



# Teacher's Manual



# Focus SCIENCE

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# Focus Science-6



## Chapter 1

## Food Components and Nutrition

- A. 1. The useful components of food needed by our body called **nutrients**. The main nutrients in our food are carbohydrates, proteins, fats, vitamins and minerals.  
2. The two food rich in fat are oil and meat.
- B. 1. (c)      2. (a)      3. (d)      4. (c)
- C. 1. Vitamins   2. fats      3. Citrus      4. 70
- D. 1. True      2. True      3. True      4. True      5. False
- E. 1. fats      2. papaya      3. Dehydration
- F. 1. Proteins are important for us because they protect and help the body to fight against infections and regulate body functions.  
2. Roughage is a dietary fiber that largely consists of cellulose. It cannot be digested by our body as our body does not contain cellulose-digesting enzymes.  
3. Foods can be classified according to their functions in our body as :  
(a) Energy-giving food      –      carbohydrates and fats  
(b) Body-building food      –      proteins  
(c) Protective food      –      vitamins and minerals
- | 4. Vitamins | Deficiency diseases |
|-------------|---------------------|
| Vitamin A   | Night blindness     |
| Vitamin B   | Beriberi            |
| Vitamin C   | Scurvy              |
| Vitamin D   | Rickets             |
- G. 1. Water plays a vital role in our body system. As it makes up almost 70 per cent of our body weight. Water helps our body to absorb nutrients from food. It also helps in throwing out some wastes from body as urine and sweat. Normally, we get most of water that our body needs from the liquids we drink, such as water, milk and tea.  
In the digestive system, water helps to breakdown complex food molecules into simpler form and it helps to maintain our body temperature.

2. The Mid-day Meal scheme has been launched by the Government of India. Under this scheme, free nutritious food is provided to school-going children in their schools. It has two main motives—to promote education in rural India, especially among poor children, and to prevent malnutrition in children. This scheme has been renamed as PM-Poshan (Poshan Shakti Nirwan) initiative to improve the nutritional levels of children and to support their education.
3. A diet containing all the nutrients (carbohydrates, fats, proteins, vitamins and minerals etc.) in their proper amounts is known as the **balanced diet**. In a balanced diet, energy-giving foods, body-building foods and protective foods are present in correct proportions.  
However a balanced diet is not the same for everyone. It depends on age, sex and type of work that one does.
  - In early childhood, the child grows rapidly. He/she needs more proteins.
  - Nursing mothers and pregnant women also need more proteins.
  - A hard-working labourer needs more fats and more carbohydrates to get energy.
4. There are several vitamins which are essential for the proper functioning of our body. Each vitamin has a special function in our body and deficiency of it in the diet may cause a deficiency disease.

Vitamins	Deficiency diseases	Symptoms
Vitamin A	Night blindness	<ul style="list-style-type: none"> <li>• Poor vision and loss of vision in darkness (night)</li> </ul>
Vitamin B	Beriberi	<ul style="list-style-type: none"> <li>• Extreme weakness</li> <li>• Swelling of legs</li> <li>• Loss of appetite and weight</li> </ul>
Vitamin C	Scurvy	<ul style="list-style-type: none"> <li>• Spongy and bleeding gums, loose teeth</li> <li>• General weakness and pain in the muscles and joints</li> </ul>

Vitamin D	Rickets	<ul style="list-style-type: none"> <li>• Bones become soft, bent and deformed.</li> <li>• Bowed legs due to malformation of leg bones.</li> <li>• Pain in bones; soft bones are more susceptible to fracture.</li> </ul>
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Chapter  
**2**

## Grouping of Materials

- A. 1. One solid which is soluble in water is sugar and liquid which is soluble in water is alcohol.  
2. The two inflammable substances are petrol and alcohol.
- B. 1. (c)      2. (a)      3. (d)      4. (c)
- C. 1. density      2. dissolves  
3. non-lustrous      4. dull
- D. 1. False      2. True      3. True      4. True
- E. 1. (b)      2. (d)      3. (a)      4. (c)
- F. 1. The materials which have a special shine on them are said to be lustrous and the special shine on them is called lustre. Iron, copper, aluminium and gold are examples of some lustrous materials which show bright metallic lustre when they are freshly cut.
2. Certain substances dissolve completely in water. Such substances are called **soluble substances** and this property is called **solubility**.  
Soluble substances include sugar, common salt and other substances that totally dissolve or disappear in water.
3. The property of a material due to which we can see through it clearly is called **transparency**. Transparent materials include glass, water, acrylic sheet and cellophane paper.
4. Some metals such as copper and aluminium become dull and lose shine over long periods of time. This is because of action of air on them or due to a layer of dust or dirt formed over them. When oxygen in the air combines with such metals, it causes damage to them. For example, iron

gets damaged on coming in contact with moist air and the process is called **rusting**.

- G. 1.** Grouping of objects together with similar properties is called **sorting**. The materials can be grouped on the basis of similarities or differences in their properties.

Materials can be grouped as lustrous and non-lustrous on the basis of lustre/shine possessed by them.

- 2.** A substance which is denser than water will sink in water. A substance which is less dense than the water will float on water. Thus, we can group materials on the basis of floatation or sinking in water. Some materials float in water while others sink. If you drop an iron nail in water, it will sink but a wooden block will float on water. Likewise, aluminium will be lighter than iron but heavier than water. It will sink in the water.

- 3.** Conductivity of heat means the transfer of heat energy from a hot body to a cold body due to direct contact.

For example, if two metals are placed in contact with each other one being hot and the other being cold. After sometime the cold metal will also become hot.

- 4.** A magnetic property of a material is the atomic or subatomic response of a material to an applied magnetic field where in the electron spin and charge create a dipole moment and a magnetic field.

You must have noticed that some materials are attracted strongly towards a magnet. However, most of the materials are not attracted towards magnet.

The materials which are attracted towards a magnet are called magnetic materials.

For example, materials made from iron, steel, cobalt and nickel are magnetic in nature.



- A. 1.** Two names of pure substances are gold and silver.
- 2.** Two examples of immiscible liquids are mustard oil and water.

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

C. 1. thresher    2. Liebig's condensor

3. purest                            4. Salt, evaporation

D. 1. False        2. True            3. True            4. False

E. 1. gold        2. Sand            3. pulses        4. water

F. 1. **Sedimentation** is the process in which heavier particles of an insoluble solid in a liquid settle down. The particles that settle down are called sediments.

**Decantation** is the process of pouring out the liquid without disturbing the sediments. It is also used to separate the mixture of two immiscible liquids.

2. The five pure substances are gold, silver, copper, salt and water.

3. The process of separating the grains from the rest of the plant is called threshing. After harvesting the food crops, the grains need to be separated from the rest of the plant. This is done by the process of threshing.

4. The two important properties of mixtures are as follows :

(a) The constituents of a mixture may be in any ratio.

(b) They retain their individual properties. For example, the properties of iron and sulphur do not change when mixed together.

G. 1. The process of separating insoluble and suspended solids of various sizes from a liquid, using a filter is called **filtration**. The size of the pores in the filter depends upon the size of the particles which are to be removed. The most common example is making tea. While preparing tea, a sieve is used to separate tea leaves from the water. Through sieve pores, only water will pass. The liquid which is obtained after filtration is filtrate.

2. The process of converting a liquid into its vapour, by heating it below the boiling point of the liquid is called **evaporation**. Salt is obtained from sea because sea water contains large amount of common salt and the salts of the other metals dissolved in it. Near the sea shore the sea water is collected in shallow pits and allowed to evaporate in sunshine. In a few days, the whole water evaporates, leaving behind impure salt.

3. Filter paper is used as the process of separating solid matter from a liquid. Filter paper has tiny holes in it. Because of tiny pores present in it gives clear solution as the particles trapped in the pores of filter paper. For example removing sand from the water.
4. Some examples of mixtures used in our daily life are as follows:
  - (a) A cup of tea contains water, sugar, milk and juices of tea leaves.
  - (b) Air is a mixture of oxygen, nitrogen, carbon dioxide, argon and water vapour etc.
  - (c) Sea water is a mixture of water, salts and several gases dissolved in it.
  - (d) Rock salt is a mixture of common salt and fine sand.
  - (e) A glass of nimbu-pani is a mixture of water, sugar and citric acid.



- A.** 1. The two most important groups of plants are flowering plants and non-flowering plants.  
 2. The parts of a plant are root, stem, leaves, flowers, fruits and seeds.
- B.** 1. (a)      2. (b)      3. (c)      4. (c)
- C.** 1. ovary      2. Photosynthesis  
 3. flower      4. green
- D.** 1. (f)      2. (d)      3. (c)      4. (b)  
 5. (e)      6. (a)
- E.** 1. False      2. True      3. True      4. True      5. True
- F.** 1. The portion of the stem between two nodes are called internodes.  
 2. Pollen grains are fine dust like particles that take part in reproduction.  
 3. Two functions of stem are :  
 (a) The stem conducts water and dissolved mineral salts from the roots to the leaves.

- (b) The stem also stores food.
4. Tap root consists a single main primary root with lateral branches arising from it. The primary root is longer than its branches and grows vertically downward into the soil. For example : balsam, zinnia etc.
- G. 1. (a) **Herbs** are small plants with a soft green stem. They do not grow more than three or four feet in height.  
Examples : Mustard, sunflower, petunia, pea, wheat, paddy and balsam.
- (b) **Shrubs** are medium-sized plants with hard and thick stems. Many branches are seen rising just above the ground.  
Examples : China rose, rose, lemon, bougainvillea and heena (mehndi).
- (c) **Trees** are the tall plants with hard and thick stems. They are generally more than 3 metre high. They live for many years. Every year they bear flowers, fruits and seeds. These have a single main stem which grows for some distance above the ground before giving out branches.  
Examples : Trees of Mango, banyan, neem, etc.
- (d) The plants give out extra amount of water from the plant through stomata in the form of vapours. This process is known as **transpiration**.

2.

S.No.	Root	Stem
1.	Develops from radicle	Develops from plumule
2.	Nodes and internodes absent	Nodes and internodes present
3.	Never green	Often green
4.	Leaves and buds absent	Bears leaves and buds
5.	Generally develops below the ground	Generally develops above the ground

3. The pollen grains are transferred from the anther to the stigma of either the same flower or of another flower of the



same kind by wind, water or insects. This process is known as **pollination**. It is said to be the first process of fertilization in flowering plants. Pollen grains contain male gamete and are present in the anthers of the flowers.



Chapter  
**5**

## Body Movements

- A.** 1. The two types of organ system are circulatory system and nervous system.  
2. The two types of joints are ball and socket joint and hinge joint.
- B.** 1. (b)      2. (c)      3. (c)      4. (b)      5. (d)
- C.** 1. Hinge      2. 12      3. segmented body  
4. Streamlined      5. ribs
- D.** 1. False      2. True      3. True      4. True
- E.** 1. (d)      2. (a)      3. (e)      4. (b)      5. (c)
- F.** 1. Bones cannot move by themselves. Muscles are parts of the body that help in bringing about movement. They are attached to the bones by means of tough bands called tendons.  
2. The elbow, knee and finger joints allow movement in one plane only; i.e., up and down or backward or forward, like the hinge of a door. Such joints are therefore called **hinge joints**.  
3. (a) Birds have streamlined bodies, which make it easier for them to move through air.  
(b) Their bones are hollow, which make them light weight.  
4. Circulatory system, Nervous system, Excretory system, Reproductive system, Digestive system and Respiratory system.
- G.** 1. The skeletal system performs four main functions :  
(a) Protection : The bones protect the soft organs of our body. The brain is protected by the skull, the heart and lungs by the thin long bones in our chest called the ribs.  
(b) Support : Our body has a number of soft organs and muscles. It is necessary to have a hard framework to support these parts otherwise the body will collapse. Our skeleton provides framework and holds us upright.

(c) Movement : Though the individual bones are hard, several of them can move at place where they are joined to other bones. That is why, we can move our arms, legs, fingers and many other parts of our body.

(d) Making blood cells : Bones are hard from the outside but they are soft and spongy on the inside. The inside of bones contains a soft substance called the bone marrow. Blood cells are made in the bone marrow.

2. Most fish have a streamlined shaped body, the head and the tail are narrow; the middle portion of the body is broader. This kind of shape offers least resistance to the flow of water and makes it easier for them to swim through water.

Fish have fins and a flexible backbone that help them in swimming. Most of the fish have a special structure called swim bladder that can be filled with air or emptied to help them to move up and down in water.

3. Many times due to accidents, bones get broken or dislocated from their positions. The ligaments joining the bones get torn and these causes a lot of pain and swelling. There might be injury to the bone also. If a bone is broken we call it a fracture.

A fracture is a break in the bone. The break may be of a hair line crack or serious break in one or more points or broken away. Fracture also causes pain and swelling in the area around it.

4. Snakes do not have limbs (legs, arms or wings). They move by crawling on their bellies. They have scales, which cover their bodies and help them to crawl.

Most snakes move in wave like manner. Their flexible backbones help them in this movement. Their body curves like a wave. The wave like motion pushes the body forward by pressing against the ground.

- A.** 1. Two herbivores are cow and goat.  
2. Fish breathe through gills and dog breathe through lungs.
- B.** 1. (c)      2. (a)      3. (b)      4. (a)
- C.** 1. increase   2. move      3. oxygen   4. waste   5. gills
- D.** 1. (b)      2. (a)      3. (d)      4. (c)  
5. (f)      6. (e)
- E.** 1. True      2. False      3. False      4. False      5. False
- F.** 1. cactus      2. Camel      3. cat      4. lion
- G.** 1. Two adaptations of a camel to survive in a desert are :
- (a) When water is available, the camel can drink a large quantity of water.
  - (b) Camels have a hump where fat is stored. This provides energy in times of shortage of water and food. They can therefore live without water and food for several days.
2. The animals that only eats plants and grass are **herbivores**.
3. The presence of specific features or certain habits, which enable a plant or an animal to live in its surroundings are called **adaptations**.
4. Types of plants on the basis of Habitat are as follows:
- (a) **Hydrophytes** : Living in water like lotus, water lily, water hyacinth, water chestnut etc. These plants are called **aquatic plants**.
  - (b) **Mesophytes** : Living on land with sufficient water, like most herbs and trees. These plants are called **terrestrial plants**.
  - (c) **Xerophytes** : Living on land in dry climate having scarcity of water as in desert like cacti, babool and ber.
- H.** 1. (a) **Producers** : Green plants make their own food from carbon dioxide and water using the sunlight in the presence of chlorophyll in the leaves by the process of photosynthesis. During this process, oxygen is given out

into the atmosphere. The organism that can make their own food are called **producers**.

(b) **Consumers** : Some organisms depend directly or indirectly on the food prepared by plants. They are called **consumers**. For example; all animals including human beings. Consumers include herbivores, carnivores and omnivores.

(c) **Decomposers** : There is another category of living organisms which derive their food from dead and decaying plants and animals. These are called **decomposers**, as they decompose the dead organic matter. Micro organisms like bacteria and fungi act as decomposers.

2. Animals are dependent on plants for shelter and food, while plants are dependent on animals for pollination and seed dispersal. The plants filter water and make it clean and animals require clean water for drinking purposes.

3. Fishes are aquatic animals. They do not have lungs but they have gills which help in their respiration underwater. The water enters the mouth of the fish and pass through the gills which are rich in blood. These gills filaments absorb oxygen from the water and move it into the bloodstream.



## Chapter 7

# Motion and Measurement

A. 1. Two means of transport used on water are boats and ships.  
2. Two examples of linear motion are a car moving on a road and a bullet shot from a gun.

B. 1. (b)            2. (c)            3. (a)            4. (c)

C. 1. rest            2. 100            3. linear motion  
4. Screw Gauge            5. reading

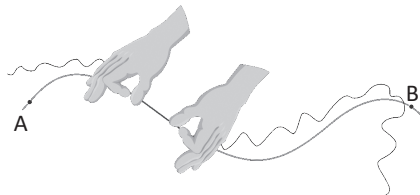
D. 1. (b)            2. (c)            3. (d)            4. (a)

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

F. 1. Second            2. kelvin  
3. moving car            4. tree

- G. 1.** (a) 1 millimetre                      (b) 1 centimetre  
 (c) 1 metre                                      (d) 1 kilometre
- 2.** Measurement is a comparison of an unknown quantity with a known fixed quantity of the same kind.
- 3.** The change in position of an object with time is called motion.  
 For example – Moving of a car.
- 4.** If the motion occurs again and again at a regular interval of time, then the motion is called periodic motion. The revolution of the Earth around the Sun, pendulum of a clock, heart beat, motion of the moon around the Earth, all are the examples of periodic motion.
- H. 1.** We cannot measure the length of a curved line by using a metre scale. We can use a thread or a divider from the geometry box to measure the length of a curved line.

