrified body is called electrostatic force.

(c) Gravitational Force

The force of attraction between any two objects possessing mass is called force of gravitation or gravitational force.

For example, the force acting between any two books, between a book and a table, between you and your friend, between earth and the moon etc., is gravitational force.

Gravitational force exists everywhere in the universe.

Earth has a huge mass. So, it attracts every objects towards it. That is why a ball thrown upwards ultimately comes down, a ripened fruit falling from a tree falls down to the Earth.

4. When the resultant of all the forces acting on a body is zero, the forces are said to be balanced forces. When the resultant of all the forces acting on a body is not zero, the forces are unbalanced forces.

   Of the two unbalanced diet force can bring changes in state of motion.

G. HOTS Questions :

Ans. 1. It is because we need to gather more oxygen and accommodate in yourself as there are some breathing problems high atop a mountain as higher the atmospheric pressure the thinner the air.

2. This is so because we also have air inside of us that are at the same pressure. It counter balances the crushing tendancy.

THINGS TO DO

Do it yourself.

12 Sound

EXERCISE

A. Tick (✓) the correct answer :

Ans. 1. c. Hertz 2. a. time period
3. a. infrasonic waves 4. b. traffic noise

B. Fill in the blanks :

Ans. 1. The number of oscillations per second is called **frequency.**
2. Unwanted or annoying noise in the environment is called **noise pollution.**
3. Sound is produced by a **vibrating** body.
4. **Pinna** collects sound waves and directs them to the ear tube.
5. Sound waves of frequencies below 20 Hz are called **infrasonic waves.**

C. Very Short Answer Questions :

Ans. 1. Noise pollution is the sustained presence of harmful, unwanted, or annoying noise in the environment.
2. Frequency is the number of oscillations per second.
3. Sound is produced whenever an object vibrates in a surrounding medium.

D. Short Answer Questions :

Ans. 1. The speed of sound depends on the nature of medium (or material) through which it travels. It is also influenced by temperature.
2. 'Time period' of an oscillation is the time taken to complete one oscillation.
3. The audible range of frequency of sound waves for human beings is 20 Hz to 20,000 Hz (20 Khz).
4. The three types of musical instruments are—stringed instruments, wind instruments and percussion instruments.

E. Long Answer Questions :

Ans. 1. When we talk, we make sound. This sound is made by the vibrations of two vocal cords presentin our voice box fixed in the throat. This can be shown as follows : Let us hold the fingers of our right hand gently on our throat and talk to one of our friends (or sing a song). When we are talking (making sound) our fingers feel that something is moving or vibrating inside the throat. Actually, when we talk, air from the lungs passes up the wind-pipe. This air makes the voca cords in our voice box to vibrate rapidly. And vibrating vocal cords produce the sound (of our talk). Thus, sound is produced while we talk when our vocal cords vibrate.
2. Sound waves in air travel through vibrations that cause waves in the air. We hear the sound when these waves reach our ears. To understand how this happens, let us take the example of a loudspeaker.
When a loudspeaker is switched on, a membrane in the loudspeaker moves backward and forwards, i.e., it vibrates. This causes the air molecules surrounding the loudspeaker to vibrate. If we imagine the air

molecules to be like small balls, a sound wave travelling through air alternatively pushes these balls close together and then pulls them away from each other. The areas where they lie together are called compressions, and the areas which they lie away from one another are called rarefactions.

As the sound waves propagate, the molecules themselves do not move from one point to another, they only vibrate about a mean position. It is the effect that propagates and reaches our ears.

3. The ear can be broadly classified into three parts : the outer ear, the middle ear, and the inner ear.

   Outer ear : The part of the outer ear, that is visible to us, is called pinna. The pinna collects sound waves and directs them to the ear tube. At the end of the ear tube is the ear drum (also called tympanum). The ear drum vibrates when sound waves strike it and transmits the sound to the middle ear.

   Middle ear : The middle ear is a cavity with three important ear bones. These three bones are placed in such a way that they move when the ear drum vibrates and, therefore, transmit the vibration to the inner ear.

