# Chapter 1. Nutrition in Plants

### Test Yourself (Page 8)

**1.** autotrophs **2.** chlorophyll **3.** nutrition **4.** photosynthesis **5.** Sun

### Exercise

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

**B.** **1.** consumers **2.** two **3.** chroloplasts **4.** Parasites **5.** autotrophs

**C.** **1.** F **2.** T. **3.** F **4.** T **5.** T

**D.** **1.** Nutrition **2.** Stomata **3.** Light **4.** Totally Parasitic **5.** Heterotroph

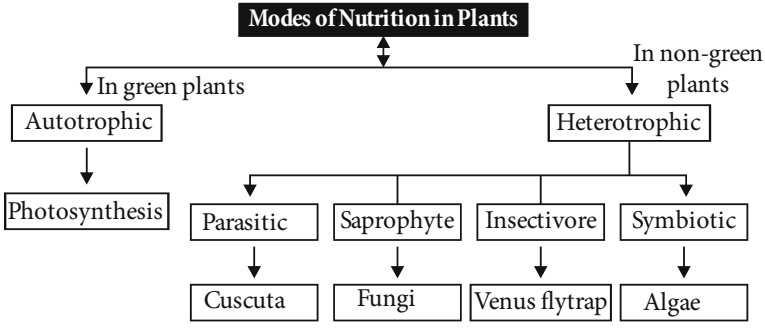
**E.** **1.** Stomata are very small openings in membranes, particularly in plants, through which water and gas pass. These are found in the epidermis of leaves, stems and other organs that is used to control gas exchange. **2.** Saprophytes release enzymes to break down complex organic matter into simpler substances. Examples of saprophytic plants are fungi and bacteria. **3.** The organisms which cannot make their food and depend on others for their food are called heterotrophs. **4.** Most green plants utilize the energy trapped from sunlight to convert simple substances like carbon dioxide and water into food. Hence, they are called autotrophs. **5.** Green plants make their own food using carbon dioxide and water in the presence of chlorophyll and sunlight. The process by which green plants make their food is called photosynthesis. Photosynthesis is described by the following reaction.

$$\underset{\text{(from the air)}}{\text{Carbon Dioxide}} + \underset{\text{(from the soil)}}{\text{Water}} \xrightarrow[\text{Chlorophyll}]{\text{Sunlight}} \underset{\text{(food stored in the plant)}}{\text{Glucose}} + \underset{\text{(released into the atmosphere)}}{\text{Oxygen}}$$

**F.** **1.** The nutrients in the soil can be replenished by adopting the following methods : (i) by using manures (ii) by applying fertilizers (iii) by crop rotation method (iv) by growing leguminous crops. There is also a natural way by which nutrients are replenished in the soil. Saprophytes act upon dead and decaying matter and break them into simpler substances which can be used by other organisms. Bacteria break down proteins from dead plants and minerals into nitrates. These nitrates are absorbed by plant roots to build new amino acids and proteins. These bacteria and fungi are known as decomposers as they decompose the dead bodies of plants and animals into simple substances. (Note : For diagram of 'Replenishment of nutrients in the soil' see book page no 10.) **2.** Food has three main functions in the body : (i) growth and development (ii) provision of energy (iii) repair and maintenance of the body's cell. **3.** Chlorophyll is

a green pigment found in the leaves and green stems of plants. Green pigments trap light energy from the Sun, which is then used to combine carbon dioxide and water into sugar in the process of photosynthesis. **4.** Plants get their mineral nutrients from the soil. If plants/crops are grown continuously year after year, the soil loses its fertility and becomes poorer in nutrients. As a result the yield of crops goes on decreasing. Farmers apply manures and fertilizers in their fields to enrich the fertility of the soil. Thus the addition of manures and fertilizers, helps in the replenishment of nutrients in the soil. **5.** The plants which depend wholly on the host plant for their food are called totally parasitic plants. Plants such as cuscuta (amarbel), apodanthes, certain bacteria and fungi are totally parasitic. The plants which make a part of their food themselves by photosynthesis but derive other components of food such as, water, minerals, etc., from the host plant are called partial parasitic plants. The mode of nutrition in some plants like, mistletoe is partially parasitic.

**G.**




**Hots**

**1.** If there were no animals on the earth then there were few vegetation on earth or almost nil. As the balance of the carbon dioxide and oxygen is mainly maintained by the animals and the plants. The carbon dioxide given out by the animals is taken by the plants which in turn releases oxygen that is important for the survival of the animals. **2.** Humans cannot synthesis their our food; therefore, they are heterotrophs. We make our food in the kitchen but the raw materials that we use to cook the food are either obtained from plants or from animals. Thus, humans, directly or indirectly, depend upon plants for their food.

## Chapter 2. Nutrition in Animals

**Test Yourself (Page 17)**

**1.** Nutrition is the process by which nutrients from foods are absorbed and processed by the body. **2.** Hetrotrophic nutrition. **3.** Ingestion, digestion, absorption, assimilation, egestion. **4.** When *amoeba* comes in contact with its food, it throws out finger-like projections from its

body. **5.** The pseudopodia completely enclose the food forming small cavities called food vacuoles. The food vacuole moves around in the cytoplasm. Here, the digestive enzymes help in the break-down of food into simpler and soluble molecules. The digested food is then absorbed and assimilated and the *Amoeba* grows in size.

## Test Yourself (Page 22)

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

## Exercise

**A.** **1.** (c) **2.** (c) **3.** (c) **4.** (a) **5.** (c)

**B.** **1.** digestion, simpler **2.** Salivary amylase **3.** in mouth, in oesophagus, in stomach, in small intestine, in large intestine **4.** ruminants **5.** egestion

**C.** **1.** F **2.** F **3.** F. **4.** T **5.** T

**D.** **1.** Protein **2.** Liver **3.** Incisors **4.** Mouth, esophagus, stomach, small intestine, large intestine, rectum and anus **5.** Cellulose

**E.** **1.** Teeth are of four types –incisors, canines, premolars and molars. (i) Incisors are found in the front of the mouth. They are chisel-shaped and mainly used for biting and cutting. (ii) Next to the incisors are the canines. These are pointed and sharp and are used for piercing and tearing pieces of food. (iii) Premolars are the chewing and grinding teeth. They are broad and flat. They chew and grind food and convert it into fine pieces.(iv) Molars are similar to premolars, but are larger. They are also used to chew and grind food. **2.** The nutrients present in the digested food are absorbed by the finger-like projections on the inner wall of the small intestine. These finger-like projections on the inner wall of the small intestine are called villi (singular : villus). These villi increase the surface area for absorption. **3.** Chewing → Stomach digestion → Small intestine digestion, Absorption and waste elimination. **4. Name of Enzyme :** Salivary amylase, Pepsin, Trypsin, Lipase, Amylase. **Site of Secretion :** Mouth, Stomach, Small intestine, Small intestine, Small intestine.**5.** (a) Starch → Sugars (b) breaks into fatty acids (c) Proteins → Peptids

**F.** **1.** The grass-eating animals such as cow, buffalo, horse, etc., swallow half chewed grass quickly and store it in a part of their stomach called rumen. Here the food gets partially digested. The partially digested food is called cud. When the animals are not eating, the cud returns to the mouth in small lumps and is chewed. This process is called rumination. **2.** The digestion process in amoeba is a simple process while in human beings it is a complex process. Amoeba engulfs its food by surrounding the food particle with its pseudopodia. The undigested food is expelled out by the vacuole. While in human beings, the food (which is complex substance) is taken inside the mouth and undergoes a complex process of digestion and absorption in the digestive system. Finally the undigested food

is expelled in the form of faeces. **3. (a)** Saliva, secreted by the salivary glands, contains digestive juices which help in the breakdown of starch into sugar. **(b)** Oesophagus is a hollow tube (about 25 cm long) made up of muscles. After the food is swallowed, it moves down by the movement of its muscular wall. From oesophagus the food goes into the stomach.(c) Tongue is the organ used for taste. It contains taste buds to distinguish whether a food is sweet, salty, sour or bitter. It mixes the saliva with the food and also helps us in speaking. **(d)** The main function of liver is to filter the blood coming from the digestive tract before passing it to rest of the body. The liver makes proteins important for blood clotting and other functions. The primary functions of the liver are production and excretion. **4.** Do it yourself. **5.** The complete process can be represented by the following flowchart. Food → Mouth → Stomach → Small Intestine → Large Intestine → Anus → Faeces.