Make a knot at one end of the thread. Place the knot at the beginning of the line (point A) and press it with your finger. Place a small portion of the thread exactly along the line.



Measuring a curved line by a thread

Press the other end of this position with your other hand. The thread between two fingers now has the same length as the position AB of the line. Now place the first finger at point B. Again place a small portion of thread along the next position of the line. In this way, trace the entire length of the curved line using the thread. Mark the thread where it touched the end of the line. Now stretch out the thread on a metre scale and measure its marked portion. The length of this portion is the length of the curved line.

Open a divider so that its legs are a small distance apart, for example 5 mm. Place one of the legs at one end of the line, put the other leg on the line. Take the divider



Measuring the length of a curved line with the help of a divider

along the line and count the numbers of steps in which it covers the entire length of the line. If some portion less than the distance between the two legs is left out, measure it separately by adjusting the distance between the legs. The length of the curved line is obtained as follows :

Total length = (number of steps  $\times$  distance between legs of divider) + length of left over segment.

2. Here are some precautions you should take while measuring length :

- Keep the ruler exactly along the length to be measured.
- Do not use worn out portions of the instrument. Very often the markings at the ends of a ruler gets erased due to overuse. In this case, use any other full mark on the ruler instead of the 0-mark. To get the length, subtract the reading of this full mark from the reading at the other end.

- Keep your eye vertically above the point where the measurement is to be taken. In the figure, it shows a ruler being used to measure the length of a pencil. It shows three



Measuring tape and metre scale

- positions of the eyes to observe the reading on the ruler, coinciding with the pencil point.

3. **Parallax Error** : Parallax error is a reading error, which is arising from the wrong positioning of the observer's eye. It occurs more commonly when the thickness of the sample is different from that of the metre ruler.

4. Travelling is the act of moving people or goods from one place to another. Availability of goods from one place to another is also made possible through transportation.

In ancient time, people had to walk, use boats or animals such as horses to travel from one place to another. Later, invention of the wheel led to the development of several other modes of transport such as trains, cars, aeroplanes and motorboats etc., which not only reduced the wastage of time but also helped in measuring the distance travelled.



# Reflection of Light and Shadow

- A. 1. Two translucent materials are oiled paper and tissue paper.  
2. Two non-luminous bodies are metal and stones.
- B. 1. (a)      2. (c)      3. (b)      4. (a)      5. (b)
- C. 1. black      2. opaque      3. luminous      4. energy
- D. 1. True      2. False      3. True      4. True      5. True
- E. 1. glass      2. firefly  
3. wooden box      4. air
- F. 1. (a)      2. (c)      3. (b)      4. (d)
- G. 1. When the rays of light starting from a point travel in various directions, then the collection of such rays is called a **divergent beam of light**.
2. The phenomenon due to which left hand side of object appears as right hand side and vice versa is called **lateral inversion**.
3. Two characteristics of shadow are :
- (a) It is always erect.  
(b) Irrespective of the colour of the object, the shadow is always black.
4. The point on the mirror surface where the incident ray strikes or the reflected ray bounces off is called point of incidence.
- H. 1. It consists of a rectangular cardboard box such that its one side is made of 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.

2.

S.No.	Real Image	Virtual Image
1.	The reflected rays actually meet after reflection.	The reflected rays do not meet but appear to come from a point.

2.	A real image can be taken on a screen.	A virtual image cannot be taken on a screen.
3.	It is formed in front of the mirror.	It is formed behind the mirror.

3. A shadow consists of two regions :
- (a) **Umbra** : A region of total darkness or the complete shadow is called **umbra**. In this region the ray of light does not enter at all.
- (b) **Penumbra** : A region of partial darkness which surrounds the umbra is called **penumbra**. Some rays of light always reach this region and partially illuminate it.
4. The surface of a mirror is very smooth. When a ray of light falls on this surface it gets reflected along a particular direction. Reflection of light from a smooth mirror is called **regular reflection**.

If the reflecting surface is irregular, then the rays of light that fall on it are scattered in all directions. This is called **irregular** or **diffused reflection**.



- A. 1. Two types of electric cell are dry cell and button cell.  
2. Two non-metals which are good conductors of electricity are carbon and graphite.
- B. 1. (d)      2. (d)      3. (b)      4. (a)
- C. 1. filament      2. chemical, electrical  
3. Electric conductors      4. electric current
- D. 1. (b)      2. (c)      3. (a)      4. (e)      5. (d)
- E. 1. False      2. True      3. False      4. True      5. True
- F. 1. An electric switch is a device, which is used to control the flow of electric current through an electric circuit. The bulb lighted up when the electric circuit was completed by touching the base of the bulb with the cap of electric cell.



The bulb stopped glowing, when the electric circuit was broken by moving away the bulb from the cap of the cell.

2. An electric circuit is a path along which electricity can flow.
  3. Electricity is used for lighting, cooling refrigeration, household appliances, etc. The use of electricity is not limited to a certain point, it has unlimited uses in today's world.
  4. (a) Materials which allow the electricity current to flow through them are called electrical conductors.  
(b) Materials which do not allow the electric current to flow through them are called electric insulators.  
(c) An electric circuit is a closed path of wires and electrical components which allows a current pass through it on the application of potential difference between two points in path.
- G. 1.** A torch is a portable electric lamp which uses two or more cells to light a small bulb. It is used to provide light in the dark when it is switched on. A torch consists of a simple electric circuit in which two or more cells are connected to the torch bulb through a sliding switch.
2. An electric cell is an electrical power supply. It converts stored chemical energy into electrical energy, allowing positive charges to flow from the positive terminal to the negative one through an external circuit.
  3. The electric circuit in which there is no gap in the connections between the terminals of the cell, wires and bulb, etc., is called a complete circuit or closed circuit. A bulb lights up when the circuit is complete (or closed).  
In a closed circuit, the electric current passes from one terminal of the cell to the other through connecting wires and bulb.  
The electric circuit in which there is a gap in the connections between the terminals of the cell, wires and the bulb, etc. is called an open circuit (or incomplete circuit). Electricity does not flow through an open circuit because there is a gap in its path.

4. An electric cell is a device which converts chemical energy into electrical energy. Many devices like torch, watch, mobile, camera etc. run by electric cells.

The electric cell which is normally used in torches and other electrical appliances is known as a dry cell. Dry cell was invented by a French scientist, Georges Leclanche in 1866. A dry cell when connected in a closed circuit causes electric current to flow through the circuit. A dry cell is therefore, a source of electrical energy. It has two terminals, namely positive and negative. The end that is flat is the negative (or  $-$ ) terminal and the end that has a small circular metal cap is the positive (or  $+$ ) terminal. A cell connected in a circuit causes electric current to flow from the positive to the negative terminal through the circuit.



Chapter  
**10**

## Magnetism

- A. 1. Two artificial magnets are bar magnet and horse shoe magnet.  
2. Electromagnets are used in electric motors and door bells.
- B. 1. (a)            2. (b)            3. (b)            4. (c)
- C. 1. Magnes                            2. iron, nickel, cobalt  
3. magnetic                            4. magnetic
- D. 1. False            2. False            3. False            4. True            5. True
- E. 1. iron            2. Rubber            3. Heating            4. Rubber
- F. 1. (c)            2. (d)            3. (a)            4. (e)            5. (b)
- G. 1. A substance to which properties of the natural magnet are imparted by artificial means is called **artificial magnet**.  
The magnets made from cobalt, nickel, steel and iron are called artificial magnets.
2. Substances which are neither attracted by a magnet nor can be converted into artificial magnets are called **non-magnetic substances**.  
Stone, china ware, glass, wood, paper, brass, aluminium, mica, abonite, plastic gold, silver, etc. are non-magnetic substances.
3. The magnetic poles always exist in pairs. It is not possible to separate the two poles of a magnet. If a bar magnet is

broken in two parts, each part is found to be a magnet.

4. A **magnetic compass** is a device which is used to find the direction by the pilots and navigators in which their ship or aeroplane is going.
  5. Two properties of magnets are directive property and attractive property.
- H. 1. Some people assign the name magnet to the name of the shepherd boy Magnes. He had many sheep and goats and used to take them to the nearby mountains for grazing. In order to control the herd of sheep and goats he had a stick in his hand. The stick on one end was covered with iron tip. One day, he found that he had to pull hard to free his stick from rock on the mountain. It seemed as the stick was being attracted by the rock. The rock was a natural magnet and it attracted the iron tip of stick. This is the story behind the discovery of the natural magnets. Natural magnets are also called **lodestones**.
2. When the north pole of the base magnet is brought near the north pole of a freely suspended magnetic needle, the north end of the magnetic needle gets repelled. Similarly, when the south pole of a bar magnet is brought near the south pole of a freely suspended magnetic needle, the south end of the magnetic needle gets repelled. However, if the north pole of a bar magnet is brought near the south pole of needle or vice-versa, attraction takes place.
  3. When two magnets are placed with their like poles facing each other, the lines of force are in opposite directions and hence like poles repel each other. When the unlike poles of a bar magnet face each other the magnetic lines of force are in the same direction and hence unlike poles attract each other.
  4. Thus, some tips to keep magnet safe are :
    - (a) Magnets should never be heated strongly.
    - (b) Magnets should never be hammered.
    - (c) A wooden block should be kept between the pairs of bar magnets.
    - (d) Magnets should never be kept near electronic items.



- A. 1. Two main constituents of air are nitrogen and oxygen.  
2. Plants need carbon dioxide for their growth.
- B. 1. (a)      2. (b)      3. (d)      4. (a)      5. (a)  
6. (c)      7. (b)      8. (c)      9. (a)      10. (b)
- C. 1. living      2. atmosphere      3. 21%  
4. 21%      5. oxygen
- D. 1. False      2. False      3. True      4. True      5. True  
6. False
- E. 1. (b)      2. (c)      3. (d)      4. (a)
- F. 1. The blanket of air surrounding the Earth is the **atmosphere**.  
Air in the atmosphere is a mixture of gases. It includes nitrogen, oxygen, carbon dioxide, water vapours, dust particles and some gases in very-very small ratio.
2. Two importance of air are :
- (a) Air keeps the Earth warm enough to support life. It traps the heat that comes from the Sun and prevents the Earth from getting too much cold.
- (b) Air living organisms breath air. It vibrates their sound cord in their throats and they are able to speak.
3. We make use of wind in our sailboats, we make use of wind energy in running windmills in generating electricity with the help of aerogenerators.
4. The uses of nitrogen are as follows :
- (a) Nitrogen is filled in bulbs to prevent the filaments from getting oxidised.
- (b) It is filled in the spaces in food cans to stop bacterial growth and to retain the flavour of the food.
5. Air is a very unique element of earth. It has many properties that are its own.
- (a) Air is colourless and transparent. This is the factor that allows us to see through the air.
- (b) Air lacks smell and taste.
- G. 1. Lavosier in 1789, proved that the active component of air is  $\frac{1}{5}$  of the total volume of air and the inactive part of air is  $\frac{4}{5}$  of the total volume of air. He named the active part

of air oxygen and the inactive component nitrogen. So, the ratio of oxygen and nitrogen in air is 1 : 4 by volume.

We know that air not only contains oxygen and nitrogen but a variety of other gases also, for example; carbon dioxide, water vapour, ozone and noble gases. Helium, neon, argon, krypton, xenon and radon are collectively called noble gases.

Other constituents of air are dust particles, carbon particles, carbon monoxide, nitrogen dioxide, sulphur dioxide and chlorofluorocarbons (CFCs).

2. The blanket of air surrounding the Earth is the atmosphere. Air in the atmosphere is a mixture of gases. It includes nitrogen, oxygen, carbon dioxide, water vapours, dust particles and some gases in very-very small ratio. We breathe in oxygen and breathe out carbon dioxide. These two gases are important since they support life.

Air has dust particles in it. You might have seen that the first shower of rain bring down a good amount of dust with them. These dust particles are seen on the glass screens of your cars and houses when it starts raining for the first time in a season.

3. Air has many uses. We use air without knowing that we are using it. Air is useful in following ways :
  - (a) Air helps in bringing rain. The air containing water vapour rises up in the atmosphere. On rising up to certain heights, it cools down and small droplets of water are formed. These water droplets form clouds and fall as rain.
  - (b) Air keeps the Earth warm enough to support life. It traps the heat that comes from the Sun and prevents the Earth from getting too much cold.
  - (c) All living organisms breathe air. It vibrates their sound cord in their throats and they are able to speak.
4. The balance of oxygen and carbon dioxide is made due to respiration and photosynthesis. During respiration, we leave carbon dioxide and take in oxygen the balance of carbon dioxide and oxygen is made. And during the photosynthesis of plants, the balance of carbon dioxide and oxygen is made.

# Focus Science-7



## Chapter 1

## Nutrition in Plants

- A. 1. There are two types of nutritions :  
(a) Autotrophic nutrition      (b) Heterotrophic nutrition
2. Fungi are eukaryotic organisms that include microorganisms such as yeasts, moulds and mushrooms.
- B. 1. (b)      2. (b)      3. (a)      4. (b)      5. (a)
- C. 1. autotrophs      2. starch      3. Food  
4. parasitic      5. mistletoe
- D. 1. True      2. False      3. True      4. False      5. True
- E. 1. (b)      2. (e)      3. (a)      4. (c)      5. (d)
- F. 1. The entire process of taking in food by living organisms and its utilization within the body.
2. Carbohydrates, proteins, fats, vitamins and minerals are the main components of our food.
3. The process of using the energy of sunlight to convert water and carbon dioxide into carbohydrates (starch) and oxygen is called **photosynthesis**.
4. The plants which derive their food from the bodies of the host plants and animals are called parasites.
5. The two different plants which live together for their sustenance as parts of the same plant and mutually help each other are called symbionts.  
Such relationship of mutually helping each other is called **symbiosis**.
- G. 1. The type of nutrition in which the organisms make their own food itself from simple inorganic substances is called **autotrophic nutrition** or **holophytic nutrition**.  
Green plants make their food from carbon dioxide and water in the presence of **chlorophyll** and **sunlight**. So, the type of nutrition in green plants is autotrophic nutrition.

The organisms which make their own food from the simple substances present in the environment are called **autotrophs** (auto, self; trophe, nutrition).

**2. Materials (factors) Necessary for Photosynthesis**

- (a) The presence of a green pigment called chlorophyll : Chlorophyll present in the leaves traps the light energy of the Sun to make energy-carrying particles.
- (b) The presence of sunlight : Light energy is used to synthesize or prepare food with the help of carbon dioxide and water. As the light intensity is increased, the rate of photosynthesis increases.
- (c) The availability of carbon dioxide : Leaves take in carbon dioxide and release oxygen through the tiny pores called stomata. Poor availability of  $\text{CO}_2$  lowers the extent/rate of photosynthesis.
- (d) Availability of water and minerals : Plants absorb water and minerals from the soil through their roots. Poor availability of  $\text{H}_2\text{O}$  lowers the extent/rate of photosynthesis. Mineral salts are the food of plants.
- (e) Temperature : The temperature does not affect the light reaction. The effect of temperature on photosynthesis vary plant to plant.

**3. Aim :** To show that green plants produce oxygen during photosynthesis.

**Materials required :** Beaker, water-plant cuttings, glass funnel, test tube etc.

**Procedure :**

- (a) Fill a beaker to about three-fourth with pond water.
- (b) Place a few cuttings of water-plant in it and cover them with a glass funnel.
- (c) Fill a test tube with water, cover its mouth with your thumb and place it over the stem of the funnel.



(a)



(b)

- (d) Place the whole set-up in the sunlight.

(e) After some time bubbles of a gas starting from the leaves are found moving into the test tube. When the test tube is filled with the gas, remove it from the beaker and bring a glowing splinter near its mouth.

**Observation :** The splinter starts burning with a bright flame.

**Conclusion :** This shows that the gas in the test-tube is oxygen and it is produced during photosynthesis in green plants.

4. The bacteria called **Rhizobium** can take atmospheric nitrogen and convert it into a soluble form also. But Rhizobium cannot make its own food, so it lives in the roots of peas, gram, moong, beans and other legumes and provide them with nitrogen. Most of the pulses (dals) are obtained from **leguminous plants**. In return, the plants provide food and shelter to the bacteria. Farmers usually grow a bean crop to increase the fertility of soil. This practice is known as **rotation of crops**.