   Inner ear : The inner ear is connected to the middle ear through a small opening. The inner ear is filled with a fluid. When this fluid vibrates, it excites tiny hair in the inner ear. These hair transform the vibrations into electrical impulses, which are then transferred to the brain via the auditory nerve. This is how we 'hear' a sound.

4. Broadly, musical instruments are classified into the following three categories.
   - In stringed instruments like violin, guitar, and sitar, sound is produced by a vibrating string. The shrillness or pitch of the sound is altered by changing the length of the vibrating portion of the string. For example, a sitar player plucks the string with the right hand while the pitch of the sound produced is changed by pressing the string with the index finger of the left hand. These instruments also have an air chamber, which helps increase the loudness of the sound produced.
   - In wind instruments like trumpet, flute, and harmonica, sound is produced by the vibrating air column inside the instrument. The pitch of the sound is altered by changing the length of the vibrating air column.
   - In percussion instruments like tabla, drums, and dholak sound is produced by a vibrating skin or membrane. The pitch of the sound is altered (to a certain extent) by increasing or decreasing the tension in the membrane.

F. HOTS Questions :

Ans. 1. This is so because sound cannot travel in vacuum. It needs a medium to travel. Whereas on the surface of the moon their is no air to carry the sound waves.

2. Yes, music can become noise. It happens when it exceeds the audible range of us.

THINGS TO DO

Do it yourself.

13 Chemical Effects of Current

EXERCISE

A. Tick (✓) the correct answer :

Ans. 1. a. electricty 2. a. electrons 3. a. carcinogenic

B. Fill in the blanks :

Ans. 1. Electricity is an **essential** part of modern living.
2. **Insulators** are materials which do not allow electricity to pass through them.
3. **Distilled** water is a bad conductor of electricity.
4. **Electrolysis** is defined as the chemical decomposition of constituents of solution on passage of electric current.
5. The strength of the battery is **increased** by adding more dry cells to it.

C. Write true or false :

Ans. 1. True 2. True 3. False 4. False

D. Very Short Answer Questions :

Ans. 1. No, distilled water does not conduct electricity.
2. This is because electricity can pass through our wet hands and can give us an electric shock.
3. Electroplating is done for the following two main reasons :
   - To protect the metal underneath
   - To produce an attractive finish.

E. Short Answer Questions :

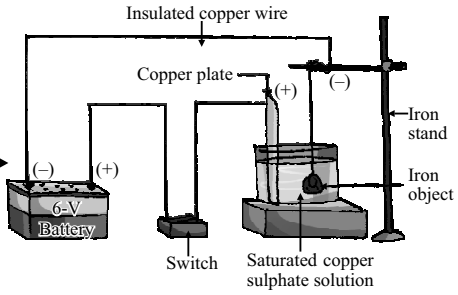
Ans. 1. Tap water conducts electricity because it is found mixed with a number of gases and minerals in it and therefore, is impure and this makes it a good conductor of electricity.
2. In nature, it is practically impossible to find a 100% pure sample of water or distilled water because water is a great solvent and a good number of gases (from the atmosphere) and other substances (from soils, stones, rocks, plant and animal wastes) get dissolve in it easily.
3. Anode is a positively charged electrode in a voltameter.
4. Nowadays electrolysis is used widely in chemical and commercial industries for the following reasons :
   - Refining impure metals into pure ones
   - Extraction of metals from their ores.
   - Electroplating.

F. Long Answer Questions :

Ans. 1. The three possible effects of electric current passing through a solution are as follows :
   - Gas bubbles get deposited at the electrodes.
   - Colour of the electrolyte solution change.
   - A metal gets deposited at the negative electrode or cathode.
2. Electrolysis is the chemical change that is brought in an electrolyte by the passage of electric current.

Electrolysis takes place in an electrolytic cell. An electrolytic cell consists of a beaker in which the electrolyte is poured. Two plates or rods, made up of conducting materials, are dipped in the electrolyte. These rods are known as *electrodes.* The two ends of the rods are connected to a battery. The rod which is connected to the positive terminal of the battery is known as *anode* while that connected to the negative terminal is known as *cathode.* When the circuit is closed, i.e. the electric current is switched on, the electrolyte splits into anions and cations. The cations formed in the electrolytes get attracted towards the cathode and get deposited there. The anions on the other hand are deposited on the anode.