**G.**

| Parts of the Digestive System | Enzymes/ Digestive Juices | Food Acted Upon | Product Formed |
|---|---|---|---|
| Mouth | Salivary amylase | Starch | Sugars |
| Stomach | Gastric juice | Proteins | Peptides |
| Pancreas | Trypsin | Proteins | Peptides |

**HOTS**

**1.** Acidity occurs when there is excess secretion of acids in the gastric glands of the stomach. When the secretion is more than usual, we feel, what is commonly known as heartburn, which is normally triggered off by consumption of spicy. **2.** Ginger is an effective remedy for gastric trouble. So he can be given ginger to get rid of gastric problem.

## Chapter 3. Heat and Temperature

### Test Yourself (Page 32)

**1.** Thermometer **2.** Temperature **3.** Mercury **4.** Heat **5.** Mercury

### Test Yourself (Page 38)

**1.** higher temperature; lower temperature **2.** good **3.** convection **4.** land; sea; water; land **5.** radiation.

### Exercise

**A.** **1.** (a) **2.** (b) **3.** (a) **4.** (c) **5.** (a)

**B.** **1.** Radiation **2.** temperature **3.** Mercury **4.** Convection **5.** radiant

**C.** **1.** F **2.** F **3.** F **4.** T **5.** F

**D.** **1.** Thermometer **2.** Heat **3.** Radiation **4.** Thermos flask **5.** Land breeze

**E.** **1.** The process of transmission of heat energy in solids without actual movement of particles from their position is called conduction. Liquid

(with the exception of mercury and molten metals) and gases are poor conductors of heat. Therefore, they cannot be heated by conduction. When liquids and gases are heated, the heat is carried from one part to another by the actual movement of the hot particles. This movement of particles due to the temperature difference between different parts of the same substance is called **convection**. **2.** (i) Copper tubing is used in automobiles radiators as it readily takes heat from the hot water coming from the engine. (ii) Mercury is used as a thermometric liquid as it is a good conductor of heat.

**3.** (i) 37°C to °F : Formula = °C × 9/5 + 32 = °F $\Rightarrow$ 37 × 9/5 + 32
= 66.6 + 32 = 98.6° F

(ii) –40°F to °C : Formula = (°F —32) × 5/9 = °C $\Rightarrow$ (–40 –32) × 5/9
= –72° × 5/9 = –40°C

**4.** Mercury is preferred to other liquids because of the following reasons : (i) It has a uniform contraction and expansion. (ii) It does not stick to the wall of the thermometer. (iii) Mercury is the only metal which is found in liquid state. It is also a good conductor of heat. (iv) It is shining; slivery white liquid which can be seen very easily and the position of the boundary edge can be read distinctly on a scale. **5.** (i) The transfer of heat energy from a hot body to a cold body directly, without heating the space in between the two bodies, is called radiation and the heat energy transmitted by the process of radiation is called radiant heat or thermal radiation. (ii) Convection current is the transfer of heat by the mass movement of heated particles into an area of cooler fluid. (iii) Many metals like silver, copper, gold and aluminium are good thermal conductors.

**F. 1.** The degree of hotness or coldness of an object, on some chosen scale, is called its temperature. Temperature of an object is measured with a device called thermometer. There are three temperature scales : (i) Celsius scale (earlier called as centigrade scale) (ii) Fahrenheit scale (iii) Kelvin (or Absolute) scale. **Celsius Scale :** This scale is indicated by °C (read as degree Celsius or degree centigrade). On this scale (in honour of Anders Celsius) the melting point of ice is taken as 0°C and boiling point of water as 100°C. The difference between these two points is divided into 100 degrees. **2. Materials Required :** Round bottomed flask, cold water, potassium permanganate. **Method :** (i) Gently place a small crystal of potassium permanganate into a round bottomed flask containing cold water. (ii) Heat the water near the crystal with a small Bunsen burner flame. (iii) Observe the movement of the purple coloured solution. **Observation :** The purple coloured solution rises from the place of heating, moves a bit away and then moves down to the bottom of the beaker. **Conclusion :** This experiment shows that in liquids, heat is transferred by convection. **3.** Laboratory thermometer consists of a thin

glass tube which is sealed at one end and has a bulb at the other end. The bulb is generally filled with mercury or alcohol. The range of temperature which a laboratory thermometer can measure is from −10°C to 110°C (*Note : For diagram see 'laboratory thermometer' on page* 32). **4.** During the day Sun shines equally on the land and sea. However, the land warms up more and faster than the sea. The air over the land becomes hotter and rises upwards. This results in fall of pressure over the surface of the land. To take its place, the cooler air from the sea moves towards the land. This convection current from the sea to the land is called the sea breeze. After sunset, land loses heat faster than the sea water. As a result, the air over the sea is warmer at night. The air over the sea being warmer rises up and to take its place, cooler air from the land starts moving towards the sea. The convection current from the land to the sea is called land breeze. **5.** The flask consists of a double-walled bottle made of thin glass with the inner surfaces of the walls silvered. Air is pumped out of the space between the walls to create vacuum. This also reduces heat loss due to convection since there are no air molecules to carry away the heat. Heat loss due to radiation is minimized by making the surface of the jar highly reflective, so that heat radiations are reflected back into the jar. The mouth of the flask is closed with cork or plastic. The glass bottle is placed in a metal or plastic case and is supported on corks at the sides and at the bottom (*Note : For diagram see vacuum flask on page* 38).

**G.** Do it yourself.

**HOTS**

**1.** Heat requires a medium for conduction. The heat is transmitted through solids by conduction while through liquids and gases by convection. Since vacuum does not have any medium, heat cannot be conducted, however the heat can propagate in vacuum through radiation. **2.** The black pot will cool faster because blackened surface is a good radiator than a silver surface. **3.** When a hot liquid is poured into a tumbler, the inner layer of the tumbler gets heated and it expands before the outer layer and an unequal expansion of both layers causes the tumbler to crack. **4.** 1 degree Celsius, for *e.g.*, water boils at 100 °C or 212 °F.

## Chapter 4. Acids, Bases and Salts

**Test Yourself (Page 47)**

**1.** acetic **2.** weak **3.** an acid; weak **4.** bitter; sour **5.** mineral

**Test Yourself (Page 51)**

**1.** Litmus **2.** cream of magnesia **3.** acidic salt **4.** antacid **5.** Indicator

**Exercise**

**A.** **1.** (c) **2.** (b) **3.** (b) **4.** (a) **5.** (b)

**B.** **1.** red, blue **2.** calcium carbonate **3.** litmus paper **4.** Baking soda **5.** soapy

**C.** **1.** F. **2.** T **3.** F **4.** T **5.** F

**D.** **1.** Mineral acids **2.** Indicator **3.** China rose **4.** Sulphuric acid **5.** Methyl orange **6.** Sodium chloride (NaCl)

**E.** **1.** The process in which an acid completely reacts with a base to form salt and water is called neutralization. This reaction cancels the effect of the acid and base.

$$\text{Acid} + \text{Base} \longrightarrow \text{Salt} + \text{Water}$$

The following reaction is an example of neutralisation.

$$\underset{\text{Hydrochloric acid}}{HCl} + \underset{\text{Sodium hydroxide}}{NaOH} \longrightarrow \underset{\text{Common salt}}{NaCl} + \underset{\text{Water}}{H_2O}$$

**2.** Acid-base indicators (also known as pH indicators) are substances which change colour with pH. They are usually weak acids or bases. For example : Litmus paper. **3.** The process in which an acid completely reacts with a base to form salt and water is called neutralisation. This reaction cancels the effect of the acid and base.

$$\text{Acid} + \text{Base} \longrightarrow \text{Salt} + \text{Water}$$

**4.** Yes **5. Acids :** (i) These are sour to taste. (ii) Acids turn blue litmus red. **Bases :** (i) These are bitter to taste. (ii) Bases do not change the colour of blue litmus.