5. The plants which derive their food from the dead and decaying organic matter are called **saprophytes**. They do not contain chlorophyll to make their own food.

This type of nutrition in plants such as mushrooms and some bacteria (e.g., lactobacillus, Acetobacter) is saprophytic, because they derive their food from the dead and decayed organic matter.

The roots of saprophytes contain living organisms called **fungi**. Fungi are capable of digesting dead and decaying matter. The fungi produce digestive juices which convert the dead and decaying matter into sugar which can be then used as food by these plants. Fungi are also called saprotrophs.



- A. 1. Two ruminant animals are cow and goat.  
2. Two enzymes which are present in small intestine are Pancreatic amylase and trypsin.
- B. 1. (c)      2. (c)      3. (a)      4. (b)



- C. 1. Salivary                      2. unicellular                      3. gastric  
 4. mastication                      5. food pipe
- D. 1. False            2. True            3. True            4. True            5. True
- E. 1. (g)            2. (f)            3. (d)            4. (a)            5. (e)  
 6. (c)            7. (b)
- F. 1. cat            2. yeast            3. neck            4. lung
- G. 1. Each tooth has the following parts :

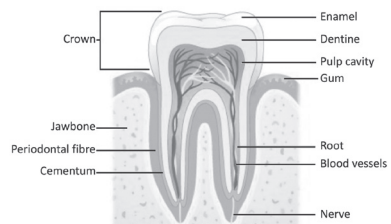
- (a) **Root** : The part of a tooth embedded into the jaw.  
 (b) **Crown** : The top part of the tooth above the gums.  
 (c) **Neck** : The part between the root and the crown.

The tooth internally is made up of :

- (d) **Enamel** : It is the white part of a tooth and is the hardest substance in our body. It is deposited outside the crown of the tooth. Enamel contains calcium salts.

(e) **Dentine** : Dentine is like a bone structure. It is hard.

- (f) **Pulp cavity** : Inside the dentine, there is a soft pulp cavity which contains blood vessels and nerves.



Structure of a tooth

2. Food is pushed down by the wave like movement of the wall of the food pipe. This wave like movement in the food pipe which pushes the food forward is called as **peristalsis**.
3. Chewing, breaks down the food into small pieces and mixes it with saliva. It is a digestive juice which is secreted by salivary gland. The mixing and chewing of food is called the mastication. Saliva contains the enzyme amylase, which converts the starch into sugar.
4. All the animals that chew and eat grass are called **ruminants**. The examples of ruminants are cows, buffaloes, goats, sheep and bison.
5. Small intestine has millions of finger like projections called **villi** which absorb the digested food and pass it into the

blood stream. Thus, the nutrients are carried to all parts of the body.

The cells utilise this food to release energy.

**H. 1.** The process of holozoic nutrition is divided into following stages :

(a) Ingestion : The act of getting and eating food collectively is called ingestion. In human beings, ingestion takes place through the mouth.

(b) Digestion : The process of breaking down of food from bigger molecules into simpler and soluble molecules inside the body is called digestion. The process of digestion begins in the mouth and is completed in the stomach.

(c) Absorption : The process by which soluble molecules present in the digested food pass into the body fluids like blood is called absorption. In human beings absorption takes place in the small intestine.

(d) Assimilation : The process in which the absorbed food is used for producing energy and growth is called assimilation.

(e) Egestion : The process by which the undigested food materials are expelled or removed from body through the anus is called egestion.

**2. Tongue :** The tongue is a muscular organ and it helps to mix saliva in the food. It is attached at the back to the floor of the buccal cavity. The tongue helps in swallowing the food into food pipe or oesophagus.

The tongue is the main organ that contains taste buds that help to determine bitter, sour, sweet and salty taste. Different sets of taste buds located in the specific areas of the tongue distinguish whether the food is sweet, salty, sour, bitter etc. The taste buds help us to select the right quality of food. The tongue also helps us to speak.

**3. Small Intestine** is a long coiled tube. It is about 7.5 metre long. Complete digestion of food occurs in small intestine. The upper part of the small intestine is known as duodenum

which receives secretions from the liver (bile juice) and from the pancreas, pancreatic juice. These juices contain salts and enzymes. The pancreas makes many enzymes such as pancreatic amylase, peptidases trypsin etc.

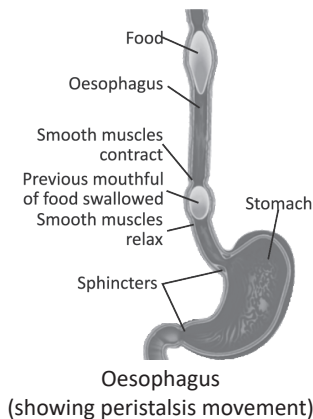
Small intestine has millions of finger like projections called villi which absorb the digested food and pass it into the blood stream. Thus, the nutrients are carried to all parts of the body.

The cells utilise this food to release energy.

4. All the animals that chew and eat grass are called **ruminants**. Thus, ruminants are hooved plant-eating animals that digest cellulose (a complex carbohydrate). The examples of ruminants are cows, buffaloes, goats, sheep and bison.

The ruminants have complicated stomach consists of four chambers—the rumen, reticulum, omasum and abomasum. They quickly swallow the grass and store it in a separate part of the stomach called rumen which is the first chamber of the stomach. Here it is acted upon by bacteria and microorganisms. This partly digested food is called cud. This half digested food then goes to the second muscular chamber, the reticulum from where this cud returns to the mouth in small lumps and the animal chews it. This process is called rumination and these animals are called ruminants. Examples are goat, sheep, bison etc. Then it returns to the second chamber of the stomach—the reticulum.

5.

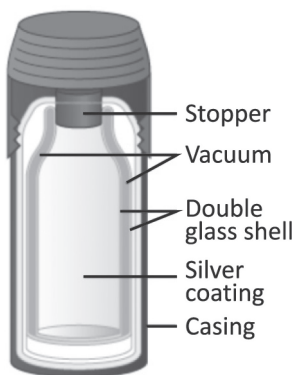




- A. 1. Two common scales to measure temperature are Celsius scale and Fahrenheit scale.  
2. Three materials which are bad conductors of heat are water, air and glass.
- B. 1. (b)            2. (d)            3. (a)            4. (d)
- C. 1. coldness            2. heat            3. centigrade  
4. mercury            5. black
- D. 1. True            2. True            3. True            4. True            5. False
- E. 1. (c)            2. (d)            3. (b)            4. (e)            5. (a)
- F. 1. rubber            2. land breeze            3. iron
- G. 1. Relationship between Celsius and Fahrenheit Scales  
To convert temperature from Celsius to Fahrenheit scales, multiply it by  $9/5$  and add 32. Degree centigrade has 100 equal parts and degree fahrenheit has 32-212 equal parts.  
2. For  $10^{\circ}\text{C} = \text{F} = (10 \times 9/5) + 32 = \text{F} = (10 \times 9/5) + 32^{\circ}\text{F}$   
 $= 18 + 32^{\circ}\text{F} = 50^{\circ}\text{F}$   
For  $50^{\circ}\text{C} = \text{F} = (50 \times 9/5) + 32 = \text{F} = 90 + 32 = 122^{\circ}\text{F}$   
For  $100^{\circ}\text{C} = \text{F} = (100 \times 9/5) + 32 = \text{F} = 180 + 32 = 212^{\circ}\text{F}$   
3. The degree of hotness or coldness of an object on some chosen scale is called its **temperature**. Temperature of an object is its degree of hotness or coldness.  
4. The process of transfer of heat from a hot body to a cold body without heating the intervening material medium is called **radiation**.  
5. Brass, stainless steel etc., are good conductors of heat. Water, air, glass are poor or bad conductors of heat. Glass, air, plastics, rubber etc., are insulators.
- H. 1. Four precautions while using a clinical thermometer are as follows :  
(a) Give it a firm jerk and ensure that the mercury level is below  $35^{\circ}\text{C}$  before use.  
(b) Thermometer should be washed before and after use, preferably with an antiseptic solution using cotton.

- (c) Do not hold the thermometer by the bulb while reading it.
- (d) Handle the thermometer with care. If it hits against some hard object it can break.
2. The materials which allow heat to flow through them easily are called **good conductors of heat**. Silver, copper, aluminium, iron, brass, stainless steel etc., are good conductors of heat. The materials which do not allow heat to flow through them easily are called **poor conductors of heat**. Water, air, glass are poor or bad conductors of heat. Handles of cooking utensils are made up of insulators because insulators prevents the handles from getting heated and allows us to hold the utensils easily.

3.



Thermos flask



Chapter

**4**

## Acids, Bases and Salts

- A. 1. Two bases are sodium hydroxide and potassium hydroxide.  
2.  $\text{H}_2\text{SO}_4$  is the formula for sulphuric acid.
- B. 1. (d)      2. (b)      3. (d)      4. (a)
- C. 1. common salt      2. organic acid      3.  $\text{H}^+$   
4. natural      5.  $\text{OH}^-$
- D. 1. True      2. False      3. True      4. False      5. True
- E. 1. (e)      2. (a)      3. (d)      4. (c)      5. (b)
- F. 1. onion      2. lichen  
3. sulphuric acid      4. calcium hydroxide

- G. 1.** Substances such as baking soda that are bitter in taste and feel soapy to touch are called **bases**.

Sodium hydroxide (NaOH), potassium hydroxide (KOH) and calcium hydroxide (Ca(OH)<sub>2</sub>) are the examples of bases.

- 2.** Indicators are weak acids or bases that shows a change in colour as the concentration of hydrogen ions in a solution changes. The indicators dissociate slightly in the water and form ions.

Litmus, turmeric are example of Indicators.

- 3.** The word acid is derived from the Latin word acere which means sour. Acids are generally sour in taste. Sourness is the characteristic property of all acids. The sour taste of many substances in our food is due to the acids present in them.
- 4.** When an acidic solution and a basic solution are reacted with each other they neutralise the effect of each other. This reaction is known as **neutralisation reaction**.
- 5.** A salt is a compound produced along with water in a neutralisation reaction between an acid and a base. The most common salt known to us is sodium chloride. A salt is neutral— it is neither acidic nor basic.

- H. 1. Aim:** Preparation of Soap.

**Procedure:** Take 20 ml of castor oil in a beaker. Other oil such as coconut oil can also be used. Dissolve half a teaspoonful of caustic soda in about 20 ml of water. Mix the oil and the sodium hydroxide solution. Heat the mixture and let it boil for 5-10 minutes. Stir continuously. The reaction that occurs is :

Oil + Sodium hydroxide → Soap + Glycerine

To separate the soap from the mixture, add a teaspoonful of salt to the beaker and stir. On cooling, solid soap separates out as a crust on top of the solution.

- 2. Uses of Acids**

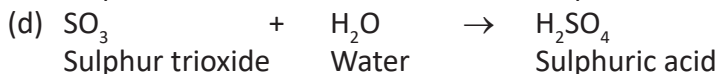
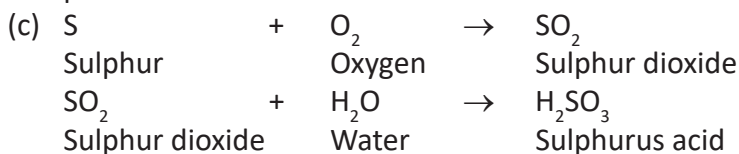
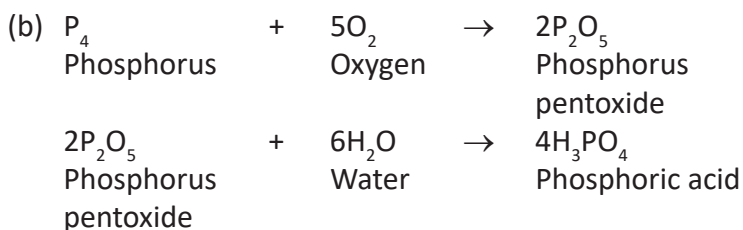
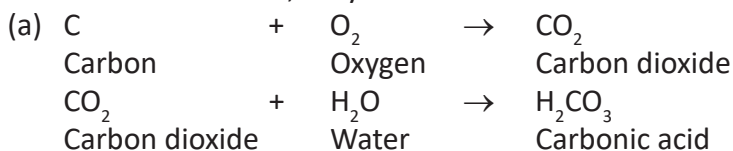
Inorganic acids are used in homes and industry. Organic acids are used as a part of food. Some common uses of acids are as follows :

- **Sulphuric Acid** : It is also called oil of vitriol.
    - (a) It is used as dehydrating agent.
    - (b) It is used in storage batteries.
    - (c) It is also used in the batteries for inverters, trucks and cars.
    - (d) It is used in manufacture of fertilisers, dyes, plastic, detergent and paints.
    - (e) It is also used in paper and textile industries.
  - **Hydrochloric Acid** :
    - (a) It is used for making glucose from starch.
    - (b) It is used in our homes for cleaning kitchen sinks and sanitary ware or clogged drains.
    - (c) It is used for cleaning metallic surface before tinning, soldering and galvanisation.
    - (d) It is used in the manufacture of chemicals like glue, bleaching powder.
    - (e) It is used in dyeing of clothes.
  - **Organic Acid** : Acetic acid is used as table acid for salad dressing and preservation of food to be used as pickle. Citric acid is used as a medicine. Tartaric acid is used in the manufacturing of baking soda.
  - **Nitric Acid** :
    - (a) It is used in the manufacture of fertilisers like ammonium nitrate.
    - (b) It is used in the extraction of metals.
    - (c) It is used in the explosive like trinitrotoluene (TNT), picric acid, dynamite, gun powder.
    - (d) It is used in the purification of precious metals like gold and silver.
3. Salts are useful to us in many ways. Uses of some salts are given below :
- (a) **Sodium Chloride (NaCl)** : It is commonly known as common salt. It is used in food as a preservative in pickles, in curing meat and fish, in the manufacture of chemical such as washing soda, baking soda.

- (b) Sodium Bicarbonate ( $\text{NaHCO}_3$ ) : It is commonly known as baking powder. It is used in baking breads and cakes. It is also used in medicines as well as in acid-type fire extinguishers.
- (c) Potash Alum (Phitkari) : It is used in the purification of water.
- (d) Potassium Nitrate : It is used in the manufacture of gun powder in making fireworks, in glass industry and as a fertiliser.
- (e) Silver Nitrate : It is used in developing photographic films and also as an antiseptic.
4. Acids can be prepared from non-metals by two stage processes.

Firstly the non-metals are burnt in air to form oxide of non-metals.

Secondly the oxide of non-metals are dissolved in water, to form acidic oxide or acids. For example, non-metals like nitrogen, carbon, sulphur reacts with oxygen and form nitrogen dioxide, carbon dioxide, sulphur dioxide respectively which are acidic in nature. When these oxides are dissolved in water, they form acidic oxides or acids.



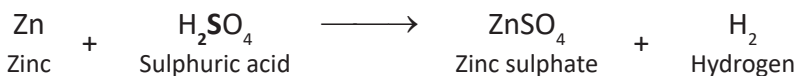




- A. 1. Two examples of physical change are melting of wax and formation of clouds.  
2. Three examples of chemical change are clotting of blood, rusting of iron and burning of paper.
- B. 1. (b)            2. (c)            3. (c)            4. (a)
- C. 1. absorbed            2. Galvanisation  
3. irreversible            4. salt            5. Rusting
- D. 1. (d)            2. (a)            3. (b)            4. (e)            5. (c)
- E. 1. True            2. True            3. False            4. False
- F. 1. HCl            2.  $\text{Na}_2\text{CO}_3$             3. NaCl            4.  $\text{C}_6\text{H}_{12}\text{O}_6$   
5.  $\text{C}_{12}\text{H}_{22}\text{O}_{11}$             6.  $\text{CuSO}_4$             7.  $\text{CaCl}_2$             8. ZnO
- G. 1. Co            2. Na            3. O            4. N            5. Fe  
6. C            7. Cu            8. S            9. Zn            10. K
- H. 1. A chemical change is a change in which one or more new substances are formed is called **chemical change**.  
Burning of paper and Bursting of a firecracker are two examples of chemical change.  
2. Change of state in water is a physical change in which on heating ice melts and water evaporates. On cooling, water vapour cools to form water and on further cooling, water freezes to form ice. This is a reversible change, where the form of water changes on reversing the condition. No new substances are formed.  
3. Characteristics of Chemical Changes  
(a) The change is irreversible.  
(b) The change is permanent.  
(c) New substance is formed.  
(d) Total mass remains the same.  
4. Sea water contains 97% of the total water on the Earth. Sea water is saline. It contains salt. In addition to salts, sea water has many impurities. Salinity and impurities in sea water makes it unfit for human consumption.