3. Electroplating is carried out in a vessel containing the solution of a compound of a metal that is to form a coat. A rod of the plating metal and the object to be plated are immersed in the solution. The object to be electroplated is connected to the negative terminal of the battery (cathode). The rod of plating metal is connected to the positive terminal of the battery (anode). The object serves as cathode and the rod as anode. Electrolysis takes place by applying an electric current through the electrodes, and the positive ions get deposited on the object as element, thus, forming a coating.
4. Electroplating is done for the following two purposes :
   - To protect the metal underneath
   - To produce an attractive finish

   Applications of Electroplating
   - It is widely used for coating metal objects with a thin layer of different metals. For example, chromium plating is done on many objects such as kitchen gas burners, bath taps, etc.
   - Electroplating is widely used to prevent corrosion. For example, chromium has a shiny appearance and it does not corrode.
   - Jewellers electroplate silver and gold on less expensive metals.
   - Tin cans used for storing food are made by electroplating tin on iron.
   - Iron is coated with zinc to protect it from corrosion and prevent formation of rust.
5. 

G. HOTS Questions :

Ans. 1. No, a plastic or wooden object cannot be coated with metal by electroplating. This is so because they are not metals and they will not be able to lose ions that will be deposited on the other terminal.

2. This is so because silver is a very expensive metal in comparison to copper.

THINGS TO DO

Do it yourself.

EXERCISE

A. Tick (✓) the correct answer :

Ans. 1. b. copper rod 2. c. one will lose and the other will gain electrons
3. d. 8.0

B. Fill in the blanks :

Ans. 1. **Electroscope** is a device that can be used to detect charge on any body.
2. The process of transferring charge from a charge object to the Earth is called **conduction.**
3. **Earthquakes** occur due to disturbances deep down inside the crust.
4. The seismic focus is also called **seismic origin** or **hypocenter.**
5. The graphical record of the intensity of seismic waves is called **Seismograms.**

C. Write one word for the following :

Ans. 1. The process of transferring charge from a charged object to the Earth.
Conduction
2. Rapid flow of charge through the air between the two oppositely charged clouds. **Lightning**
3. The relative movement of different parts of the lithosphere producing high intensity shock waves. **Earthquake**
4. An instrument which detects and records the magnitude of earthquake.
Richter scale

D. Match the following :

Ans.

1.	Earthing	(a)	Richter scale
2.	Earthquake	(b)	Lithosphere
3.	Tectonic places	(c)	Earth's crust
4.	Faults	(d)	Lightning

E. Very Short Answer Questions :

Ans. 1. Only insulators can be charged with static electricity.
2. Lightning
3. Faults
4. Seismograph

F. Short Answer Questions :

Ans. 1. One should not following things during thunderstorm when one is inside our house :
(i) Stay away from anything that could conduct electricity. This includes fireplaces, radiators stoves, metal pipes, sinks and phones.
(ii) Do not use any plug-in electrical appliances like hair dryers or electric razors. If lightning strikes your house they can conduct the charge to you.
(iii) Do not use the telephone during the storm. Lightning may strike

telephone lines outside.

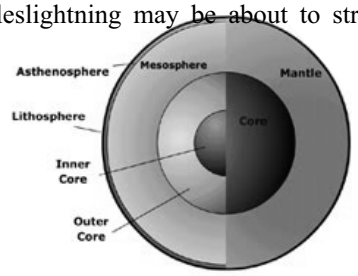
2. When a highly charged cloud passes over a tall building, it induces an opposite charge on it.
3. (a) Richter Scale (b) Seismograph or Seismometer
4. The destructive (or damaging) effect of an earthquake depends upon the following factors :
   - Magnitude of the earthquake
   - Local geological conditions
   - Focal depth
   - Distance from the epicentre
   - Design of buildings and other structures
   - Density of constructions and population in the affected area.

G. Long Answer Questions :

Ans. 1. High-rise buildings can be protected from lightning by providing a lightning conductor at its highest point.