**F.** **1.** Acids make purple-cabbage juice turn pink and bases make the juice turn blue or greenish. In the given materials, citric acid turns cabbage juice pink which shows that it is acidic. Magnesium hydroxide turns cabbage juice to greenish which shows it is basic. And sodium sulphate does not change colour of cabbage as it is neutral. **2.** While weak acids only partially ionise, strong acids do so completely. When dissolved in water, weak acids lose less $H^+$ than strong acids do. Because unpaired atoms are present in strong acids, they have higher conductivity than weak acids, which have lower conductivity. **3.** (a) (i) It is used in the manufacture of fertilizers, drugs, dyes, detergents, paints and explosives. (ii) It is used in the manufacture of synthetic fibres, artificial silk and celluloid. (b) (i) Dilute hydrochloric acid is used in various industries for removing deposits from inside boilers. This process is known as descaling. (ii) Hydrochloric acid is also used for cleaning sinks and sanitary ware. (c) (i) It is used in the manufacture of fertilizers like ammonium nitrate. (ii) It is used for editing designs or names upon metals like copper, brass or bronze. **4.** Soap is a substance used with water for washing and cleaning made of a compound of natural oils or fats with sodium hydroxide on another strong alkali and typically having perfume and colouring added.

**How can we prepare soap?** Fats and oils are composed of triglycerides : three molecules of fatty acids attach to a single molecule of glycerol. The alkaline solution, which is often called lye (although the term 'lyc soap' refers almost exclusively to soap made with sodium hydroxide), brings about a chemical reaction known as saponification. **5.** Our stomach contains hydrochloric acid which helps in digestion. However, excess hydrochloric acid can cause indigestion. The antacid tablet usually contains magnesium hydroxide, also called milk of magnesia. It neutralises the excess hydrochloric acid in the stomach and relieves the discomfort. Quite often baking soda (sodium bicarbonate or sodium hydrogen carbonate) is also taken to have relief from acidity. Baking soda is also basic in nature and it neutralises the excess acid in the stomach.

**6.**

| Salt | Uses |
|---|---|
| Sodium chloride | It is essential for life processes.<br>It is also used in preparing and preserving food. |
| Sodium bicarbonate | It is used in the manufacture of glass.<br>It is used in baking powder. |
| Ammonium chloride | It is used in dry cells.<br>It is used in soldering. |
| Potassium nitrate | It is used in the manufacture of fertilisers and explosives. |
| Sodium nitrate | It is used in the manufacture of fertilisers. |

### HOTS

**1.** No, they are not the same because a weak acid is an acid which is weak in its nature whereas dilute acid means a concentrated acid or a strong acid that has been made weak by adding water to it. **2.** Most of the toothpastes includes sodium fluoride, silica, sodium lauryl, etc. It may neutralise the acid formation in mouth cavity as well as at teeth gaps. So toothpaste is basic in nature. **3.** A strong base is a compound that will completely ionise into metal and hydroxide ions when in solution. Conversely a weak base only partially ionises to metal and hydroxide ions in solution.

## Chapter 5. Physical and Chemical Changes

### Test Yourself (Page 62)

**1.** Physical property **2.** The change is usually temporary. The change can be reversed on withdrawing the agent that caused the change. **3.** Magnesium oxide. **4.** Physical and chemical property **5.** Formation of

curd from milk changes the chemical composition milk and hence it is a chemical change.

**Test Yourself (64)**

**1.** Hydrates Iron (III) oxide **2.** Brown **3.** Presence of air (oxygen) and water. **4.** Applying oil, galvanising and alleging. **5.** Crystallisation.

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

**B.** **1.** physical **2.** physical **3.** copper sulphate **4.** porous **5.** absorption, release

**C.** **1.** T **2.** T **3.** F **4.** F **5.** T

**D.** **1.** Sodium, chloride **2.** Crystallisation **3.** Physical **4.** Freezing **5.** Galvanisation

**E.** **1.** By applying oil or grease, the surface gets a waterproof coating and the moisture and oxygen cannot come into direct contact with the iron article. Hence, rusting is prevented. **2.** Iron articles and utensils when exposed to moist air, get gradually coated with reddish brown coating called rust. **3.** Galvanisation of iron prevents its rusting. Thus, water pipes are galvanised **4.** A physical change in a substance doesn't change what the substance is. In a chemical change where there is a chemical reaction, a new substance is formed and energy is either given off or absorbed. **5.** Crystallisation is the process of obtaining large crystals of pure substance from a saturated solution. This method is used to obtain crystals of pure salt from sea water. Sea water contains large amount of salt dissolved in it.

**F.** **1.** When the iron is exposed to air and moisture, rust formation takes place. Rust is nothing but iron oxide, a new substance formed out of the reaction. The colour of the surface of the iron also changes. Hence, rusting of iron is a chemical change. **2. (i) Coating With Oils and Grease :** Iron and steel instruments and parts of various machines and agricultural tools are kept smeared with oils when not in use. This prevents corrosion. **(ii) Coating With Paints :** Coating railway coaches, bridges, steel furniture, automobiles, etc., with paints prevents corrosion. **(iii) By Galvanisation :** Coating of an iron object with a thin layer of zinc is called galvanisation. Galvanisation of iron prevents its rusting. Galvanised iron sheets are used for roofing and for making buckets, drums, etc. **(iv) By Electroplating Corrosionmetals :** Corrosion of metals can be prevented by electroplating any corrosion-resistant metal such as nickel, chromium, etc., on them. Chromium or nickel coating prevents rusting of auto parts, bathroom fittings (taps showers), etc. **(v) By Alloying :** Certain metals can be made corrosion-resistant when alloyed with other metals. For example, stainless steel which is corrosion-resistant is made by alloying iron with nickel and chromium. **3.** Take a piece of magnesium ribbon. Hold one end of it with a pair of tongs and the other end over the Bunsen or spirit lamp. It starts burning with a dazzling light and produces dense

white fumes. The white fumes on cooling form a white powder called magnesium oxide. From the observations made, the following conclusion is made : Magnesium burns when heated in air to form a new substance called magnesium oxide.

$$\text{Magnesium} + \underset{\text{(From air)}}{\text{Oxygen}} \longrightarrow \underset{\text{(White powdery substance)}}{\text{Magnesium oxide}} + \text{Heta} + \text{Light}$$

From the conclusion, we see that magnesium on burning : (i) Forms a new substance. (ii) The new substance has properties entirely different from those of magnesium. Hence, it is a chemical change. **4.** Take a few cubes of ice in a glass. Place the glass in the Sun so that all the ice melts. Place the glass in the freezing chamber of refrigerator for a few hours. The water freezes to form ice. The state of ice changes from solid to liquid on heating and the state of water changes from liquid to solid on cooling. No new substances are formed. The change is temporary and reversible in nature. Thus, the change of stater of winter is a physical change. **5. (a)** An atom is a particle of matter that uniquely defines a chemical element. An atom consists of a central nucleus that is usually surrounded by one or more electrons. **(b)** Matter is composed of basic units, called molecules. **(c)** An element is a pure substance that is made up of only one kind of element. Besides oxygen, hydrogen, iron, mercury, aluminium, silver and uranium are also elements. **(d)** A mixture consists of two or more pure substances that are mixed together but not chemically bonded. **(e)** Pure substances such as water are known as compounds. Compounds are made up of molecules that contain more than one kind of atom. Compounds are two or more elements chemically bonded.