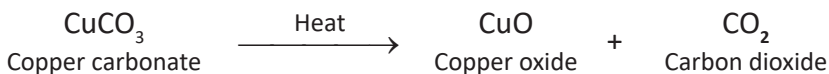
- I. 1. Characteristics of physical change are as follows :
- (a) During a physical change, no new substance is formed.
  - (b) During a physical change, only physical properties (such as size, shape, smell, colour and state) change.
  - (c) No or very small amount of energy is either absorbed or evolved during a physical change.
  - (d) A physical change can be either reversible or irreversible.
2. Characteristics of chemical reaction are as follows :
- (a) Evolution of Gas : During a chemical reaction gas may evolve. If one of the reactants is a liquid or in solution form, evolution of gas is marked by effervescence (bubbling) in the liquid. The evolution of gas is shown by an arrow pointing upward ( $\uparrow$ ).

When a metal reacts with an acid, hydrogen gas is evolved.



- (b) Change in Colour : One of the products formed during a chemical reaction may have a different colour than the reactants. In such a case, change in colour accompanies the chemical reaction.

When green coloured copper carbonate is heated strongly, a black residue of copper oxide is left.



### 3. Differences between Physical and Chemical changes :

S.No.	Parameters	Physical Change	Chemical Change
1.	New substance	No new substance is formed.	One or more new substances are formed.
2.	Nature of change	It is a temporary change.	It is a permanent change.

3.	Reversibility	It is easily reversible by simple physical methods.	It is irreversible.
4.	Physical and chemical properties	Only the physical properties of the substance get changed.	Both the physical and chemical properties of substance are changed.
5.	Amount of energy (in the form of heat, light etc.)	Very little energy is absorbed or given out.	A very large amount of energy is absorbed or given out.

4. **Aim** : To obtain crystals of alum from impure alum powder.

**Procedure** : Prepare a solution of impure alum in a beaker of hot water. Heat the water on low flame and go on adding more alum till no more of it goes into solution. Allow the mixture to cool. On cooling, filter the solution through a filter paper. Hang a small piece of alum crystal in this solution with the help of thread. The small crystal grows in size with each passing day. Same process may be carried to obtain big, clean and pure crystals of a substance from its impure mixture.



Crystallisation



Chapter

6

## Respiration in Organisms

- A. 1. Two main organs of respiration in human beings are nose and lungs.
- B. 1. (c)      2. (b)      3. (a)      4. (c)      5. (a)
- C. 1. oxygen    2. trachea    3. power house on mitochondria  
4. carbon dioxide    5. inhalation
- D. 1. False    2. False    3. True    4. True    5. False
- E. 1. (e)    2. (d)    3. (a)    4. (b)    5. (c)
- F. 1. photosynthesis    2. cow  
3. intestine    4. stomach

G. 1. The process in living organisms which produces energy from the food is called respiration.

2. In aerobic respiration products formed are carbon dioxide and water.

In anaerobic respiration products formed are carbon dioxide and ethyl alcohol.

3. Respiration process can be expressed as :



4. Gills are organs of respiration in fish. Fish takes oxygen from the water through gills. Which are feathery structures behind the head, usually covered by a flap.

5. The main organs of respiration are nose, throat, trachea, bronchi and lungs.

H. 1. Like other living things plants also respire for their survival. They need energy to stay alive. They get energy by the process of respiration (energy from the food). Like animals, plants use oxygen of air for respiration and release carbon dioxide.

**Respiration in Stems :** The stems of herbaceous plants or herbs have stomata. The exchange of respiratory gases oxygen and carbon dioxide in the stem of herbaceous plants takes place through stomata by the process of diffusion. The hard and woody stems of trees do not have stomata. These stems have lenticles in their bark for gaseous exchange. The oxygen from the air diffuses into the stem of a woody plant through lenticles and reaches all the inner cells of the stem for respiration. The carbon dioxide produced in the cells of the stem during respiration diffuses out into the air again through the lenticles.

**Respiration in Leaves :** The exchange of respiratory gases in the leaves take place by the process of diffusion through stomata. The diffused oxygen is used in respiration. The carbon dioxide produced during respiration diffuses out from the leaf into the air through the stomata.

2. **Cellular respiration** involves the production of energy by break down of glucose whereas **breathing** involves taking in oxygen and removing carbon dioxide from the body and there is no production of energy in breathing like that of cellular respiration.
3. **Respiration in Grasshopper** : Grasshopper breathe through tiny holes (or pores) on their body called **spiracles**. Oxygen enters the spiracles and reaches all parts of the grasshopper's body through a network of thin air tubes called **trachea**. The trachea branches into tracheoles which reach each and every cell of grasshopper's body. Carbon dioxide produced during respiration in grasshopper is carried back by the same air tubes to the spiracles where it is expelled in the process of breathing.
4. **Inhalation** : During inhalation, the ribs move up and outwards while the diaphragm moves down. This movement increases space in our chest cavity and thus reduces pressure inside chest cavity. The air outside nostrils which is at higher pressure thus rushes into the lungs and the lungs get filled with air.

**Exhalation** : During exhalation, the ribs move down and inwards while the diaphragm moves upto its former position. This reduces the size of the chest cavity and thus increases the pressure inside chest cavity. This pushes the air out of the lungs. These breathing movements can easily be felt in our body. Take a deep breath while keeping your palm on the abdomen. You can easily feel the movement of abdomen and expansion of your chest cavity.

5. **Aim** : To show that energy is released during respiration.

**Materials Required** : Bean seeds, water, flask, stand, thermometer.

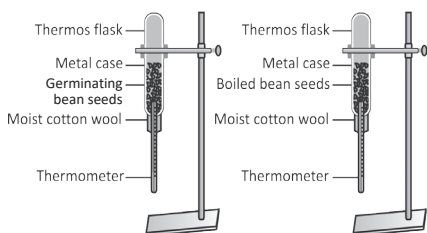
**Procedure** :

- (a) Soak some bean seeds in water overnight and keep them moist till they begin to germinate.

(b) Now take half of the seeds and boil them, to stop the germination process.

(c) Keep the germinating seeds in one thermos flask and the boiled seeds in another flask.

(d) Keep a cotton wool on the mouth of the flask to keep the seeds moist and also allow them to respire.



(e) Insert thermometer in both the flasks.

(f) Measure the temperature in each flask once in a day for the rest of the week.

(g) Note down the readings.

(h) Compare the readings of the two thermometers.

**Observation :** You will observe that the thermometer kept in the flask containing boiled seeds does not show any increase or decrease in the temperature. The thermometer kept in the flask having germinating seed shows an increase in temperature.

**Conclusion :** This shows that when respiration takes place, heat energy is released.



## Chapter 7

# Transportation in Plants and Animals

A. 1. Blood is composed of two parts : (a) plasma – the liquid part, (b) corpuscles – the solid part.

2. Two unicellular organisms in which nutrients reach by diffusion are amoeba and paramecium.

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

C. 1. Pulse rate            2. sieve tubes

3. Proteins    4. Veins            5. excretion

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

- E. 1. (d)            2. (e)            3. (b)            4. (c)            5. (a)
- F. 1. plasma                            2. nutrition  
3. photosynthesis            4. translocation
- G. 1. Stethoscope is a device used by a doctor to listen to heartbeat and diagnose the diseases.  
2. The process of losing water in the form of water vapour from a living plant is known as transpiration.  
3. When toxic materials are not removed from the body they mix with the blood and cause damage to the body's cells. As a result, the removal of such poisonous waste materials is required.  
4. Xylem vessels comprises of long tube like structure which are hollow. Xylem transports water and mineral upwards from the roots.  
Phloem transports glucose made in the leaves to other parts of the plant.  
5. Tubes that enclose and transport blood from one organ to other organ.
- H. 1. Blood is the most important tissue in the circulatory system. The human body contains 3-5 litres of blood. It consists of a bright red fluid known as plasma in which three types of blood cells float.  
(a) Plasma : Plasma is the liquid part of the blood. It is yellowish in colour and contains about 90 per cent water. It has food, wastes, enzymes etc., dissolved in it. It also contains proteins that help the blood to clot.  
(b) Blood Cells : There are three types of blood cells :  
(i) **Red Blood Cells (RBCs)** : RBCs are disc shaped cells. These cells contain a red-coloured pigments called haemoglobin. It absorbs oxygen and transfer it to the cells all over the body. It carries oxygen to different parts of the body. Oxygen combines with haemoglobin to form a compound oxyhaemoglobin.  
Haemoglobin + Oxygen → Oxyhaemoglobin

This is a reversible reaction. When blood reaches cells and tissues which need oxygen, oxyhaemoglobin again changes to oxygen and haemoglobin. This oxygen is issued by the cells for respiration. Haemoglobin then becomes free to carry more oxygen.

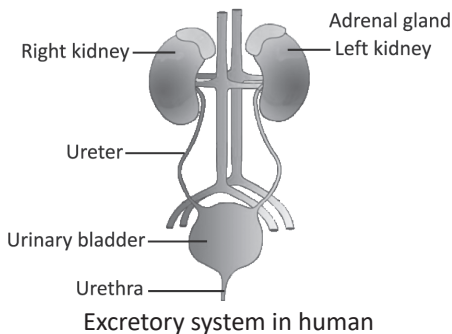
(ii) **White Blood Cells (WBCs)** : WBCs are slightly larger than red blood cells. They are fewer in number than red blood cells. Their function is to fight against diseases by destroying harmful bacteria and other foreign antigens.

(iii) **Platelets** : Platelets are smaller than red blood cells. It is the fluid component of blood in which all types of blood cells or corpuscles remain scattered. They help the blood to clot whenever there is a wound on the body. This blocks the flow of blood and prevents blood loss.

2. A badly injured person may lose blood. A blood loss by 40 per cent may cause death. The doctor must give the patient blood, donated by another person (called a donor) to make up for the blood loss. This procedure is called **blood transfusion**.

There are four kinds of blood groups known as A, B, AB and O. Different persons have different blood groups. Doctors have to be careful and match the blood of the patient with that of the donor before carrying out blood transfusion. This is because if blood of unmatched groups get mixed, the red blood cells stick together and it can lead to death.

3.



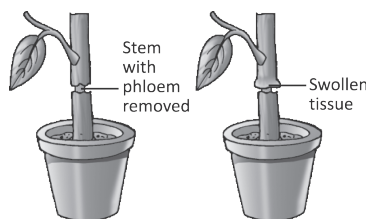


4. **Aim** : Phloem transports food materials in plants.

**Materials Required** : Plant (potted)

**Procedure** :

- (a) Take a plant with thick stem.
- (b) Remove the phloem tissue as shown in figure. Observe the stem after a few days.



**Observation and Conclusion** :

The stem shows swelling in the upper portion due to accumulation of food material. This happens since after removal of phloem tissue, the downward movement of food gets blocked.



Chapter

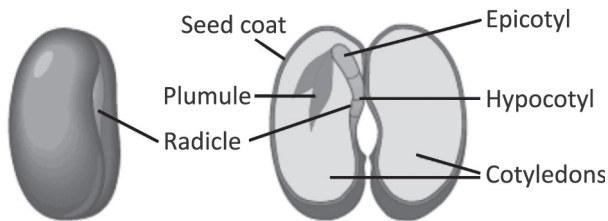
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## Reproduction in Plants

- A. 1. Root – sweet potato      Leaf – bryophyllum  
2. Male gametes produced by anther.  
Female gametes produced by ovule.
- B. 1. (a)      2. (b)      3. (a)      4. (a)
- C. 1. bud      2. unisexual      3. Pistil      4. bulb  
5. sexual
- D. 1. False      2. False      3. True      4. True      5. False
- E. 1. (c)      2. (d)      3. (a)      4. (b)
- F. 1. pollen grain      2. stamen  
3. bryophyllum      4. flower
- G. 1. (a) **Pollination** : The transfer of pollen grains from the anther to the stigma of a flower is called pollination. Pollination can occur in two ways: self pollination and cross pollination.  
(b) **Fertilisation** : The fusion of male gamete with the female gamete to produce zygote is called fertilisation.
2. **Sexual reproduction** : it involves fusion of male and female gamete.

**Asexual reproduction** : a mode of reproduction, in which a plant gives rise to new plants without seeds.

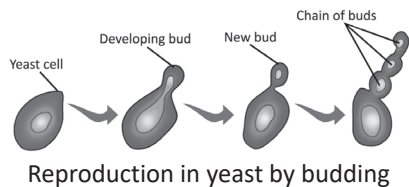
3. Grafting is a process in which a portion of one plant is placed onto a portion of another plant (stock). It is an artificial method of vegetative propagation.
4. (a) **Seed Coat** : The hard outer covering that protects the seed.  
(b) **Cotyledons** : They store food for the growing embryo. Some seeds have only one cotyledon and are called monocot seeds, e.g., maize, wheat, rice. Some seeds have two cotyledons and are called dicot seeds, e.g., gram, pea.



Structure of a gram seed

- (c) **Embryo** : After germination, the embryo develops into a new plant. It has two parts– plumule which gives rise to shoot system and radicle which gives rise to root system.

**H. 1. Budding** : A bulb-like projection formed on the body of an organism is known as the bud. The process by which an organism reproduces



by producing buds is called budding. The nucleus of the parent body divides into two and one of the nuclei goes into the other bud. When the bud gets matured, it detaches itself from the parent body and becomes an independent individual. Yeast (a non-green plant) reproduces by budding. Reproduction in Yeast by budding is shown in figure.

**2. Dispersal by Animals :** Men and animals help a great deal in the dispersal of fruits and seeds.

(a) Many fruits are dispersed by animals when they are moved from one place to another. Seeds of fruits like guava and tomato, when eaten, pass undigested through the digestive tract and reach the soil.

(b) Squirrels and mice store nuts in their burrows. Sometimes they germinate under favourable conditions, e.g., Walnut, oak etc.

(c) Some seeds with spines, hooks and bars stick to the hair or furs of animals and are dispersed to distant places, e.g., xanthium.

**3. Artificial Methods of Vegetative Propagation:** Due to the advantages of vegetative reproduction, several artificial methods of reproduction of plants by vegetative propagation have been developed.

(a) Cutting : Cutting means a piece of stem having a few nodes. In this method, a part of the stem of plant having leaf buds is cut off and placed in moist soil. Under favourable conditions, the cutting develops roots and leaves and grows into a new plant. Rose, bougainvillea, champa and sugarcane are common examples of plants grown by this method.

Sometimes the stem cutting has to be dipped into a rooting hormone to stimulate rooting.

(b) Grafting : In this method, a small branch of plant (scion) is inserted into cut made in a rooted stem (stock). This method is employed to develop new varieties of plants.

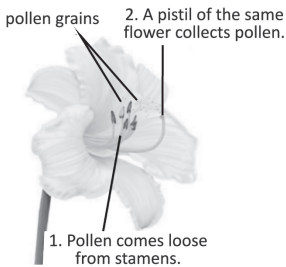
(c) Layering : In this type of vegetative reproduction, the branch of a plant is bent and covered with moist soil. Layering is used in plants like jasmine, bougainvillea and strawberry which have soft stems.

(d) Tissue Culture : In this artificial method of vegetative reproduction, tissues are selectively picked up from the tip of a healthy plant and placed in nutrient medium

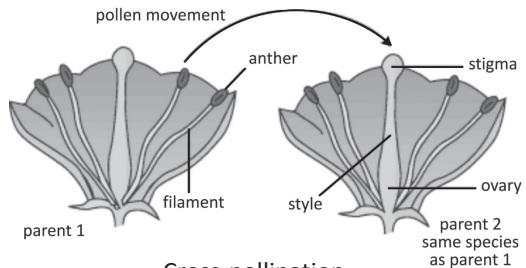
under suitable conditions. These contain hormones that help various cells to divide and grow. New plantlets grow which can be removed and placed in soil to obtain bigger plants. This technique is also called micropropagation.

### **Advantages of Artificial Methods of Vegetative Reproduction**

- (a) In plants like potato, banana, sugarcane, rose, grape etc. which do not produce viable seeds, it is a convenient method for growing new plants.
  - (b) It is an easier, rapid and less expensive method of reproduction.
  - (c) Plants produced by this method are identical copies of the parent plant and show no variation.
  - (d) Plants raised by vegetative propagation bear flowers and fruits earlier than the plants raised by seeds.
4. The transfer of pollen grains from the anther to the stigma of a flower is called pollination. Pollination can occur in two ways: self pollination and cross pollination.
- (a) Self pollination : When the pollen grains from the anther of a flower are transferred to the stigma of the same flower (or another flower on the same plant), it is called self pollination.
  - (b) Cross-pollination : When the pollen grains from the anther of a flower of one plant are transferred to the stigma of a flower of another plant of the same kind, it is called cross-pollination.