A lightning conductor consists of a long, thick metal rod/strip having sharp spikes at its upper end. The spikes pointing towards the sky are fixed at the highest point of the building. The lower end of the metal rod/strip is connected to a large copper (or aluminium) plate which is buried deep inside the Earth. This is called earthing.

When a highly charged cloud passes over a tall building, it induces an opposite charge on the spikes. This charge quickly flows to the Earth through the copper rod/strip. Thus, the lightning discharge is prevented and the building is saved from damage.

2. Three measures to protect oneself from lightning are as follows :
   (i) If you are outdoors, seek for a shelter. Buildings are best for shelter, but if not building are available, you can find protection in a cave, ditch or a canyon. Trees are not good cover. Tall trees attract lightning.
   (ii) If you cannot find shelter, avoid the tallest object in the area. If only isolated trees are nearby, your best protection is to crouch in the open, keeping twice as far away isolated trees as the trees are high.
   (iii) When you feel the electrical chargeif you hair stands on end or your skin tingleslightning may be about to strike you. Drop to the ground.
3. 

The inner structure of the earth (not to the scale)

4. **Seismic focus :** The point from where the shock-waves of an earthquake originate due to sudden movement/slip of rocks is termed seismic focus.
Epicenter : The point on the surface of the Earth, vertically above the seismic focus, is called epicentre.
Focal depth : The focal depth of an earthquake is the depth of the seismic focus below the Earth's surface.
Seismic waves : The waves generated in the lithosphere due to sudden movement in a part of Earth's crust are called seismic waves or shock-waves.

H. HOTS Questions :

Ans. 1. This is so because a metallic comb does not lose its electrons on rubbing.
2. The electrostatic charge can be stored using a capacitor.

THINGS TO DO

15 Light

EXERCISE

A. Tick (✓) the correct answer :

Ans. 1. a. angle of reflection 2. b. reduces
3. a. one-sixteenth of a second 4. He wears spectacles with concave lenses of appropriate focal length

B. Fill in blanks :

1. **Normal** is a line perpendicular to the surface of the mirror at the point of incidence.
2. The bouncing back of light from the surface of an object is called **reflection.**
3. The angle of incident is **perpendicular** to the angle of reflection.
4. The set of colours formed on splitting on white light is called the **spectrum of white light.**
5. **Cornea** is the front bulging part of the eye.

C. Match the following :

Ans.

1.	Optic nerve	(a)	Tape recorders, compact discs (CDs)
2.	VIBGYOR	(b)	Carries visual messages to the brain
3.	Cataract	(c)	Produced when white light splits
4.	Auditory aids	(d)	Eye lens become cloudy or opaque

D. Write True or False :

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

E. Very Short Answer Questions :

Ans. 1. An incident ray is a ray of light coming from an object that falls on the surface of the mirror.
2. Cornea is the front bulging part of the eye. It is made of thin transparent tissues. It covers the front of the eye.
3. Hypermetropia is an eye defect in which are ciliary muscles become

weak and are unable to thicken the eye lens.

4. Visually challenged people are those whose vision is extremely poor or they are blind.

F. Short Answer Questions :

Ans. 1. **First law :** The incident ray, at the reflected ray and the normal at the point of incidence are all in the same plane.

Second law : The angle of incidence is equal to the angle of reflection, i.e., Ði = Ðr.

This laws is also called the Snell's law.

The laws of reflection are applicable to all polished and smooth surfaces, whether plane or curved.

2. The phenomenon of splitting of white light into its component colours is called dispersion of light.

3. The two types of blindness are—partial blindness and total blindness. People who are totally blind cannot tell light from dark. Those who are partially blind have some sight that may be useful for certain purposes.

4. It is easy for a person with normal eyesight to see both nearby and far off objects clearly. This happens because of the action of the ciliary muscles on the lens. When the eye is focussing on far off objects, the ciliary muscles relax and the thickness of the lens reduces. This helps us to see far off objects clearly. On the other hand, when we look at an object close to us, the ciliary muscles contract making the lens thicker, thereby reducing its focal length. This increases the converging power of the lens and we can see the object clearly. The ability of the eye to alter the focal length of its lens, so that it can clearly see all objects within a certain range, is called accommodation.