**6. (i) Combination/Synthesis Reaction :** In a synthesis reaction, two or more simple substances combine to form a more complex substances. These reactions are in the general form: $A + B \longrightarrow AB$ **(ii) Decomposition Reaction :** A decomposition reaction occurs when a more complex substance breaks down into its more simple parts. It is, thus, the opposite of a synthesis reaction, and can be written as : $AB \longrightarrow A + B$ **(iii) Single Replacement Reaction :** In a single replacement reaction, a more reactive element displaces a less reactive element from a compound. This reaction comes in the general form : $A + BC \longrightarrow AC + B$ **(iv) Double Replacement Reaction :** When two compounds react to form two new compounds, a double replacement reaction takes place. Its general form is : $AB + CD \longrightarrow AD + CB$.

**G.**

| Element/ Compound | Symbol | Element/ Compound | Symbol |
|---|---|---|---|
| Sodium | Na | Water | H2O |

| | | | |
|---|---|---|---|
| Magnesium Chloride | $MgCl_2$ | Copper sulphate | $CuSO_4$ |
| Gold | Au | Sodium chloride | NaCl |
| Copper | Cu | Magnesium oxide | MgO |
| Magnesium sulphate | $MgSO_4$ | Potassium | K |
| Sulfuric acid | $H_2SO_4$ | Ferric hydroxide | $Fe(OH)_3$ |

**HOTS**

**1.** No, the chemical reaction does not occur. When a soda bottle is opened, carbon dioxide is released. The carbon dioxide is released. The carbon dioxide is already dissolved inside the soda bottle. On removing the cap, the pressure inside is released and carbon dioxide escapes. **2.** When a candle burns, both physical and chemical changes occur. On heating, candle wax melts and form liquid wax. It is a physical change. When you light the candle, the wax near the wick burns and gives new substances like carbon dioxide, carbon soot, water vapour, heat and light. This is a chemical change. **3.** For rusting, oxygen and moisture is needed and when we paint the iron, the contact of air and moisture is broken. Hence, no rusting will occur.

# Chapter 6. Respiration in Plants and Animals

### Test Yourself (Page 72)

**1.** cellular **2.** surface **3.** spiracles **4.** carbon dioxide **5.** skin.

### Test Yourself (Page 76)

**1.** T **2.** F **3.** F **4.** T **5.** T

### Exercise

**A.** **1.** (a) **2.** (d) **3.** (a) **4.** (a) **5.** (b)

**B.** **1.** respire **2.** expands **3.** ribcage **4.** inhalation **5.** milky

**C.** **1.** F **2.** T **3.** F **4.** T **5.** T

**D.** **1.** Aerobic **2.** Cellular respiration **3.** Cellular respiration **4.** Respiration **5.** Stomata (in leaves) and lenticels (in stems)

**E.** **1.** The tiny holes or openings under the leaves of the plants is called stomata. **2.** Oxidation is the breakdown of food (glucose) into carbon dioxide and water to release energy in the presence of oxygen. **3.** In the lungs, the bronchi branch out into smaller tubes known as bronchioles. **4.** Air holes called spiracles are present in insects like grasshoppers

and cockroaches. Air enters the insect body through the spiracle and is carried through tracheal tubes. **5.** The process of taking oxygen into the cells, using it for producing energy and removing the gaseous waste products (carbon dioxide and water vapour) is termed as respiration. The process of inhaling fresh air and exhaling the used air is called breathing or external respiration.

**F.** **1. Breathing :** (i) It is a process of exchange of gases. (ii) It is a biophysical process. (iii) It occurs at organ level. **Respiration :** (i) It is a process of oxidation of food in the living cells. (ii) It is biochemical process. (iii) It occurs at cellular level. **2.** Like all other living organisms, plants also respire for their survival. They also take in oxygen from the air and give out carbon dioxide. During this process most of the plants use atmospheric oxygen to break down glucose into carbon dioxide and water with the release of energy. All the parts of the plant respire–leaves, stems, roots and even flowers. The parts above the soil get their oxygen directly from the air through tiny openings in the leaves called stomata (Singular: stoma) and also through pores in stems or branches called lenticles. **3.** When we breathe in, the air enters through our nostrils. Hair and the moist inner lining of the nose prevent the dust and germs from entering the respiratory system. The air passing through the nasal passage gets warm and moist and enters the lungs through trachea (windpipe) and bronchi. **4. Aerobic Respiration :** (i) It takes place in the presence of oxygen. (ii) Glucose is completely oxidized to release carbon dioxide, water and energy. (iii) It releases more energy. (iv) It occurs both in the cytoplasm and mitochondria of the living cells. (v) Last product formed is water. **Anaerobic Respiration :** (i) It takes place in the absence of oxygen. (ii) Glucose is incompletely oxidized to release ethyl alcohol, carbon dioxide and energy. (iii) It releases less energy. (iv) It occurs only in the cytoplasm of the living cells. (v) Water is not formed. **5.** Different animals respire through different parts of their body. In unicellular animals, oxygen is directly absorbed from the water or air and carbon dioxide is released by diffusion. The process of respiration in some animals is as follows : In animals such as earthworms and leeches, exchange of gases takes place through moist and slimy surface of the skin. In amphibians such as frogs, newts and salamanders, the exchange of gases takes place through the skin (when in water), in addition to the lungs (when on land). **Aquatic animals** such as fish use gills to breathe. As water flows over the gills, the exchange of gases occurs through the large number of capillaries present in the gills. Air holes called **spiracles** are present in **insects** like grasshoppers and cockroaches. Air enters the insect body through the spiracle and is carried through tracheal tubes. Most mammals such as cats, dogs, monkeys, horses, human beings, etc., breathe with the help of special sac-like, spongy organs called **lungs**.

### HOTS

**1.** Plants take in carbon dioxide and give out oxygen directly though pores in their leaves and other thunder parts, so they don't need lungs or respiratory system. **2.** As high increases the atmospheric pressure decreases. Therefore, when we move up the oxygen available for breathing becomes less and so the mountaineers feel difficulty in breathing and need to carry oxygen cylinder to ensure sufficient oxygen supply.

## Chatper 7. Movement of Substances in Plants and Animals

### Test Yourself (Page 86)

**1.** capillaries **2.** left auricle; left ventricle **3.** heart **4.** xylem **5.** translocation.

### Test Yourself (Page 90)

**1.** excretion **2.** kidneys; bladder; urethra **3.** root hairs **4.** xylem; phloem **5.** transpiration.

### Exercise

**A.** **1.** (d) **2.** (b) **3.** (a) **4.** (d) **5.** (a)

**B.** **1.** haemoglobin **2.** hot **3.** Phloem **4.** oxygenated, deoxygenated **5.** nephrons

**C.** **1.** T **2.** F **3.** T **4.** T **5.** T

**D.** **1.** RBCs **2.** Transpiration **3.** Systole **4.** Connective **5.** Haemoglobin

**E.** **1.** Transpiration is the process by which a plant gives off water vapour through its leaves. **2.** The transport of food from the leaves to other parts of the plant is called translocation. **3.** Heart pumps blood to all parts of the body. It is able to do so by the rhythmic contractions and relaxations of its muscles. These are known as the heartbeats. A normal heart beats about 60 to 100 times a minute. Each time, the heart pumps the blood out, it rushes the arteries and produces a twitching movement or throbbing called **pulse**. Each heartbeat causes a pulse in the artery. The pulse can be felt at various places on the body viz. inner wrist, neck, temple. The number of pulse-beats per minute is called **pulse rate**. **4.** The main organs of the human excretory system are : (i) Kidneys (two) (ii) Ureters (two) (iii) Urinary bladder (one) (iv) Urethra (one) **5.** Diffusion is the movement of particles from a region of high concentration to a region of low concentration until they are evenly spread out.