Self-pollination



Cross-pollination

Generally, pollen grains have a tough protective coat which prevent them from drying up. Pollination always requires some pollinating agents to carry pollen grains and release them on the stigma.

These agents may be insects, birds, other animals, wind or water.



## Chapter 9

# Motion and Time

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- A.** 1. Two natural events which were used for measuring time in olden days are time between one sunrise and next day sunrise and time between one full moon to the next full moon.
2. The unit which is used to measure the time are seconds, minutes and hours.
- B.** 1. (b)      2. (c)      3. (c)      4. (c)
- C.** 1. oscillatory 2. time      3. sundial      4. Galileo
5. Sundial
- D.** 1. True      2. False      3. False      4. True      5. True
- E.** 1. second      2. odometer 3. light year 4. snail
- F.** 1. Speedometer is a device used to record the speed of vehicle.
2. The position of different objects changes with time. Therefore, they are said to be in motion. Thus, an object is said to be in motion if its position changes with time.
3. Romans used a sand clock. It worked on the principle that the sand from the upper chamber would fall into the lower chamber in a fixed interval of time. The fixed interval of time was taken as a unit to measure time commonly called hour and the sand clock was known as hour glass. As the upper chamber emptied completely, the hour glass was turned upside down so as to further record time.
4. Speed is defined as the ratio of the total distance travelled by a body to the total time taken to do so. It is also defined as the distance travelled in a unit time.
- SI unit of speed is metre per second ( $\text{mS}^1$ ).

5. An object moving along a straight line with a constant speed is said to be in **uniform motion**. On the other hand, if the speed of an object moving along a straight line keeps changing, its motion is said to be non-uniform.
- G.**
1. An object is said to be at rest if its position does not change with time in relation to stationary objects in its surroundings. Motion is opposite of rest. It is the transfer or movement of an object from one place to another. In other words, the change in position of a body is motion.
  2.  $S = \frac{D}{T}$   $S = \frac{75}{5} = 15 \text{ km/hr}$   
 $\frac{75 \times 1000 \text{ m}}{5 \times 60 \times 60} = 4.16 \text{ m/s}$
  3.  $S = \frac{D}{T}$   $S = \frac{800}{16} = 50 \text{ km/hr}$
  4. Galileo (1564-1642), an Italian scientist, discovered the pendulum. An ideal simple pendulum is a heavy point mass suspended by a weightless inextensible and a perfectly flexible string from a rigid support. A practical pendulum consists of a small heavy brass sphere called bob suspended by a long fine thread from a rigid support. When the bob is displaced from its mean position, then it begins to oscillate in a vertical plane under gravity, to and fro about the mean position. This to and fro motion of a simple pendulums are examples of a periodic or an oscillatory motion.



## Chapter 10

# Electric Current and its Effect

- A.**
1. Two terminals of dry cell are positive (+ve), and negative (-ve).
  2. Two devices in which electromagnets are used in electric bells and loudspeakers.
- B.**
1. (c)      2. (a)      3. (a)      4. (c)
- C.**
1. Electromagnets      2. insulation
  3. on line      4. tungsten      5. Insulators

- D. 1. True      2. True      3. True      4. False      5. True  
 E. 1. (b)      2. (a)      3. (e)      4. (d)      5. (c)  
 F. 1. electromagnet      2. oven  
     3. bulb      4. wood

G. 1. **Open circuits** do not allow the current to flow through the circuit.

**Close circuits** are complete and allows electricity to flow through.

2. The materials which allow the electric current to pass through them are the conductors of the electricity. Non-metals like glass, plastic, wood, paper, cloth and rubber are the non-conductors of electricity.

Non-conductor of electricity are also called **insulators**.

3. **Resistor** is circuit element designed to offer a certain resistance to the flow of electric current.

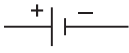
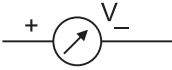
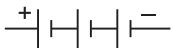



4. Three uses of electromagnet are as follows :

(a) An electromagnet is used in a loudspeakers for simplifying a signal.

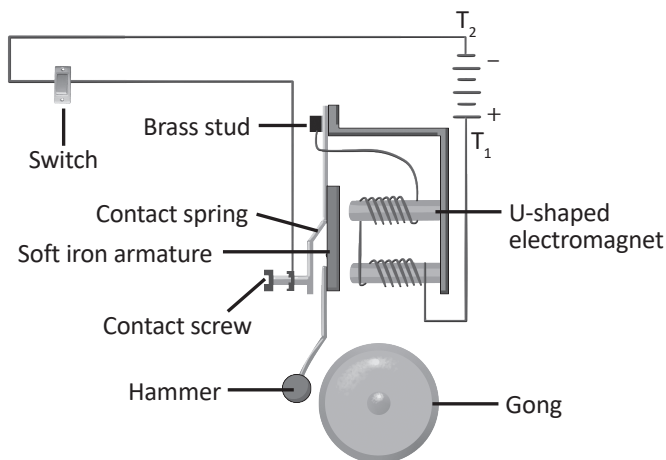
(b) Cranes with strong electromagnets are used to lift heavy loads like big machines, steel girders and scrap iron objects for loading and unloading purposes.

(c) Electromagnets are used to separate magnetic materials like iron and steel objects from a heap of junk metal scrap.

H. 1.

Name	Symbols	Name	Symbols
Cell		Voltmeter	
Battery		Wires joined	
Resistor		Ammeter	

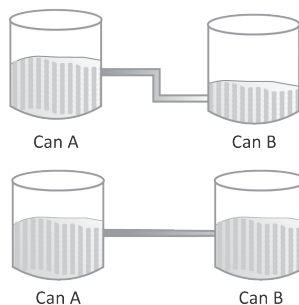
2.



An electric bell

3. **Aim :** To understand the reason for the flow of electricity.

**Procedure :**



(a) Take the two vessel A and B. Both of these should be connected with a tube having a stopcock.

(b) Pour some water in both the beakers such that the water level in the vessel A should be more than the water level in vessel B.

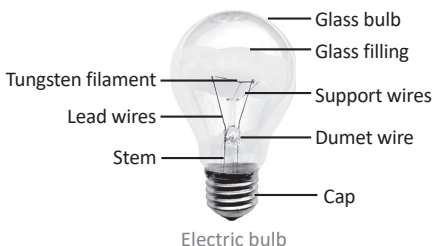
**Observation and Conclusion :**

On opening the stopcock, the water would flow from vessel A to vessel B through the tube. But the flow of water would stop when the level of water in two vessel would become equal. The electricity can be compared to the flow of water.

4. An incandescent light bulb contains a thin wire filament (usually tungsten) that glows hot when an electric current



is passed through it. In the presence of oxygen, the filament would burn up as a result of the high temperature. A glass bulb, then is used to keep oxygen away from



the filament. When electric current is passed through an electric bulb or lamp, it heats up the tungsten filament of the lamp to a high temperature. At this temperature, the filament emits both heat and light. A lighted electric bulb is shown in the fig. When the filament is broken or fused or the 'circuit' is broken then no current passes through the circuit. In this situation, the bulb does not glow.



Chapter  
**11**

## Light, Mirrors and Lenses

- A.** 1. Two observations from everyday life which show that light travels in straight line are light emerges from the torch and train always travels in a straight line.  
2. Two types of spherical mirrors are concave mirror and convex mirror.
- B.** 1. (c)      2. (a)      3. (a)      4. (b)
- C.** 1. outer surface      2. concave  
3. straight      4. VIBGYOR
- D.** 1. True      2. True      3. False      4. True
- E.** 1. Spherical mirrors are curved in shape and are part of an imaginary hollow sphere. Spherical mirrors are constructed from glass.  
2. **Real Image** : A real image is one in which light rays actually intersect or pass through the image point.  
A real image can be obtained on a screen.  
**Virtual Image** : A virtual image is one in which the light rays do not really pass through the image point but appears to

diverge from that point. If you move towards the mirror, your image will move towards the mirror.

3. AMBULANCE is written in its mirror image in front of the hospital vehicles, so that the drivers of the vehicles in front of the ambulance can read correctly through their rear view mirror.
  4. Two common uses of lens are in telescopes and cameras.
  5. Light of all colours travel at the same speed in vacuum. But in any transparent medium such as glass, water etc., the light of different colours travel with different speeds. The red light travels the fastest and the violet light the slowest of all the seven colours. As a result, the red light bends the least and the violet light bends the most.
- F. 1. This law states that when the light rays fall on the smooth surface, the angle of reflection is equal to the angle of incidence, also incident ray, reflected ray all lie in same plane.

2. **Aim** : Verification of rectilinear propagation of light.

**Materials Required** : A candle, cardboard and a match box.

**Procedure** :

- (a) Take three cardboard pieces of equal size.
- (b) Make a hole exactly at the centre of each piece of cardboard.
- (c) Make them stand straight on a table using wooden supports.
- (d) Keep a burning candle at one end of the arrangement so that its flame should be at the level of the holes.
- (e) Now adjust the cards in such a way that you can see the candle flame clearly through the holes.
- (f) Now disturb the arrangement by changing the position of one of the cardboards.

**Observations and Conclusion** : You will find that you are not able to see the candle flame.

Thus, rectilinear propagation of light is verified.

### 3. Uses of concave mirror are as follows :

- (a) It is used as reflecting mirror for projector lamps. The object is placed at the centre of curvature to obtain an image of the same size.
- (b) Concave mirror is used to collect heat radiations in solar devices.
- (c) It is used as shaving mirror, dentist mirror. It produces an erect, virtual and highly magnified image of an object placed between its pole and focus.
- (d) It is used in flood lights.
- (e) It is used in torches, headlights.
- (f) It is used in the ophthalmoscope by doctors to concentrate light on a small region which is to be examined.

### Uses of convex mirror are as follows :

- (a) It is used as a security mirror in slopes and on roads at sharp bends and concealed entrances.
- (b) It is used as a rear view mirror in automobiles. This is due to the reason that a convex mirror provides a wider field of view than a plane or concave mirror. It produces an erect diminished and virtual image.
- (c) It is used as a reflector in street lamp so as to diverge light over a large area.

### 4. Splitting of white light in seven colours are called **dispersion of white light**.

Have you seen a rainbow in the sky during monsoon? How many colours are present there in a rainbow?

Can you name all the colours? These colours actually come from the white light that we get from the sun. This is because the white light is a combination of many colours. When the white light passes through the prism, it splits up into its constituent colours. This is known as dispersion and the band of (seven) colours that we get on the screen is known as the visible spectrum of light.

The colours seen in the visible spectrum are Violet, Indigo, Blue, Green, Yellow orange and Red, known as VIBGYOR in short.

5. (a) **Incident Ray** : It is the ray of light which strikes the reflecting surface.  
(b) **Pole** : The centre of the mirror is called its pole (P).  
(c) **Centre of curvature** : The centre of the sphere of which the mirror forms a part is called the centre of curvature (C).



Chapter  
**12**

## Forests : Our Lifeline

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- A. 1. Two animals which eat the dead animals are vultures, and jackals.  
2. Two causes of deforestation are increase in population and forest fires.
- B. 1. (c)      2. (b)      3. (a)      4. (a)      5. (c)
- C. 1. natural    2. producers    3. food web    4. consumers
- D. 1. A forest has four layers which are :  
(a) Emergent Layer      (b) Canopy  
(c) Understorey Layer    (d) Forest floor
2. The producer in food chain are plants or grasses.
3. With the growing awareness among people the importance of forests is realised. Special drives of planting more and more trees to save environment from the bad effects of deforestation is called **afforestation**. Thus, it becomes our moral duty to conserve forests and to protect our environment for the benefit of our future generations.
4. The microorganisms which convert the dead plants and animals to humus are known as **decomposers**.  
Bacteria and fungi are two decomposers.
5. The removal of top fertile soil from a region by wind, rain or running water is called soil erosion. Forests prevent soil

erosion. The roots of trees bind the soil and save it from being washed away by water or rain or blown away by the wind. Thus, forests prevent soil erosion and help in the conservation of soil.

- E. 1. Forests provide us many things that we need. Besides, they play a very important role in maintaining the environmental balance. Let us understand how forests are important to us. Several plants that grow in forests are used in the preparation of medicines. The bark of cinchona tree is the source of medicine called quinine, used for treatment of malaria disease.

A variety of trees growing in the forests like teak, shisham, rose wood, sal etc., are sources of wood. Good quality wood is used to make furniture, boats, sports goods and for constructing houses.

Forests maintain the natural balance of carbon dioxide and oxygen in the atmosphere by using up carbon dioxide and releasing oxygen during photosynthesis. In this way, forests serve as green lungs in nature.

The removal of top fertile soil from a region by wind, rain or running water is called soil erosion. Forests prevent soil erosion. The roots of trees bind the soil and save it from being washed away by water or rain or blown away by the wind. Thus, forests prevent soil erosion and help in the conservation of soil.

Many tribal people of our country live in forests. The forests provide them with food, shelter, water and medicines.

Trees in the forests recycle large quantity of water regularly. Water gets evaporated into the atmosphere by plant leaves by the process known as transpiration. Gradually, this water vapour forms clouds and bring rainfall. Thus, forests increase rainfall in the region.

Forests act like a big check dam in the region. They slow down the flow of rainwater, reduce its force which helps to

control floods. The forest trees allow water to percolate into the ground. This helps in replenishing the groundwater in the region.

2. The transfer of energy from green plants (the primary producers) to decomposers through a sequence of organisms in which each organism eats the one below it in the chain and is eaten by the one above is known as **food chain**. A food chain always begins with producers.

Example starts with grass which is eaten by grasshopper, which is eaten again by frog, which is eaten by snake, which is eaten by hawk.

3. In nature, we can see a number of food chains. All food chains are linked. A number of food chains exist together in a forest to form a **food web**.

Food web improves the stability of an ecosystem as it includes all the interconnected food chains. These food webs are important for illustrating the feeding relationships in a community among the species.

4. Forest is a dynamic living entity, i.e., it is full of life and vitality.

Since forests are very beneficial to us, to other animals and to the environment, we must conserve our forests. Some of the ways to conserve forests are given below:

- (a) "Tree for a tree." principle should be adopted for every tree that has been felled, a new tree should be planted.
  - (b) Excessive cutting down of forest trees should not be allowed by the Government.
  - (c) Paper products (such as old newspapers, magazines, books and notebooks etc.) should be recycled to conserve forests.
5. The greater humidity and warmth of the forest floor allow bacteria and fungi to flourish in the forest soil. As leaves, trees, other plants and animals die, they all fall on the forest floor. The animals waste (animal dung or bird's droppings) also fall in the forest floor. The microorganisms like bacteria

feed upon the dead plants and animals tissues and waste and convert them into a dark coloured substance called humus. The microorganisms which convert the dead plants and animals to humus are known as decomposers. The humus contains nutrients (like nitrogen and phosphorus etc.) derived from dead plants and animals. When humus mixes with forest soil, the soil gets nutrients. These nutrients are again absorbed by the roots of the living plants. In this way, the nutrients are cycled. So, nothing goes waste in the forest. Decomposers are a kind of cleansing agents of the environment.



## Chapter 13

# Waste Water Management

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- A. 1. Two sources of sewage are domestic and industrial sewage.  
2. Two wastes which should not be thrown into the drain are used tea leaves and polythene bags.
- B. 1. (d)            2. (b)            3. (a)            4. (b)
- C. 1. waste water            2. sedimentation  
3. vermi cakes            4. water bodies  
5. chlorination
- D. 1. False            2. False            3. False            4. True            5. False
- E. 1. Sewage is the waste water from homes (domestic liquid waste) as well as from industries that has dissolved and suspended impurities in it.

Most of the waste water outlets at homes and industries are connected to drainage pipes. These smaller drainage pipes are then connected to the large ones in the area. This network of small drains to bigger ones ultimately forms the **sewerage system**.

2. In sewage treatment plants, the treatment consist of three stages :

**First Stage :** In the first stage, the sewage is passed through coarse screens or sieves to remove large objects like rags, wood pieces, cans stick pieces, polythene bags etc.

**Second Stage :** After this, the waste water passes into a primary clarifier. Here organic materials like faeces (sludge) sink slowly to the bottom and floating materials like grease and oil float at the surface of water. The sludge is removed with the help of a scraper and floating materials are removed with a skimmer. The sludge is then sent to a separate tanks called digesters where it is broken down or decomposed by anaerobic bacteria.