G. Long Answer Questions :

Ans. 1. The characteristics of the image formed by a plane mirror are as follows :

(i) The image is formed behind the mirror.

(ii) It is a virtual image which cannot be taken on the screen.

(iii) The size of the image and the object is the same.

(iv) The image formed by the plane mirror is erect and not inverted. That is why, you see yourself upright in plane mirror and not inverted.

(v) The image will be formed as far behind the mirror as the object is in front of it. That is why you find that when you move closer to the mirror your image also seems to move closer. Similarly, when you move away from the mirror, your image also seems to move away.

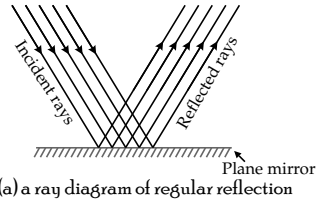
(vi) The image formed by a plane mirror is laterally inverted. Lateral inversion means that the right side of the object appears as left and the left side of the object appears right.

2. Depending on the nature of the surface, there are usually two types of reflection : regular and irregular reflection.

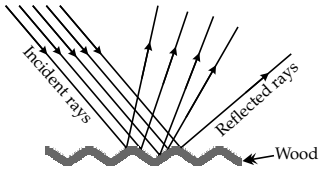
Regular reflection : When a parallel beam of light is incident on a plane and highly polished surface, the whole light falling on the surface is

reflected in a definite direction. Such a reflection is called regular reflection.

Diffused reflection : When a parallel beam of light is incident on a rough or irregular surface such as a wall or a piece of wood, the rays get reflected in all directions and the reflected light spreads over a wide area. Such a reflection is called diffused reflection. It is this type of reflection that enables us to see various objects around us.

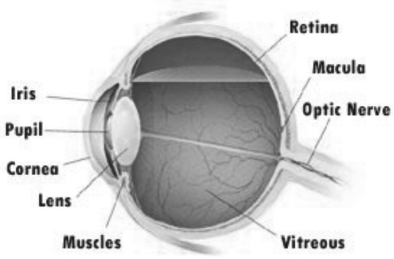


(a) a ray diagram of regular reflection



(b) a ray diagram of irregular reflection

3. Human eye is almost spherical with a slight bulge in the front as shown in the given figure. In most cases it is 2.5 cm long. It has eyelids that act as shutters and protect it from dust and injury. Internally it consists of the following parts :



Parts of the Eye

(i) Cornea : It is the front bulging part of the eye. It is made of thin transparent tissues. It covers the front of the eye.

(ii) Iris : It is the coloured part of the eye behind the cornea. It increases or decreases the size of the pupil to control the amount of light entering the eye.

(iii) Pupil : It is the tiny hole in the middle of the iris. It allows light to enter the eye.

(iv) Lens : It lies behind the pupil and the iris. It is transparent and is made up of many concentric layers. It focuses light to form an image on the retina.

(v) Retina : It is lining just behind the eyeball. It acts as a screen for image formation. It is sensitive to light. It has light sensitive receptors called rods and cones. When light falls on these receptors, they send signals to the brain through the optic nerve. The brain then interprets the image.

(vi) Optic nerve : It is a bundle of nerves beginning from the brain and entering the eyeball from behind. It carries visual messages to the brain from retina.

(vii) Ciliary muscle : It is a ring of muscles which holds the lens in position. they also control the focal length of the eye lens by contracting and expanding.

(viii) Sclera/Sclerotic : It is the visible white part of the eye filled with watery fluid. It protects the internal parts of the eye.

(ix) Blind spot : It is a portion on the retina where the optic nerve enters

the eyeball. It does not have any rods and cones and is insensitive to light. Images forming on this spot are not visible.

4. There are 63 symbols or characters in Braille. Each symbol is represented by a cell which consists of two vertical rows of three dots each. One or more dots in a cell may be embossed (raised) to form the symbols.

   A visually challenged person can feel these raised dots with the fingers and recognize the letters. This way they are also able to read books and other text printed in Braille.

H. HOTS Questions :

Ans. 1. If the retina gets damaged a person would be unable to see.

2. A glass slab allows light to pass through it, hence it does not show any type of dispersion.

THINGS TO DO

Do it yourself.

Note

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