**F.** **1.** Arteries are blood vessels that carry oxygenated blood away from the heart to all the other parts of the body. Their walls are thick and elastic as the blood is pumped out of the heart under high pressure. The passage is narrow as the walls are thick. The veins have thin walls. Veins have tiny one-way valves which allow blood to flow only towards the

heart. Veins are situated just under the skin. These can be easily seen as greenish-blue tubes on your hands and legs. **Importance of capillaries in the circulary system :** Capillaries carry blood away from the body and exchange nutrients, waste and oxygen with tissues at the cellular level. **2.** Take a small sized well watered potted plant. Cover the plant with a transparent polythene bag. Tie the bag at the base of the stem. Leave the plant in sunlight for a few hours and then observe. Drops of water on the inside of the bag. Water vapour transpired by the plant condenses as water droplets. (*Note : For diagram, refer to page* 86) **3.** Heart is a fist sized small muscular organ which is conical in shape and is situated in the chest to a little left from the centre. Heart keeps on beating throughout the lifetime of an individual. It is the centre of the circulatory system which facilitates circulation of blood in the body. The human heart has four chambers : (i) Right and left auricles (or atria) and (ii) Right and left ventricles. The right auricle receives deoxygenated blood from the rest of the body except the lungs. The right ventricle pumps this blood to the lungs. The left auricle receives oxygenated blood from the lungs. The left ventricle pumps this blood to the rest of the body. Thus, blood moves from the right side of the heart to the left side, by passing through the lungs. (*Note : For diagram see 'heart', diagram on book page* 83) **4.** Plants need water for making food by photosynthesis, they need mineral salts for healthy growth. Both water and minerals are absorbed from the soil by the roots of the plant and transported to various parts of the plant, like stems, leaves and flowers. The water and minerals, dissolved in it move from the roots of the plant to its leaves, through the xylem vessels and tracheids. (Both are conducting tissues). **5.** (i) It carries life-giving oxygen to all the body parts. (ii) It collects carbon dioxide for removal from the lungs. (iii) Blood is the vehicle for metabolic communication between the organs of the body.(iv) It helps in maintaining a constant body temperature. (v) It protects the body against invading germs. (vi) It transports waste materials to the excretory organs for excretion.

## HOTS

**1.** The colour of blood is red because of haemoglobin present in blood cells. Haemoglobin attracts iron molecules and when oxygen is added to the blood cells, the iron and the oxygen react and the reaction gives out red light that is seen by our eyes. **2.** Blood is usually drawn from large vein of arm and is collected in a plastic bag. The plastic bag contain sodium citrate, phosphate, dextrose and adenine. The combination of these chemicals help to preserve blood and prevent its clotting. The sodium citrate acts as a anticoagulant and prevent clotting of blood. **3.** It usually indicates an increased production of white blood cells to fight an infection. **4.** In winter season, the environmental temperature will be less. So there won't be any sweating or water loss. Moreover to

keep the temperature of the body constant, the blood capillaries in our skin get constricted which raises the blood pressure. In order to maintain the blood pressure excess waters along with the wastes is excreted in the form of urine.

## Chapter 8. Reproduction in Plants

**Test Yourself (Page 99)**

**1.** yeast **2.** amoeba **3.** fern **4.** mango **5.** bryophyllum **6.** potato

**Test Yourself (Page 102)**

**(i)** Animals **(ii)** Explosion **(iii)** Lotus **(iv)** Wind **(v)** Animals **(vi)** Water

**Exercise**

**A.** **1.** (c) **2.** (b) **3.** (a) **4.** (a) **5.** (b)

**B.** **1.** reproduction **2.** replication **3.** budding **4.** anther, stigma **5.** fragmentation

**C.** **1.** T **2.** T **3.** T **4.** T **5.** F

**D.** **1.** Sexual reproduction **2.** Stamen **3.** Vegetative propagation **4.** Pollination **5.** Grafting

**E.** **1.** The ability of living organisms to produce new living beings similar to themselves is called reproduction. It is one of the most important characteristics of the living organism. Reproduction helps : (i) In the continuity of life (ii) In survival and increasing the population of any species. **2.** When a seed has matured, it germinates when amount of air, water, and temperature are available. **3. Self-pollination :** (i) The pollination takes place within a single flower. (ii) There is less variation. **Cross-pollination :** (i) The poller grains move from one flower to another flower. (ii) There is much more variation. **4.** The process by which the embryo in the seed grows into a new plant is called germination. **5.** The process of growing full organisms from body parts or growing a lost part is called regeneration. Regeneration is more common in reproduction of animals–earthworms, lizards, fish.

**F.** **1.** Pollination is the process by which pollen grains from the anther of a flower are transferred to the stigma of the same flower or another flower. After pollination, the stigma secrets nutrients for the pollen grains. The pollen grains absorb these nutrients to form a thin tube called pollen tube. This grows into stigma and down the style. It contains two male gametes. It grows until it reaches the ovule and enters it. It then releases the male gametes, one of which fuses with egg to form **zygote**. The fusion of male gamete with female egg is called **fertilization**. **2.** It is the modern method of vegetative propagation. In this method, a piece of tissue is cut from the plant and kept in a nutrient medium under controlled conditions. This tissue grows into a mass of cells called callus. The

callus in then transferred to another nutrient medium containing plant hormones. Here it multiplies and differentiates into small plantlets. These plantlets are now grown in soil pols for further growth. **3.** Microscopic organisms, such as yeasts, reproduce asexually by budding. In this type of reproduction, a small out-growth appears on the body of the organism. This out growth is called bud. This bud keeps on increasing in size and separates from the parent to form an independent organism. Sometimes, it never separates and a chain or colony of interconnected organisms is formed. **4.** The fusion of male gamete with female egg is called fertilization. **Fruits and Seeds Formation :** After fertilization the ovary grows into a fruit. The ovules develop into seeds. Each seed contains an embryo. The embryo is made up of redicle, plumule and cotyledons. The stigma, style, stamens, petals and sepals dry and fall off. With time, the seed hardens and dries. This enables it to survive in adverse conditions. The ovary wall may become fleshy and succulent as in plums or tomatoes or becomes a pod as in poppy. The whole ovary after fertilization grows to form a fruit. Actually a fruit is a biologically ripened ovary. **5. (i) Dispersal by Wind :** Seeds that are usually small and light are dispersed by wind. Seeds of dandelion, maple, cotton, etc., are dispersed by wind. There winglike structures help them in flying with the wind. **(ii) Dispersal by Water :** Seeds and fruits that can float are dispersed by water. Seeds/Fruits of coconut, lily, lotus, etc., are dispersed in this way. Coconut tree grows near sea shore. The coconut, which is the seed of the coconut palm, floats in water and is carried away from one place to another by water currents. **(iii) Dispersal by Animals and Humans :** Men and animals eat several types of fruits like mango, apple, papaya, etc., and disperse their seeds. Birds also play a vital role in seeds dispersal. These seeds on getting right conditions for growth germinate into new plants. **(iv) Dispersal by Bursts :** Fruits of plants such as pea, balsam, touch - me - not, etc., open or explode when they are ripe or dry. The seeds get thrown off up to a distance of 15 metres and are scattered away from the parent plant.