**Third Stage :** In the third stage, the clarified water is passed through aeration tank. This tank contains aerobic bacteria. These bacteria rapidly grow and consume organic contaminants like faeces, food waste soap, detergents and convert them into carbon dioxide. The microbes settle down at the bottom as activated sludge. The sludge can also be activated by blowing air into it, called aeration.

3. Sanitation involves the disposal of mainly human waste. It is very important for community health.

Both the surface water and ground water get polluted. The drinking of water contaminated with human excreta causes a large number of water borne diseases like cholera, typhoid, polio, meningitis, hepatitis and dysentery.

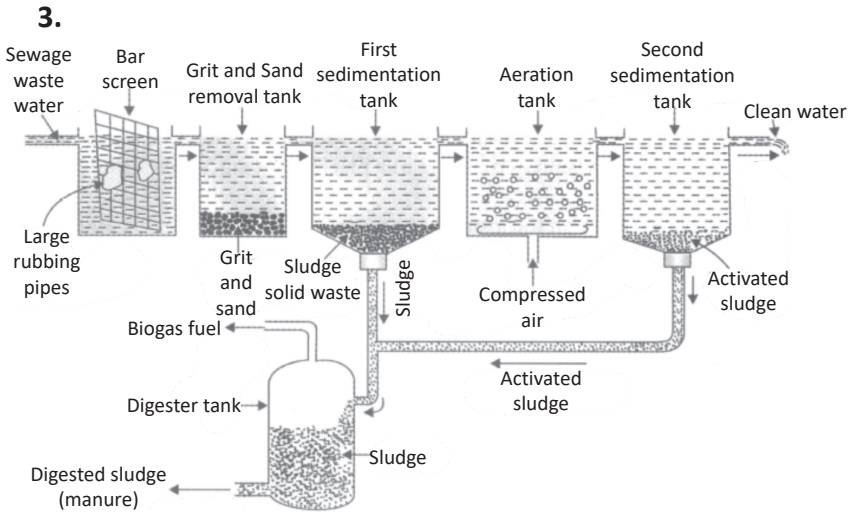
4. Aeration tank is the tank in which air (or oxygen) is injected in the mixed liquor or sewage effluent.

F. 1. (a) **Household or Domestic Wastes :** Most of the household wastes come from kitchen, it includes polybag. Vegetable peelings, waste from packing, waste water and sewage also come from household waste.

(b) **Industrial Wastes :** The wastes come from office and industries. At the industries end, huge amount of toxic wastes such as solid, liquid and gaseous wastes are generated. Vehicles produces waste in the form of poisonous gases. Nowadays, wastes are classified into two major categories: solid wastes and liquid wastes.



- (c) **Agricultural Wastes** : It comes from farms and farmers.
2. (a) **Filtration** : The waste water is passed through bar screen.
- (b) **Grit and sand removal** : The waste water is slowly passed through the grit and sand removal tank.
- (c) **Sedimentation** : The waste water is then sent to the sedimentation tanks.
- (d) **Aeration** : Air is pumped into the clarified water so that bacteria can proliferate.



Sewage Treatment Plant

4. A septic tank is sewage disposal system that consists of a concrete or metal tank with an outlet submerged in the ground. Domestic sewage enters the tank through another Inlet pipe. The solids settle down in the tank and the liquid flows through the outlet pipe into the soil.

# Focus Science-8



Chapter

1

## Crop Production and Management

- A. 1. Before sowing the seeds the soil should be prepared for good yield. The first step in the preparation of soil involves loosening and turning of soil by the process called **tilling** or **ploughing**.
2. Two chemical fertilisers are urea and ammonium sulphate.
- B. 1. (a)      2. (b)      3. (b)
- C. 1. Agriculture      2. Turning, loosening  
3. Oct/Nov., March/April      4. manure
- D. 1. True      2. True      3. True      4. True
- E. 1. When plants of same kind are grown and cultivated at one place on a large scale, it is called **crop**. Cereals, pulses, vegetables, fruits and spices are some different types of crops.
2. The practice of growing plants and rearing animals for food and other useful products is known as **agriculture**.
3. The process of separating grains from the straw is called **threshing**.
4. Irrigation means the watering of land to make it ready for agriculture.
- F. 1. **Manure** is an organic substance obtained from the decomposition of plants and animal wastes. Farmers dump plants and animal wastes in pits at open places and allow it to decompose. The decomposition is caused by some micro-organisms. The decomposed matter is used as organic manure. Vermicomposting is a good manure.
- Fertilisers** are chemical substances which are rich in a particular nutrient. These are manufactured in factories. Chemical fertilisers are easily soluble in water and easy to store and handle therefore very popular among farmers. Fertilisers help farmers to grow better crops.

Some examples of fertilisers are urea, ammonium sulphate, potash, NPK (Nitrogen, Phosphorous and Potassium).

2. The water available in wells, lakes and canals is lifted up by different methods for taking it to the fields. Cattle or human labour is used in traditional method of irrigation.

Moat (Pully system), chain system, rahat (lever system) and dhekli are some traditional methods to irrigate the field.

Modern methods of irrigation help us to use water economically.

Tubewells, drip irrigation are the modern methods of irrigation. Pumps are commonly used for lifting underground water. Electricity, diesel, biogas and solar energy are used to run these pumps.

Drip irrigation is very good method of irrigation. In this system, water is not wasted, it directly goes to the roots of the plants drop by drop through pipes. So, it is called drip system. It is the best technique for watering fruit plants, garden and trees. It is a boon in regions where there is very less water available.

3. Production of fish is called **fishery** or **pisciculture**. Fish are very good source of proteins. Oil is obtained from some fish that is rich in vitamins A and D.
4. The green revolution, a programme that began in the 1960s, refers to the dramatic increase in agricultural productivity due to the use of genetically improved varieties of seeds.

Dr M.S. Swaminathan, considered as India's premier green revolution scientist, is a well-known agricultural geneticist. Swaminathan brought a variety of seeds developed in Mexico and cross-bred them with the local varieties in India to obtain a hybrid variety. The hybrid variety yielded more grains than the traditional types. His pioneering efforts have largely contributed in plant biotechnology and have helped transform India from a famine-prone food importer to an agriculturally self-sufficient nation.



- A. 1. Two disease-causing microorganisms in humans are common cold and cholera.  
2. Two diseases caused by bacteria are typhoid and diphtheria.
- B. 1. (b)            2. (a)            3. (b)
- C. 1. Bryophytes            2. pathogens  
3. Yeast            4. Lactobacillus
- D. 1. True            2. True            3. False            4. True
- E. 1. Amoeba    2. Cholera    3. Tobacco mosaic            4. Lion
- F. 1. The process of prevention of food from spoilage and retaining their nutritive value for a long time by giving a suitable physical or chemical treatment is called **food preservation**.  
2. The process of conversion of sugar into alcohol by the action of microbes, like yeast is called **fermentation**.  
3. Two precautions to be taken while using antibiotics :  
(a) We must complete the entire course of antibiotics prescribed by the doctor. This will completely destroy the disease causing microorganisms in our body. We may fall ill again if we do not complete the course.  
(b) Antibiotics should be taken only on the advice of a qualified doctor.  
4. The process of one's body's ability to resist a disease is known as **immunity**.
- G. 1. In 1929, a Scottish bacteriologist Sir Alexander Fleming was working on a culture of disease-causing Staphylococci bacteria in his laboratory. Suddenly, he found the spores of a little green mould (fungi called *Penicillium notatum*) in one of his culture plates. He observed that the presence of green mould not only prevented the growth of bacteria but also killed many of these disease causing bacteria. From this mould, penicillin drug was prepared. In this way, Sir Alexander Fleming discovered penicillin drug which is an effective antibiotic.

2. Food preservation means to keep eatable items fresh for a longer time. The wastage of perishable food materials can be reduced by using appropriate methods and techniques of preservation. For example, refrigerator at home is used not only for cooling water but also to store food items. The process of prevention of food from spoilage and retaining their nutritive value for a long time by giving a suitable physical or chemical treatment is called **food preservation**.
3. General preventive measures against microbial diseases:
  - (a) If possible, the drinking water should be boiled, particularly when there are chances of infection.
  - (b) Vegetables and fruits must be properly washed before they are eaten.
  - (c) Maintain personal hygiene and good sanitary habits.
  - (d) Vaccination should be provided at a suitable age to get immunity.
  - (e) The food should always be covered so that flies cannot sit on it.
  - (f) Good sanitation should be maintained in the community.
  - (g) Insecticides should be sprayed in houses periodically to kill mosquitoes.
  - (h) We should avoid eating uncovered food items from the roadside stalls.
4. Food poisoning could be caused due to the consumption of food spoilt by some micro-organisms. Microorganisms that grow on our food sometimes produce toxic substances. The disease caused due to the presence of a large number of micro-organisms in the food, or due to presence of toxic substances in food formed by the action of micro-organisms, is called food poisoning.

The major symptoms of food poisoning are :

Vomiting, diarrhoea (Loose motions), pain in abdomen, headaches and fever. Food poisoning can cause serious illness and even death.

So, it is very important that we preserve food to prevent it from being spoilt.



- A.** 1. Two byproducts of petroleum are coaltar and coalgas.  
2. Two natural gases are methane and propane.
- B.** 1. (b)            2. (d)            3. (b)
- C.** 1. mining      2. Coal          3. Coalgas      4. coal
- D.** 1. False        2. True          3. True          4. True
- E.** 1. Peat          2. Paraffin wax            3. Coalgas
- F.** 1. Coal is a hard, black combustible mineral that consists mainly of carbon. Coal is one of the earliest used fossil fuels. It is hard as stone and black in colour. It is found in deep mines, under the surface of earth and is extracted by mining.
2. Uses of coaltar are :
- as a raw material for many dyes. Coaltar is added to the fabric dyes to make fast colour that does not fade on exposure to sunlight.
  - as a waterproofing and insulating material for buildings and for surfacing of roads.
  - in making paints, explosives, perfumes, plastics, photographic plates and naphthalene balls.
  - as a raw material for drugs and medicines and also used in soaps and shampoos.
3. Petroleum is sometimes also called black gold because its occurrence is natural and is found as a yellowish-black liquid mixture of hydrocarbons that are found in geological formations.
4. The natural fuels formed from the remains of living organisms buried under the earth long long ago, are called fossil fuels.
- G.** 1. Petroleum was formed by the decomposition of the remains of tiny plants and animals buried under the sea millions of years ago. It is believed that millions of years ago, the tiny plants and animals which lived in the sea, died. Their dead bodies sank to the bottom of sea and were soon covered with mud and sand. Due to high pressure, heat, action of bacteria and in the absence of air, the dead remains of tiny

plants and animals were slowly converted into petroleum. Petroleum thus formed got trapped between two layers of impervious rocks, forming an oil deposit.

2. About 300 million years ago, the earth had dense forests in low lying wet land areas. Due to natural processes like earthquakes, volcanoes and floods etc., these forests were buried under the surface of earth. As more soil deposited over them, they were compressed. The temperature also rose as they sank deeper and deeper. Due to high pressure and high temperature inside the earth and in the absence of air, the wood of buried forest plants and trees was slowly converted into coal.

**The Uses of Coal are :**

- (a) Coal is used in many houses in villages as fuel to cook food in chulhas.
  - (b) Coal is used in railway engines to produce steam to run the engine.
  - (c) Coal is used in many industries to produce organic compounds.
  - (d) Coal is used in thermal power plants to produce electricity.
  - (e) Coal is used to make coke and coal gas.
3. Uses of natural gas :
    - (a) Natural gas is used as a fuel in Thermal Power Stations for generating electricity.
    - (b) Natural gas is used as a source of hydrogen gas needed to manufacture fertilisers.
    - (c) Natural gas is used as a starting material for the manufacture of a number of chemicals.
    - (d) Compressed Natural Gas (CNG) is used as a fuel in transport vehicles like cars, bus etc.
  4. We know that the fossil fuels are non-renewable, exhaustible resources yet we are using them at a much faster rate than at which they can be produced. At this rate, the reserves which were built over a million of years will last only a few more

hundred years. So, we should conserve these resources and use them judiciously.



Chapter  
**4**

## Combustion and Flame

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- A. 1. Two fuels used in transportation are Petrol and CNG.  
2. Two types of fire extinguishers are water and carbon dioxide.
- B. 1. (d)      2. (c)      3. (a)      4. (a)
- C. 1. combustible substance    2. Ignition temperature  
3. Oxygen                            4. Carbon dioxide
- D. 1. True      2. False      3. False      4. False
- E. 1. The lowest temperature at which a substance catches fire and starts burning, is called its ignition.  
2. A chemical process in which a substance reacts with oxygen (of air) to give off heat and light (which may or may not be produced), is called **combustion**.  
3. For combustion reaction to take place there are three conditions which are necessary.  
• Presence of a combustible substance (A substance which can burn).  
• Presence of a supporter of combustion (like air or oxygen).  
• Attainment of ignition temperature.  
4. When water is thrown on the fire, it cools the combustible substance below its ignition temperature and this prevents the fire from spreading. Thus, water is very effective in fire-fighting operations.
- F. 1. At airports and petrol pumps, the fire extinguisher which is based on the principle of smothering the fire is used. These fire extinguishers are called hydrocarbon fire extinguishers. In such fire extinguishers, sodium bicarbonate containing Turkey red oil (Sulphated castor oil) is used. It also contains dilute sulphuric acid. When it is operated, carbon dioxide is liberated in the form of foam in the reaction of sulphuric acid with sodium bicarbonate done under pressure. The foam covers the whole surface of oil. It cuts off the supply of air hence fire is controlled.



2. The important harmful effects produced by the burning of fuels are as follows :

- Burning of fossil fuels leads to global warming due to release of carbon dioxide.
- Burning of coal and diesel releases sulphur dioxide and petrol engines give off gaseous oxides of nitrogen. These oxides form acid rain when these are dissolved in water.
- Incomplete combustion of fuels release carbon monoxide gas which is very poisonous and may even lead to death if inhaled in excess.

### 3. Types of Fuels

(a) **Solid Fuels** : Solid fuels leave some ash or residue after combustion. Some of the solid fuels and their calorific values are given in the table.

(b) **Liquid Fuels** : Most of the liquid fuels in use are the hydrocarbons which exist in the liquid phase at room temperature. Some of the liquid fuels and their calorific values are given in the table.

(c) **Gaseous Fuels** : Some of the gaseous fuels exist naturally at room temperature and some are made by the treatment of coal. The gaseous fuels and their calorific values are given in the table. Thus we can see that hydrogen is the best fuel as it has the highest calorific value, it is non-polluting, as it produces only water and energy on burning. So, it is an ideal fuel with high efficiency, but the drawback is that it is not easily available and not easy to store.

4. The region where combustion of gaseous materials takes place producing heat and light is known as a **flame**. All liquid and gaseous combustible substances burn with a flame.

The characteristics of a good fuel are as follows :

- Fairly cheap and easily available.
- Moderate ignition temperature, i.e., it should not catch fire at room temperature and it should not have very high ignition temperature.

- Safe and easy to store.
- Should not cause pollution on burning.
- Should produce a large amount of heat energy for less amount of burnt fuel.
- Should have a high calorific value.



Chapter  
**5**

## Conservation of Plants and Animals

- A.** 1. The species found exclusively in a particular area are **endemic species**.
2. The species which exist in very low numbers on earth are **endangered species**.
- B.** 1. (c)      2. (c)      3. (b)      4. (d)
- C.** 1. Dinosaur, Pink headed duck      2. 14
3. wild animals      4. Threatened
- D.** 1. True      2. False      3. True      4. True
- E.** 1. (d)      2. (a)      3. (b)      4. (c)      5. (e)
- F.** 1. Wildlife includes all the organisms either plants or animals other than cultivated or domesticated.
2. Project Tiger is a wildlife conservation project which was launched by the Government of India in 1972 to protect the tigers in the country.
3. The great variety of all living organisms including plants, animals, microorganisms found on earth, their inter-relationships and their relationship with the environment is known as **biodiversity** or **biological diversity**.
4. Extinct species are those species which are no longer living and have been lost forever. Examples of extinct animals include pink headed duck, Indian aurochs and northern Sumatran rhinoceros.
- G.** 1. Biosphere Reserve is a large, protected area of land meant for the conservation of wildlife, biodiversity and the traditional lifestyle of the tribal people living in the area. The Biosphere Reserves often include one or more National Parks as well

as Wildlife Sanctuaries and help to maintain biodiversity. In our country there are **14** Biosphere Reserves. Some of these are given in the table :

<b>Biosphere Reserves</b>	<b>State</b>
Great Nicobar	Andman and Nicobar
Thar desert	Rajasthan
Sunder Ban	West Bengal
Nilgiri	Kerala, Karnataka and Tamil Nadu
Nanda Devi	Uttarakhand

2. The term Sanctuary means ‘a place of safety’. So, Wildlife Sanctuary means ‘the place where wild animals remain safe’. A wildlife sanctuary is a protected area of land which is created for the protection of wild animals in their natural environment like forests (in which hunting is not permitted). A wildlife sanctuary does not allow any human activity which disturbs the wild animals or their habitat.