### HOTS

**1.** Yes, because insects can carry only light weight seeds which can be carried away by wind as well as wind can't carry heavy weight seeds. **2.** Cross pollination is better than self pollination for the following reasons : (i) Cross pollination produces variety in species by recombination of genes. (ii) Genetic recombination in cross pollination produces healthier progenies generation to generation. **3.** Spores are unicellular while seeds contain within them a multicellular gametophyte that produces a developing embryo.

## Chapter 9. Time and Motion

## Test Yourself (109)

**1.** millennium **2.** Time period **3.** second **4.** oscillation **5.** 10

## Exercise

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

**B.** **1.** odometer **2.** rest **3.** Speed **4.** 10, 100 **5.** Periodic

**C.** **1.** F **2.** F **3.** T **4.** T **5.** F

**D.** **1.** Curvilinear motion **2.** Stopwatch **3.** Speed = Distance/Time **4.** length of pendulum **5.** m/s

**E.** **1.** 12 km/h into m/s

1 km/h = 1 kilometer / 1 hour = 1 × 1000 m / 1 × 60× 60 s

= 1000 / 3600 = 5/18 m/s

$$\Rightarrow \overset{2}{\cancel{12}} \times \frac{5}{\underset{3}{\cancel{18}}} = \frac{10}{3} = 3.3 \text{ m/s}$$

**2.** 2 km/min into m/s

2 km/min = 2 km/1 min = 2 × 1000/1 × 60 s

$\Rightarrow 2000/60 \Rightarrow 33.33$ m/s

**3.** 16 m/s into km/h

16 m/s = 16 m/1 sec

$$= 16 \times \left[ \left( \frac{1}{1000} \right) \text{km} / \left( \frac{1}{60 \times 60} \right) \text{h} \right]$$

$$= 16 \times \left( \frac{60 \times 60}{1000} \right) = 16 \times \frac{\overset{18}{\cancel{3600}}}{\underset{5}{\cancel{1000}}} = 16 \times \frac{18}{5} \text{ km/h}$$

$$= \frac{288}{5} = 57.6 \text{ km/h}$$

**4.** 50 m/s to m/min

50 m/s = 50 m/1 sec

= 50 m / (1/60) min

= 50/(1/60) = 50 × 60 = 3000 m/min

**F.** **1.** Measurement is a technique in which the properties of an object are determined by comparing them to a standard quantity. **2.** A standard unit is a globally accepted unit of measurement. It accurate everywhere in the world. **3.** When the bob of the pendulum is displaced slightly to one side from its mean position, it begins to move to and fro motions. It oscillates about its mean position. The to and fro motion of the simple pendulum is an example of a periodic or an oscillatory motion. When the

bob moves from one position and comes back to the same position, it is said to have completed one oscillation and the time taken to complete one oscillation is called the time period of the pendulum.

**4.** Distance = 450 km; Time = 8 hours; Speed = ?

Speed = Distance / Time

= 450 / 8 = **56.**25 km/h

**5.**

**G.** **1.** An object is said to be in motion when it changes its position with respect to its time and surroundings.

**2.** A car moves with a speed of 40 km/h for 15 min

$$\text{Distance} = \text{Speed} \times \text{Time} = \overset{10}{\cancel{40}} \times \frac{15}{\cancel{60}_{\cancel{4}}} = 10 \text{ km}$$

and then

$$\text{With a speed of 60 km/h for the next 15 min} = \overset{15}{\cancel{60}} \times \frac{15}{\cancel{60}_{\cancel{4}}} = 15 \text{ km}$$

Total distance = 10 + 15 = 25 km

Therefore the car travelled 25 km in 30 min.

**3. (a)** If an object covers equal distance in equal intervals of time, its motion is called uniform motion. **(b)** A body is said to have non-uniform motion when it travels unequal distances in equal intervals of time. In other words, when a body moves with changing speed in a straight line, its motion is said to be non-uniform motion. **4.** Speed could be different at different points on the journey. Average speed is distance travelled / time taken. **5.** Do it yourself.

**HOTS**

**1.** It will have uniform speed. **2.** Any phenomenon that repeats itself regularly can serve as a measure of time. In pendulum, one second was defined as the time taken by a simple pendulum of length one metre in going from one extreme position to other extreme position. So pendulum was considered as a time-keeping device.

# Chapter 10. Electric Current and Its Effects

**Test Yourself (Page 122)**

**1.** Electric circuit **2.** Switch **3.** Fuse **4.** Filament **5.** Closed Circuit

## Test Yourself (Page 123)

**1.** magnet **2.** magnetic **3.** iron piece **4.** iron **5.** iron strip.

## Exercise

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

**B.** **1.** open **2.** melting point **3.** cells **4.** diagram **5.** electromagnet

**C.** **1.** F **2.** T **3.** F **4.** F **5.** F

**D.** **1.** Electric bulb **2.** Circuit **3.** Electric bell **4.** Fuse **5.** Heating effect of electric current.

**E.** **1.** An electric circuit is a closed path in which the electric current flows. A circuit is usually made by linking electrical components together with piece of wire. **2.** A coil wound around an iron core that acts as a magnet as long as an electric current flows through the coil, is known as an electromagnet. **3.** The heat produced depends on : (i) The current (number of cells) (ii) The material of the wire (iii) The time for which the current is passed **4.** The fuse is a safety device used in an electrical circuit to prevent a large amount of current flowing through a circuit. It consists of an alloy of low melting point fitted into a carrier made of porcelain or glass. **5.** A circuit diagram is a simplified schematic representation of the components of an electrical circuit. A good circuit diagram shows the relative positive of each of these components, how they are interconnected and other operational parameters of the circuit. **Its Significance :** A circuit diagram provides electrical engineers with an idea of how a circuit layout should look when it completed and it also aids in planning repairs.

**F.** **1.** When electric current flows through a resistor, such as a heating coil of nichrome wire, it gets heated up. The generation (production) of heat in a resistor (or conductor) when electricity passes through it is called heating effect of current. When electricity is passed through a conductor, a part of it converted into heat energy. The heat produced depends on : (i) The current (number of cells) (ii) The material of the wire (iii) The time for which the current is passed **2. Step 1 :** When the switch is pressed, the circuit is complete and a current flows through the electromagnet. **Step 2 :** The electromagnet attracts the armature towards itself. The hammer attached to it strikes the gong and produces a ringing sound. At the same time the circuit at the point X gets broken, the current stops flowing and the electromagnet loses its magnetism. **Step 3 :** The spring pulls the armature back such that contact is established again and the circuit gets completed. This keeps repeating, with the hammer striking the gong repeatidly, thereby producing a ringing sound as long as the switch gets pressed. (*Note : For diagram see page* 123) **3.** (i) It is used to make electric motors that are used in several appliances such as fans, refrigerators, air conditioners, electric bells, and telephones. (ii) It is used to separate iron

and steel from other materials in a metal scrap-yard. (iii) It is used in magnetic cranes for lifting and carrying heavy steel and cast iron articles in factories. (iv) Electromagnets are used on cranes in steel works and scrap-yards for lifting heavy loads. **4.** An electric circuit is a closed path in which the electric current flows. A circuit is usually made by linking electrical components together with piece of wire. The components such as cells, bulbs, wires, switches, etc., are called elements of an electrical circuit. Each element of an electrical circuit can be described by its symbol. **5.** Do it yourself.

### HOTS

**1.** No, it depends on the voltage. **2.** A fuse is a thin wire made of a material which have low melting point so that it melts and breaks off the circuit if the current exceeds the safety limit. A copper wire cannot be used as a fuse. It has a high melting point. It will not melt easily when a high electric current passes through it and it may damage the electrical appliances.

## Chapter 11. Light

### Test Yourself (Page 131)

**1.** erect **2.** inverted; erect **3.** reflection **4.** irregular **5.** away from

### Test Yourself (Page 135)

**1.** virtual **2.** thicker **3.** white; seven **4.** spectrum **5.** diverges

### Exercise

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

**B.** **1.** converges **2.** can **3.** virtual **4.** Virtual, real **5.** Light

**C.** **1.** T **2.** F **3.** T **4.** T **5.** F

**D.** **1.** Plane **2.** Convex **3.** Dispersion **4.** Converging rays **5.** Virtual

**E.** **1.** (a) The distance from the pole to the principal focus of a concave mirror is known as focal length of a concave mirror. (b) The distance between the center of a convex lens and the focal point of the lens where parallel rays of light meet is called the focal length of the convex lens. **2.** The white light is composed of many colours. When these colours combine, they look white. Allow a narrow beam of white light e.g., sunlight to fall on one face of a glass prism. Place a white sheet of paper on the other side of the prism. A band of seven colours is seen on the paper. The seven colours seen on the paper are Violet, Indigo, Blue, Green, Yellow, Orange and Red (VIBGYOR). This band of seven colours is known as the spectrum of white light. **3.** The image which can be obtained on a screen is called a real image. **4.** Lateral inversion means the apparent reversal of the mirror image's left and right when compared with the object. **5.** (i) Concave mirrors are used as reflectors in the headlights of cars,

searchlights, and torchlights etc. (ii) Concave mirrors are used by dentists (as the dentist's mirror) to focus light on the tooth to be examined.

**F.** **1.** (i) In a convex mirror, its outer surface is polished and in the case of a concave mirror, its inner surface is polished. (ii) In a concave mirror the image formed can be either real and inverted or virtual and erect but in a convex mirror always the image formed in virtual and erect. (iii) The magnification of a concave mirror can be either greater, equal or less than 1 but in a convex mirror the magnification is always less than 1. **2.** (i) Doctors use (concave mirrors) for examination of ear, nose, throat and eyes. (ii) These mirrors (concave) are used in search light to throw an intense beam of light to a large distance. (iii) Some people use a (concave) mirror for shaving. **3.** Light rays from a point source of light travel in all directions moving away with time. Such a beam of light is called a divergent beam of light. (i) The light rays which come out of the headlight of vehicles. (ii) Rays that are coming out of a common electric bulb. **4.** (i) It is upright or erect. (ii) Image is virtual. (iii) It is laterally inverted. (iv) It is at same distance from mirror as the real object. (v) It is of same size as the object. **5.** Newton's Disc is a coloured disc which is painted with the colours of white light [i.e., Violet, Indigo, Blue, Green, Yellow, Orange and Red (VIBGYOR)] in the correct proportions so that when it is rotated very fast, the disc appears white. The coloured disc appears white because of a property of our eyes called persistence of vision.

**G.**

| Object Position | Image Position | Nature of the Image |
|---|---|---|
| Between the lens and the focus | On the same side of the lens as the object | Upright, enlarged and virtual |
| At F | At infinity (the image formed cannot be seen) | Inverted, highly enlarged and real |
| Between F and 2F | Beyond 2 F | Inverted, same size as the object, and real |
| At 2F | At 2F | Inverted, magnified and real |
| Beyond 2F | Beyond F and 2 F | Inverted, smaller in size and real |
| At infinity | At F | Inverted, real and small in size |

## HOTS

**1.** If the size of the small mirror is less than the size of the object then the complete image of the object will not form whereas big mirror will form the complete image of the object. **2.** The mirror used in automobiles is a convex mirror. As the image size is smaller than the object size, it appears

that the object is located farther behind. So this can cause the motorists to think that the car following them is located at a larger distance than it actually is. **3.** A convex lens can be used to start a fire by directing the sun's rays to a point so it should only be used on, bright, sunny days. **4.** The basic curvature (shape) of the mirror determines the shapes of the image formed. So, we should see differently shaped images depending upon how the mirror is curved.

## Chapter 12. Forest : Our Lifeline

### Test Yourself (Page 144)

**1.** Flase **2.** false **3.** False **4.** True **5.** False

### Exercise

**A.** **1.** (c) **2.** (c) **3.** (c) **4.** (c) **5.** (a)

**B.** **1.** nutrients **2.** soil erosion **3.** transpiration **4.** secondary **5.** web

**C.** **1.** T **2.** T **3.** T **4.** F **5.** F

**D.** **1.** Canopy **2.** Humus **3.** Food chain **4.** Forest floor **5.** Saprotrophs

**E.** **1.** The sequence of living organisms in which one organism eats another is called a food chain. Thus, a food chain shows what organisms eat. It shows the interdependence of organisms on each other. All food chains begin with food producers–the plants. For example, grass is eaten by grasshopper (insect), insects are eaten by frog, frog is eaten by snake and snake is eaten by eagle. **2.** Interconnected food chains depicting the complex representation of energy flow in nature is called food web. **3.** Forests prevent soil erosion because roots of plants bind the soil and prevent it from being removed by water or wind. **4.** The branches of the stem act like an umbrella that we use during summer to protect us from the heat of the Sun. In the same way branches of the tall trees look like a roof over the other plants in the forest. This is called a canopy. **5.** Due to cutting of forests rainfall will decrease, global warming will increased, wildlife will be disturbed, droughts and floods occur. The roots of the trees that bind the soil together loosen it. As a result soil erosion occurs.

**F.** **1.** (i) Plants utilise cabon dioxide during the photosynthesis. The carbon dioxide is reduced to glucose and oxygen is released by the photolysis of water as by product. (ii) All organisms including plants utilise oxygen during the process of respiration for the oxidation of glucose and carbon dioxide is released. By these processes plants help to regulate the gases in the Earth's atmosphere. **2.** The following steps should be taken to conserve forests : (i) Massive afforestation work should be undertaken to cover large areas of land with useful plants. It should be done in areas unfit for agriculture, for example, along highways and rivers, around playgrounds and parks. (ii) Air, water and soil pollution should be reduced

so that trees and other vegetation can survive and develop in a forest. (iii) Existing laws to protect national parks, wildlife sanctuaries and biosphere reserves should be properly implemented. Guidelines of international organizations like WWF and UNESCO for forest conservation should be followed. (iv) Illegal logging has led to the decrease of a lot of trees over the year. The Indian government has laid down rules to prevent illegal logging by making it punishable under law. **3.** After plants and animals die, organisms called decomposers use the dead organic matter as a food source. They breakdown dead plants and animals into simpler substances. In the process, they return important materials to the soil and water. Bacteria and mushrooms are examples of decomposers. **4. Dependence of plants on animals :** (i) Animals provide nutrients for plants. Animal excreta and dead bodies add nutrients to the soil, which can be used by the plants. (ii) Plants need carbon dioxide for making their food by photosynthesis. Animals release carbon dioxide into the atmosphere during respiration. **Dependence of animals on plants :** (i) All animals depend for their food directly or indirectly on green plants. Herbivores feed on plant material directly while carnivores feed on the herbivores. (ii) All living organisms need oxygen for respiration. Plants release oxygen into the atmosphere during photosynthesis. **5.** There are many reasons of deforestation. Some of them are : (i) to create ingredients that are highly prized consumer items, such as the oil from palm tress. (ii) to make more land available for housing and urbanization. (iii) to harvest timber to create commercial items such as paper, furniture and homes. (iv) to create room for cattle ranching.

### HOTS

**1.** Because all the waste produced in the forest is biodegradable like dead plants and animals and droppings of animals and birds, so they are decomposed by microorganisms and mixed with soil. **2.** No, we should not cut our forest because deforestation leads to ecosystem collapse. Also they produce oxygen, prevent soil erosion, they absorb carbon emissions and actually help slow climate change. They provide shade and habitat to animals. **3.** While rainforests may seem like a distant concern, these ecosystems are critically important for our well-being. Rainforests are often called the lungs of the planet for their role in absorbing carbon dioxide, a greenhouse gas, and producing oxygen, upon which all animals depend for survival.