Some of the wild animals which are protected and preserved in our wildlife sanctuaries are: Black buck, White-eyed buch, Elephant, Golden cat, Gharial, Pink-headed duck, Marsh crocodile, Pythan and Rhinoceros.

3. Some of the steps for the conservation of wildlife are as follows :
- (a) Hunting, killing and capturing of any animal should be prevented.
  - (b) Some law should be made and strictly followed by the people for protecting wildlife.
  - (c) Deforestation should be stopped immediately. This is because depletion of forests destroy the natural habitats of wild animals and birds.
  - (d) National parks and sanctuaries should be set up to protect the wildlife and its manipulation.
  - (e) People should be awared about the need and importance of conservation of wildlife.

- (f) The feeding, breeding, nursery and resting areas of the species should be safeguard.
4. Let us study the causes that threaten the existence of many plant and animal species. Some of the major causes are as follows :
- (a) Increase in Human population : The tremendous rise in human population is one of the major causes for the loss of biodiversity. Due to construction of a large number of towns and cities for human settlement, industrialisation and construction of dams, mines etc. a large number of habitats like forests, ponds, etc. were wiped out. This led to the loss of biodiversity because natural habitat of various plants and animals were destroyed by human activities.
  - (b) Pollution : Pollution of soil, air and water is endangering many plants and animals. Pesticides and other harmful chemicals accumulating in water bodies like lakes and ponds, kill fish and other aquatic animals. Oil spill is also a great threat to marine organisms (plants and animals both).
  - (c) Illegal Hunting : Tigers, elephants, leopards, rhinoceroses, whales, seals and many other animals in the world are under threat because they are hunted down for skin, fur, tusks, claws, meat and other body parts. Even today, there is a great demand for rhino horns, tiger bones, elephant tusks and fur of several animals. These animals are hunted although it is illegal.
  - (d) Natural Disasters : Natural disasters such as earthquakes, floods, droughts, cyclones, forest-fires have also contributed to the reduction of plant and animal species in many areas.
  - (e) Deforestation : The clearing of forest (by cutting down forest trees) over a wide area is called deforestation.  
The forest land cleared of trees is used for other purposes. Some of the natural causes of deforestation are: Forest

fires and severe droughts. Forest fires can burn down all the trees and other vegetation of the forest.

- (f) Global Warming : Global warming, caused due to natural and human-made reasons, has also forced species to adapt to the changing environment.

Many organisms, specially in polar regions are under threat as they are not able to adapt well in the changing environment.

- (g) Soil Erosion : Plant roots hold the soil particles together and prevent it to erode. Thus, soil erosion is prevented by plant cover, mixing of litter by movement of wild animals and conversion to spongy humus by the microorganisms.

- (h) Exotic Species : Animals and plants that do not belong to a place originally and are introduced from elsewhere, are called exotic. The introduction of exotic species has affected many native species of plants and animals, depriving them of space, nutrients, food etc.

For example, water hyacinth, an exotic species which entered the Indian water, grows very fast and covers the whole water body (like ponds and lakes).



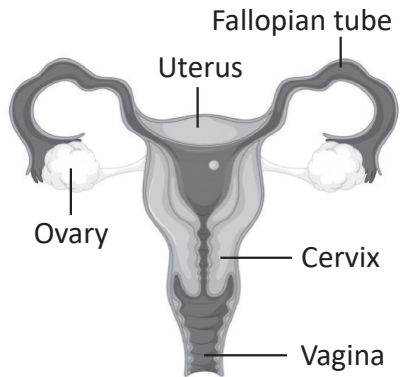
## Chapter 6

# Reproduction in Animals

- A. 1. Two examples of oviparous animals are hen and frog.  
2. Two examples of viviparous animals are humans and cow.
- B. 1. (a)      2. (a)      3. (b)      4. (c)
- C. 1. Zygote    2. testis    3. asexual, sexual    4. eggs  
5. fallopian tube
- D. 1. True      2. True      3. True      4. False      5. False
- E. 1. Penis      2. Vas deferens
- F. 1. The different methods of asexual reproduction in animals are binary fission and budding.  
2. Fertilisation is a process in which a male gamete fuses to a female gamete to form a zygote. The fusion of a sperm and an ovum is called **fertilisation**.

3. Sexual reproduction involves the fusion of male and female gametes whereas asexual reproduction does not require male and female individuals and no fusion of gametes takes place.
4. Cloning is a method of asexual reproduction which leads to the production of a genetically identical copy of a cell or an individual.

- G. 1.** The female reproductive organs consist of a pair of ovaries, a pair of oviduct and a pear shaped uterus. The ovaries are the main female reproductive organs, lie in the lower part of the abdominal cavity. They start producing ova when a girl reaches puberty. Usually, either of the ovaries produces one ovum (egg) every month. The release of an egg from the ovary is called ovulation. Ovary



The Female Reproductive System

is a muscular tube, which ends in a funnel with finger like projections. This tube carries the ovum from the ovary to the uterus, or womb, and is called the fallopian tube or oviduct. The uterus is a muscular organ. Its lower portion called the cervix, is connected to the vagina, which opens to the outside. The ovaries are attached to the uterus by ligaments.

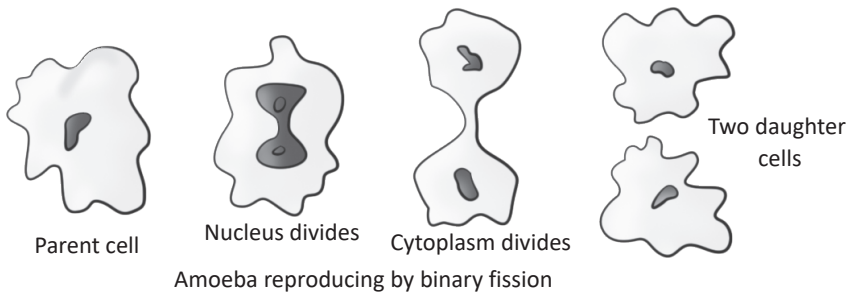
2. The hatching of a fertilised egg of frog produces a very immature young one called tadpole. The tadpoles hatch out of the eggs. Each tadpole has poorly, developed gills, a mouth and a tail with the help of which it begins to swim around and feed on algae. After a few weeks the gills disappear and tiny legs begin to appear. The head becomes more distinct and the body elongates. After about 9 weeks, the tadpole looks almost like a frog but with a finned long

tail. By 12 weeks, the tadpole has only a small tail left and looks almost like the adult frog. Soon, it will leave the water thus completing its full growth cycle. The change from tadpole to frog is an example of metamorphosis.

3. Binary fission is an asexual method of reproduction in organisms. In binary fission, the parent organism splits (or divides) to form two new organisms of the same kind.

The binary fission in a fully grown amoeba starts when its nucleus lengthens and divides into two parts. After that, the cytoplasm of amoeba divides into two parts around each nucleus. In this way, a single parent amoeba divides to form two smaller daughter amoebae. The two daughter amoebae produced by binary fission grow to their full size by eating food.

Paramecium (a unicellular animal) also reproduces by the method of binary fission.



4. The animals which give birth to young ones are called **viviparous animals**. For example, human, cow, cat, dog etc. In viviparous animals, the young ones develop in the uterus inside the body of the mother.

The animals which lay eggs from which young ones (baby animals) are hatched later on, are called **oviparous animals**. For example, hen, birds, frog etc. are **oviparous animals**. The mother lays eggs outside its body.

- H. 1. No, human beings do not undergo metamorphosis. There is no drastic change in humans. In human beings, body parts are similar to those present in the adults are present

from the time of birth. Therefore, we do not undergo metamorphosis.

2. Male reproductive system consists of a pair of testes, a pair of ducts, vas deferens, urethra and penis.

Female reproductive system consists of a pair of ovaries, fallopian tubes, uterus, vagina and external genitalia.



Chapter

7

## Reaching the Age of Adolescence

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- A. 1. We maintain the reproductive health by getting enough sleep and eat a balanced diet that is high in fiber low in fat.
2. Whether a baby is going to be a girl or a boy depends on which sperm fertilises the ovum. If the sperm carrying the X chromosome fertilises the egg (which carries only X chromosome) at fertilisation, the zygote would have two X chromosomes and develop into a female child.

If the sperm carrying the Y chromosome fertilises the egg (which carries only X chromosomes) at fertilisation, the zygote would have one X and one Y chromosome and develops into a male child.

- B. 1. (a)            2. (c)            3. (d)            4. (a)
- C. 1. HIV                            2. X, Y
3. oral cancer                    4. menarche
- D. 1. (c)            2. (d)            3. (a)            4. (b)
- E. 1. Puberty is the process of physical changes by which the body of a boy or a girl become mature and capable of reproduction. The average age for girls of puberty is 10-12 years while for boys it is 12-14 years.
2. AIDS stands for Acquired Immuno Deficiency Syndrome. The disease AIDS is caused by a dangerous HIV virus. AIDS weakens the human body's immunity, therefore, body becomes prone to many other infections or diseases.
3. Hormones refers to a substance secreted from the endocrine gland.



4. The first menstrual flow which begins at puberty in women is termed as menarche.
- F. 1. A secondary sexual characteristic is a physical characteristic of an organism that is related to or derived from its sex, but not directly part of its reproductive system.
- In humans, these characteristics typically starts to appear during puberty. In human beings, secondary sexual characteristics include enlarged breasts, widened hips of females, facial hair and Adam's apples on males and pubic hair on both.
2. (a) **Acne** : Acne is a common problem among adolescents. It appears in boys and girls around the beginning of puberty. The hormonal changes that are happening inside your body cause the sebaceous (oil) glands to become more active. When the oil glands get infected with bacteria an outbreak of acne takes place. Most teenagers get acne on the face, neck, upper back, upper chest, shoulders and back.  
(b) **Voice change** : Both, girls and boys are affected by voice changes during their adolescence. In girls, the change in their voice is hardly noticeable because it becomes only slightly deeper. As compared to boys they have a high-pitched voice. At puberty, the larynx (voice box) begins to grow. It is easily visible in some boys as a protruding part of the throat, also known as Adam's apple. But in girls, the larynx is not clearly visible from outside.
  3. (a) **Pituitary gland** : The pituitary gland also known as **master gland**, is attached to the brain. The pituitary gland stimulate the hormonal secretion of testes and ovaries.  
(b) **Thyroid gland** : Thyroid gland secretes thyroxine and due to insufficient secretion of thyroxine, a person can suffer from a disease called goitre.
  4. Some of the basic conditions or requirements for keeping good health during adolescence is to follow a healthy lifestyle which includes proper nutrition, personal hygiene,

physical exercise and maintenance of good habits. Let us study each of the above conditions in detail.

**Personal Hygiene** : Keeping our body clean is called person hygiene. Personal hygiene is needed to prevent the occurrence of diseases. The adolescents need to practise the important points of personal hygiene which can prevent diseases. Some of them are :

- (a) Everyone should have a bath at least once everyday. It is more necessary for adolescents because the increased activity of sweat glands sometimes, makes the body smelly.
- (b) Before and after taking meals, we should always wash our hands with soap and water.
- (c) Changing the clothes daily.
- (d) Girls should take special care of cleanliness during the time of menstrual flow.

**Nutritional Needs of the Adolescence** : Since adolescence is a stage of rapid growth and development, the diet for an adolescent should be carefully planned. An adolescent requires a balanced diet for that age group. We know the diet which contains adequate amounts of all the essential nutrients like carbohydrates, fats, proteins, minerals and vitamins sufficient for the normal growth and development of the body is called a balanced diet.

**Physical Exercise** : For keeping good health, we should do regular physical exercise. Physical exercise keeps the body and mind fit. All young boys and girls should take long walks, brisk walking, running, cycling, exercises, yoga in open air to keep the body fit and healthy. They must play outdoor games to build up strong bones and muscles. Interest in physical exercise gives relief from the strain of everyday life and keeps good mental health.

**Good Habits** : Adolescence is a period of rapid cognitive, emotional and attitudinal changes. This period has been denoted as the period of 'Storm and Stress'. Positive thinking

will lead to positive personality development. Adolescents can easily be tempted to be addicted to drugs, alcohol and tobacco because of the stress they undergo or because of adventure spirit. A positive adolescent must say 'No' to drugs, alcohol and tobacco because these things cause many physical and mental diseases.



- A. 1. Two roles of atmospheric pressure in our day-to-day life are:  
(a) Breathing                      (b) Weather
2. Two examples of muscular force are walking & running.
- B. 1. (c)              2. (c)              3. (d)              4. (a)
- C. 1. Muscular force              2. Force  
3. Pressure                      4. 9.81
- D. 1. Muscular force              2. Space suit
- E. 1. The force which always opposes the motion of one body over another body is called **frictional force** (or friction). This is a contact force which comes into play when a body slide or tends to slide on another body.
2. The layer of air above the earth is called the **atmosphere**. Air is also a matter and has weight. The weight of the atmosphere exerts a pressure on the surface of the Earth and on all the objects on the earth including ourselves. This pressure is called **atmospheric pressure**. It is measured by barometer.
3. Newton discovered that every object in this universe attracts other object with a certain force is called a **gravitational force**. For example, the force between our pen and the book, between a book and a table, between us and the tree, etc. is gravitational force.
4. (a) A force can change the state of motion of a body.  
(b) A force can change the shape or size of an object.
- F. 1. (a) When force is applied physically through a direct contact between the two bodies or objects, is called **contact force**. Contact forces act only when objects are in physical

contact with each other and bring about necessary changes.

If we pull a coiled spring (whose one end is fixed to a wall); an effort is applied by us on the spring. Both the objects are in contact. The result is that the spring gets stretched. This is an example of contact force.

The examples of contact forces are :

- (i) Muscular force, and
  - (ii) Frictional force (or Friction)
- (b) Some forces do not involve physical contact between two bodies on which they act. They act from a distance without touching each other. Such forces are called **non-contact forces**. So, non-contact forces are forces which can act even when objects are not in physical contact with each other and bring about changes.

The examples of non-contact forces are :

- (i) Magnetic force
- (ii) Electrostatic force
- (iii) Gravitational force

- 2. Electrostatic Force :** The force of interaction, which exist between two charges, is called electrostatic force. In other words, the force exerted by an electrically charged object is called **electrostatic force**. If we bring a plastic comb close to a heap of small pieces of paper, nothing happens. If we rub a plastic comb several times in dry hair (not in oily hair) and bring it near a heap of pieces of paper, they are attracted by the comb. This is because on rubbing, the comb gets charged. Since, the charge is produced at the site of rubbing by friction and remains there without any movement, it is called electrostatic charge.
- 3.** All human beings and animals on the Earth are subjected to the huge pressure of the atmosphere. If the pressure due to atmospheric pressure is so great, then why do they not get crushed under this huge pressure? All human beings and

animals do not feel any discomfort because their bodies get conditioned to this pressure.

Human body has a liquid called blood which flows through blood vessels into each and every cell of our body. Human body itself exerts a pressure called blood pressure which is slightly greater than the atmospheric pressure. Since the atmospheric pressure acting on human body from outside is balanced by the blood pressure acting from inside, human body do not get crushed.

When people, normally living in plains go to high mountains, quite often they find blood oozing out from their nose. Their internal pressure used as it was to balance the atmospheric pressure at plains now finds a reduced atmospheric pressure opposing it and the excess pressure on the inside causes the blood to ooze out.

4. To measure liquid pressure, a **manometer** is used. Liquid pressure is defined as the increase in the pressure when there is an increase in the depth of the liquid.



## Chapter 9

## Friction

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- A. 1. Two methods to increase friction are :  
(a) Making the surface rough.  
(b) By increasing the surface area in contact.
2. Two advantages of friction are :  
(a) It enables us to walk freely.  
(b) Breaks of vehicles work due friction.
- B. 1. (a)            2. (b)            3. (d)
- C. 1. decrease                            2. roughness  
3. reduces                                4. Frictional force
- D. 1. Streamlining                        2. Sea Boat
- E. 1. The frictional force present when one object moves slowly (or slide) over the surface of another object, is called as **sliding friction**.