## Chapter 13. Our Natural Resources

### Test Yourself (Page 151)

**1.** Water is our basic need. We cannot live for long without water. **2.** Pure water has the following properties : • It should be colourless, tasteless and

odourless. • It should not contain harmful microorganisms. • It should be free from impurities. • It should not contain any undesirable salts such as cyanides, nitrates, etc. **3.** The black-brown oily and lathery water that goes down the drains from wash basins, showers, toilets, laundries/ washing machines, etc. is called **wastewater**. **4.** Sewage is a liquid waste. Sewage contains wastewater from homes, industries, hospitals, run–off (rainwater) and suspended impurities. **5.** The impurities or pollutants present in sewage are Bacteria, human faeces, animal waste, oil, urea pesticides, herbicides, fruit/vegetable waste, Nitrates and phosphates of metals and Other microorganisms.

## Test Yourself (Page 153)

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

## Exercise

**A.** **1.** (b) **2.** (a) **3.** (a) **4.** (d) **5.** (d)

**B.** **1.** chemical **2.** oil, solid particles **3.** wastewater **4.** aerobic **5.** substances

**C.** **1.** F **2.** T **3.** T **4.** T **5.** F

**D.** **1.** Pollutants **2.** Dysentery **3.** Water Treatment **4.** Sludge **5.** Industrial Waste

**E.** **1.** The black-brown oily and lathery water that goes down the drains from wash basins, showers, toilets, laundries/washing machines, etc., is called wastewater. **2.** There are very small microbes which are microscopic that are present in water. Even if the water seems to be clean, there remains some bacteria and microbes which are already present in water. So before drinking water there should be some process to make the water clean otherwise a person may fall ill and have various diseases like Jaundice. **3.** The impurities or pollutants present in sewage are listed below :

| | | |
|---|---|---|
| 1. | Bacteria | Causing typhoid, cholera |
| 2. | Organic impurities Human faeces, animal waste, oil, urea pesticides, herbicides, fruit/ vegetable waste | Causing water pollution |
| 3. | Inorganic waste Nitrates and phosphates of metals | Causing water pollution |
| 4. | Other microorganisms | Causing dysentery, etc. |

**4.** The major aim of wastewater treatment is to remove as much of the suspended solids as possible before the remaining water called effluent, is discharged back to the environment. As solid material decays, it uses up oxygen, which is needed by the plants and animals living in the water. **5.** There are several basic rules for sanitation in public places. Some of them are : (i) there should be sufficient toilet facilities for the maximum

number of people using the area during the day. (ii) there must be a hand washing basin with clean water and soap close to the toilet facilities. (iii) refuse must be disposed of properly and not allowed to build up, as it will attract flies and vermin.

**F.** **1.** Sewage is a liquid waste. Sewage contains wastewater from homes, industries, hospitals, run(rainwater) and suspended impurities. The impurities present in sewage are termed as pollutants or contaminants. If the sewage is discharged into lakes, rivers or sea without treatment, it will pollute the water and result in major health hazards. Therefore, sewage should be treated before it is discharged. It is important to treat water not only to recycle water but also to protect our health and the environment.
**2.** There are three processes which are involved in treating wastewater before it is discharged into the water reservoirs. These processes are : (i) Primary treatment (ii) Secondary treatment (iii) Tertiary treatment.
**Primary Treatment :** This is a mechanical process which involves screening and settling of large particles. The wastewater (or sewage) is passed through bar screens. Here, large objects such as, rags, cans, plastic bags, napkins and sticks are removed. After this, the sewage flows through a long channel called the grit chamber. Here the sand and the grit settle down and are removed from time to time. The sand and grit are used as landfills. The liquid material is then passed through huge sedimentation tanks. The solid wastes such as faeces settle down at the bottom of the tank and are removed with the help of a scraper. This is sludge. **Secondary Treatment :** This is a biological process in which the organic matter in the sludge is broken down with the help of bacteria. The water flows into an aeration tank where large air blowers bubble air through the water. This helps aerobic bacteria to grow and consume organic contaminants such as faeces and the food waste still left in the water. **Tertiary Treatment :** This is a chemical process. The treated water now undergoes chemical treatment. The water is disinfected with chemicals like chlorine or may be exposed to ultraviolet rays to kill disease-causing organisms. It can also be treated with ozone gas.
**3. Sources of Wastewater :** (i) At home, water is used to wash clothes, clean utensils, bathe and flush toilets. The resultant dirty water contains urine, faeces, food wastes, soaps, detergents and other household wastes. It also contains harmful microorganisms such as germs that could cause cholera, typhoid and dysentery. (ii) The wastewater generated from farms and agricultural fields contains harmful pesticides, weedicides and animal wastes. (iii) Wastewater generated from paint and dye industries contains harmful chemicals such as lead, chromium, etc. Such discharge is also called industrial effluents. (iv) Hospitals also generate wastewater that contains harmful microorganisms which can cause diseases. Sometimes even radioactive materials are present in the wastewater. (v)

Large amount of wastewater is generated from construction of buildings. (vi) Wastewater is also generated as a result of mining operations. (vii) The leakage of petroleum oil into the sea during drilling and shipping pollutes sea water. **4.** Railway stations, bus stands, airports, hospitals, main markets and country fairs are generally very crowded places. A large amount of garbage/waste is generated at such places. If this waste is not disposed of properly, it can give rise to an epidemic. When the responsibility for the provision of sanitation facilities in public places is with the Government, each one of us must contribute to maintaining the facilities. Some basic facilities needed are sufficient toilets, wash basins to wash hands, soap to disinfect hands and proper bins for the disposal of refuse. **5.** Poor sanitation, inadequate sewage disposal and contaminated drinking water are the main causes of a large number of human diseases in India. Generally, cities have a proper drainage system. Networks of pipes that carry sewage are laid below the ground which is connected to the municipal sewer systems. Through them, the sewage reaches the sewage treatment plant. A large part of population in our country defecates in open- on dry riverbeds, fields, near railway tracks, etc. When it rains, such excreta gets washed down to the rivers, ponds and pollutes the water theirin. When polluted water seeps into the ground, it contaminates the groundwater. People consuming contaminated water may suffer from diseases like gastroenteritis, dysentery, typhoid, cholera, meningitis and hepatitis. epidemic. When the responsibility for the provision of sanitation facilities in public places is with the Government, each one of us must contribute to maintaining the facilities. Some basic facilities needed are sufficient toilets, wash basins to wash hands, soap to disinfect hands and proper bins for the disposal of refuse. 5. Poor sanitation, inadequate sewage disposal and contaminated drinking water are the main causes of a large number of human diseases in India. Generally, cities have a proper drainage system. Networks of pipes that carry sewage are laid below the ground which is connected to the municipal sewer systems. Through them, the sewage reaches the sewage treatment plant. A large part of population in our country defecates in open- on dry riverbeds, fields, near railway tracks, etc. When it rains, such excreta gets washed down to the rivers, ponds and pollutes the water theirin. When polluted water seeps into the ground, it contaminates the groundwater. People consuming contaminated water may suffer from diseases like gastroenteritis, dysentery, typhoid, cholera, meningitis and hepatitis.

## HOTS

**1.** During flood, the heavy water runoff is termed as storm water. Therefore, it is clear that the flow of storm water is much heavier than the sewage water. Thus the pipeline of storm water should be always bigger and wider than to sewage disposal pipe to control the heavy flow

of water during flood. Otherwise narrower pipes may break dew to the pressure of storm water. **2.** Because rainwater go directly to a creek or river with no processing. Sewage has to be treated before going there. Another reason is not to overload the waste treatment plants as required by federal mandates with the clean water safety act.