- Rubbing both the hands together to create heat.
  - A coaster sliding against a table.
2. We are able to walk on ground because friction between the sole of our shoes and ground prevents us from slipping over the ground. To take a step forward during walking we lift one foot off the ground and push the ground backwards with the other foot.
  3. When an object (like a wheel) rolls over the surface of another object, the resistance to its motion is called **rolling friction**. It is always easier to 'roll' than to 'slide' an object over another object.
  4. Two advantages of friction :
    - (a) It enables us to walk freely.
    - (b) Breaks of vehicles work due to friction.
- F. 1. Friction plays an important role in our daily life. Friction has good and bad aspects. In some cases, friction is useful and we want to keep it but in other cases friction is harmful and we wish to reduce it.
- We know that friction opposes motion and produces heat.
  - It causes wastage of energy.
  - It wears out rubbing surfaces like parts of machines, sole of the shoes and tyres.
  - It wears out steps of staircases in buildings and foot overbridges.
  - It reduces the efficiency of machines.

If you think so, then think again and consider the following cases.

- We would not be able to walk without friction. What happens on oily or watery floor? Oily or watery floor have less friction hence we may slip on them.
- We would not be able to write without friction.
- Cars and buses move safely on the road due to the friction between the tyres and the road.

Hence, it is clear that though friction has some disadvantages yet it is also advantageous in many cases. That's why we can say that friction is considered as a necessary evil.

- 2. Static Friction :** The maximum frictional force present between any two objects when one object just tends to move or slip over the surface of the other object, is called static friction. Static friction is a kind of starting friction because an object just tends to start moving, it does not actually move.

**Limiting friction :** The maximum opposing force that comes into play, when one body is just at urge of moving on the surface of another body.

- 3.** When two solid surfaces come in contact with each other, they experience friction. Similarly, when a solid body moves in a liquid or gas, the surface of the solid experiences friction. Why do you think birds, fish etc. have a streamlined body? The streamlined body reduces the area of contact between the body and the fluid (air/water), hence reducing the friction.

The symmetrical shape of a body/object which offers least resistance due to friction is called **streamlined shape**.

This is the reason why aeroplanes, ships and boats are given a streamlined body to move easily in air or water.

- 4.** Similarly, when a solid body moves in a liquid or gas, the surface of the solid experiences friction. Why do you think birds, fish etc. have a streamlined body? The streamlined body reduces the area of contact between the body and the fluid (air/water), hence reducing the friction.

The symmetrical shape of a body/object which offers least resistance due to friction is called streamlined shape.



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- A. 1.** Two stringed musical instruments are guitar and sitar.  
**2.** Two factors on which sound speed depends are density and temperature.

- B. 1. (b)            2. (d)            3. (c)            4. (a)
- C. 1. Hertz            2. treble, bass  
3. 20,000 Hz            4. noise
- D. 1. True            2. True            3. False            4. False
- E. 1. (c)            2. (d)            3. (b)            4. (e)            5. (a)
- F. 1. Trumpet    2. Pinna            3. Trumpet    4. Time Period
- G. 1. (a) **Oscillation** : Oscillation is defined as the process of repeating variations of any quantity or measure about its equilibrium value in time. It can also be defined as a periodic variation of a matter between her values or about its central value.

Example of oscillation is simple pendulum.

(b) **Amplitude** : The oscillations of the ball about the central position are small if you give the ball a small push. If you give the ball a stronger push, the oscillations are larger. The distance by which the ball moves away from its central position is called the amplitude of the oscillation. It is represented by a letter 'A'.

(c) **Time period** : The time taken by the pendulum for one oscillation is called the time period of the pendulum. It remains fixed as long as the length of the pendulum does not change.

Time period is measured in seconds and denoted by the letter 'T'.

2. The sounds which are unpleasant to the ear are called noise and the sound which are pleasing to the ear are called **music**.

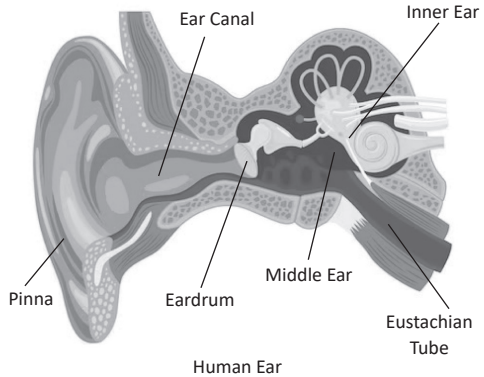
Musical sound is produced by regular vibrations and noise is produced by irregular vibrations. Sound produced by a harmonium is a musical sound but sound produced by all the students together of any class is noise.

3. The presence of loud, unwanted and disturbing sounds in our environment is called noise pollution. Doctors and all other health experts tell us that noise is a health hazard for all of us. It makes us easily irritable and adds to our level of mental tension. It is harmful for our ears and the other body



organs. Noise pollution is caused by vehicles, explosion, including bursting of crackers, machines, loudspeakers, televisions, transistors, radio etc.

4. Sound cannot travel through vacuum as there is no particles present for vibrations to take place.
- H. 1. Our ears are sensory organs that helps us to hear sound. Only one of its parts can be seen and felt by you, the outer ear. The rest of the delicate ear is buried deep inside the skull. A vibrating object causes air molecules to vibrate. When these vibrations reach our ear, they are collected by the pinna and funnelled into the ear tube.



These, then strike the eardrum which starts vibrating with the same frequency. This causes the delicate bones of the middle ear to vibrate. This stimulates tiny hair in the hearing organ, which in turn, send a signal to the auditory nerve of our nervous system. The auditory nerve takes the signal to the brain and we can then hear the sound.

2. Noise pollution can lead to many health hazards :
- (a) It increases nervous tension, irritation, earache, headache and high blood pressure.
  - (b) It may cause lack of concentration in work or studies.
  - (c) Loud music during night-time disturbs our sleep.
  - (d) Prolonged exposure to high level noise can affect the ear-drum and may lead to temporary or even permanent loss of hearing.
3. The substance through which sound travels is called **medium**. And transmission of sound is called **propagation of sound**.
- So, by saying that sound needs a medium for propagation,

we mean that sound needs a solid, liquid or gas for transmission. Sound can travel through solids, liquids and gases but it cannot travel through vacuum because vacuum has no molecules which can vibrate and carry sound waves. We can clear this fact by performing the following activity.

4. A repeated 'back and forth' motion is called **vibrations** (or oscillations). A vibration is a rapid to and fro or back and forth motion of an object. This type of motion is known as **oscillatory motion**. We will now give the example of a simple pendulum to understand the meaning of vibrations (oscillations) more clearly. A simple pendulum can be made by tying about one metre long thread from a small metal ball and suspending it from a height as shown in figure. The small metal ball of pendulum is called bob. When the pendulum is at rest (not vibrating), then its bob is in the normal position or central position.

If you give the ball a push, it performs slow to and fro movements or oscillations about the central position. These oscillations slowly get reduced and the ball ultimately comes to rest in the central position.



Chapter  
**11**

## Chemical Effects of Electric Current

- A. 1. Two insulators are plastic and rubber.  
2. Two uses of electroplating :  
(a) It is used in jewellery. (b) Purification of metals.
- B. 1. (c)      2. (a)      3. (c)
- C. 1. poor      2. chemical  
3. negative      4. electrical conductivity
- D. 1. True      2. True      3. True      4. False
- E. 1. Graphite      2. Vinegar
- F. 1. When electric current is passed through an aqueous solution of common salt (sodium chloride), it decomposes the chemical compound, sodium chloride into sodium ions (cations) and chloride (anions). This process is called

electrolysis. In other words, the chemical decomposition of an electrolyte by passing an electric current through it, is called electrolysis.

2. Conductors are the materials or substances which allow electricity to flow through them. They conduct electricity because they allow electrons to flow easily inside them from atom to atom.
3. The process of depositing a layer of any desired metal on another with the help of electric current is called electroplating. The purpose of electroplating is to protect the metal objects from corrosion (or rusting) or to make the metal objects look more attractive.

For example, deposition of chromium on car parts, bath taps, bicycle handle bars, deposition of silver on brass or copper etc. is done by electroplating.

- G. 1. LED (Light Emitting Diode) is a semiconductor device that emits light when an electric current is passed through it. Light is produced when the particles that carry the current (known as electrons and holes) combine together within the semiconductor material.
2. The chemical changes which take place in conducting liquids on passing electric current through them are called chemical effects of electric current.
  3. **Electrolytic refining** means refining (purification) by electrolysis. Electrolytic refining is the most important and most widely used method of refining metals. Many metals, like copper, zinc, tin, silver, gold and nickel are refined by this method.



- A. 1. Two destructive natural phenomena are earthquake and Tsunami.  
2. Two kinds of electric charges are positive and negative.
- B. 1. (c)            2. (a)            3. (d)            4. (a)
- C. 1. thunder            2. earthquake

3. magma                                  4. Earthing
- D. 1. False      2. False      3. False      4. False
- E. 1. Pollution   2. Ocean      3. Landslide
- F. 1. Lightning refers to the rapid flow of charge through the air between the two oppositely charged clouds.
2. An **earthquake** is a sudden shaking (or trembling) of the earth which lasts for a very short time. It is the shaking of the ground due to tremors, both powerful and weak as a result of disturbances within the Earth. Earthquake is the most dreaded natural phenomenon, as till date scientists are not able to predict the exact time and place of the earthquake. An earthquake can cause massive damage to life and property as it catches people unaware most of the time.
3. **We can be safe during lighting :**
- (a) Do not take shelter under a tree as the lightning may strike the tree.
  - (b) Remain indoors.
  - (c) You can take shelter inside a car.
  - (d) Don't go out with an umbrella with a metal cap.
  - (e) Move in a low lying place as it is safer.
  - (f) Stay away from good conductors such as poles, metal pipes etc.
  - (g) Unplug electronic appliances like computer, TV, refrigerator etc.
- Do not use wired phone. It is safer to use mobile phone and cordless phone.
4. The point vertically above the focus on the surface of the earth is called **epicentre**.
- G. 1. A **seismograph** is a device for measuring the movement of the earth, and consists of a ground-motion detection sensor called a seismometer.
2. A seismograph is advice or Instrument used to detect and record seismic waves. These seismic waves are the propagating vibrations that carry energy from the source of an earthquake outward in all directions. They travel

through the interior of the Earth and can be measured with seismographs.

**3. Tsunami** is a Japanese word that means harbour waves, because tsunamis cause the most damage in harbours. India witnessed tsunamis causing severe damage to both life and property on 26th December, 2004.

**4. During an Earthquake, if you are at Home**

(a) If you are on the ground floor close to the entrance, you can try to run outside.

(b) Usually once you start feeling the tremor, it is too late to try to run down the stairs you would jeopardise your life by doing this.

(c) If you are in bed, protect your head with pillow.

(d) The best idea is to protect yourself by taking shelter under a table or a doorframe.

(e) Stay away from heavy cupboards because things will fall down and may harm you.

**During an Earthquake, if you are Outdoors**

(a) If in a car or bus, drive slowly to a clear spot and stay inside the vehicle till the tremors stop.

(b) Do not stand under a tree, near a building or overhead power cables.



**A. 1.** Two technological aids for visually challenged people are Braille system and computers.

**2.** Two types of lenses used to correct vision are convex and concave.

**B. 1. (b)      2. (c)      3. (b)      4. (d)**

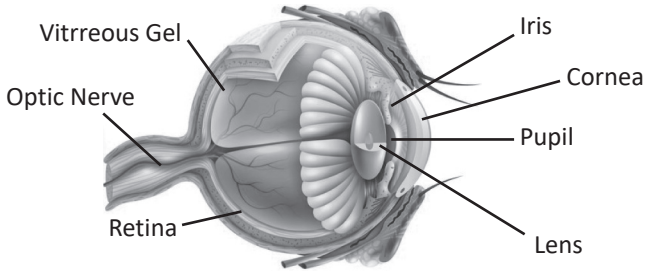
**C. 1. infinite    2. blind      3. ailiary    4. seven**

**D. 1. Purple    2. Eardrum    3. Tuberculosis**

**E. 1.** The band of colours produced when white light is split up is called the spectrum. The spectrum has seven colours : violet, indigo, blue, green, yellow, orange and red.

2. This ability of the eye to adjust the focal length of the lens is known as **accommodation**.
  3. The separation of white light into different colours is known as **dispersion**.
  4. Two laws of reflection are :
    - (a) The angle of incidence is equal to the angle of reflection.
    - (b) Incident ray, reflected ray and the normal drawn at the point of incidence to the reflecting surface, lie in the same plane.
- F. 1. (a) **Myopia** : Myopia is also known as short-sightedness. A person suffering from this defect has a sharp and clear near vision but he cannot see distant objects clearly. Thus the defect of vision in which a person can see nearby object but he cannot see a distant object is called myopia.
- (b) **Hypermetropia** : It is a defect of vision in which a person can see a distant object but cannot see a nearby object. This happens when the lens is too thin and the rays of light coming from the nearby objects focus behind the retina making the vision blurred.  
In such a case, the person has a clear distant vision but a blurred near vision. The reason of hypermetropia caused due to two reasons. First the lens might be too thin and focus the rays of light behind the retina instead of directly on it. Another reason for hypermetropia could be the larger eyeballs. This defect generally occurs in old age when the ciliary muscles become weak.
- (c) **Presbyopia** : Presbyopia is another defect of vision in which a person cannot see the nearby as well as distant object. To correct this defect a person should use bi-focal spectacles that have both types of lenses a concave one to see the distant objects and a convex lens for reading purpose.
2. A human eye is most precious gift of nature. The human eye is a most important sense organ. The eye is a natural optical instrument, which enables us to see the beautiful world around us.

The main parts of an eye are given below :



The main parts of an eye

- 1. Sclera :** It is the outermost covering of the eye. It is the white part of the human eyes which is made of white tough fibrous tissues. It protects the vital internal parts of the eye.
- 2. Cornea :** This is the front portion of the eye ball. The sclera layer continues in front of the eye as the cornea. This is a transparent white portion of the eye which covers the transparent bulge on the surface of the eyeball. It allows the light to enter in the eyeball.
- 3. Iris and Pupil :** Iris is situated behind the cornea. It has a hole in the centre known as pupil. It is a dark coloured muscular diaphragm. The pupil looks black as no light is reflected from it. The iris regulates the amount of the light entering the eye by adjusting the size of the pupil in the following way :
  - (a) If the light is dim, the iris makes the pupil expand in order to allow more light to enter the eye.
  - (b) If the light is bright, the iris make the pupil contract in order to decrease the amount of light entering the eye. The iris consist of muscles that expand and contract the pupil.
- 4. Choroid :** The dark grey layer attached to the sclera on its inner side is called the choroid. It is richly supplied with blood vessels. It darkens the eye from inside and hence, prevents any internal reflection.
- 5. Crystalline Lens :** It is a transparent crystalline double convex lens situated just behind the iris. It is held in its

position with the help of ciliary muscles. Ciliary muscles help in changing the focal length of the eye lens to see far and near objects clearly.

**6. Retina :** It is the innermost delicate membrane having a large number of nerve cells called rods and cones, which lines the inside wall of the eyes and act like the film in the cornea. The cones are sensitive to colour while the rods are sensitive to the intensity of light. The image of object we see is formed on retina.

**7. Optic Nerve :** Optic nerve are about one million separate nerve fibres that connect the rods and cones of the retina to the brain. Its function is to carry optical messages in the form of electric signals to the brain.

**3.** Some simple precautions that can help to keep them safe are :

(a) Never use too bright or too dim light while reading.

(b) Wash the eyes with clean and cold water at least twice a day.

(c) Give rest to your eyes from time to time while reading, watching television or doing work that requires a close look.

(d) Do not read in a moving vehicle.

(e) Never rub your eyes if something enters them. Instead of rubbing, wash them with clean and cold water.

(f) Consult a doctor in case of any injury to the eyes.

(g) Take care while playing with sharp objects or while cycling, walking and running to avoid any damage to the eyes.

**4. Braille System :** Visually challenged people can read books printed in Braille. Braille is a system of representing characters by raised dots. Combinations of raised dots in a six-dot 'cell' make up different characters.

The characters are read by touching them with fingers. This system was invented by Louis Braille, who lost his sight when he was a child. Books and periodicals are available in Braille for the blind.