

Chapter 1.

Components of Food

Test yourself (Page 10)

1. (a) Rice; Potato (b) Butter; Meat (c) Eggs; Oats (d) Fruits; Vegetables (e) Meat; Fish 2. Vitamins are essential for the proper functioning of our body. They help in keeping our eyes, bones, teeth and gums healthy. They also help enzymes to do their work. 3. Dil. iodine solution.

Test yourself (Page 14)

1. A diet which contains all the nutrients in. 2. (i) (c) (ii) (b) (iii) (e) (iv) (b) (v) (d) 3. The deficiency of proteins, carbohydrates and fats is known as **Protein Energy Malnutrition (PEM)**. It leads to **marasmus**. 4. If we eat excess quantity of food, the excess food is stored under the skin in the form of fat. The total mass of the body increases and the person is said to suffer from **obesity**. Obesity means being too fat.

Exercise

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

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

B. 1. goitre 2. Proteins 3. proteins, carbohydrates, fats 4. dehydration 5. sugar, starch.

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

E. 1. Haemorrhage 2. Rickets 3. Paralysis 4. Energy giving food, body building food, protective food 5. Skin disorders

F. 1. The portion of our food that does not provide any nutrient to our body but helps in maintaining a healthy digestive system is called roughage or dietary fibre. Roughage comes in many different forms. Fruits and vegetables are one common source of roughage. Whole grains are also common examples of roughage, with wheat products such as bread and porridge. 2. Anaemia is a condition that develops when your blood lacks enough healthy red blood cells. It is caused due to lack of vitamin B12 in the diet. 3. When the total mass of the body increases then the person is said to suffer from obesity. Obesity means being too fat. 4. The ratio of proteins, fats and carbohydrates in the diet should roughly be 1:1:4. People who do not get enough nutrients to eat suffer from malnutrition. 5. Minerals are very important for the following reasons : (i) Some minerals are important for growth and repair of tissues of the body. (ii) Some minerals control chemical reactions that occur in the body. (iii) Some of them give the blood its correct composition. (iv) Some are essential for the proper formation of bones and teeth.

G. 1. Water is extremely essential for all living beings. Infact 60-70% of our body weight is water. Body fluids, saliva, blood all have water. Functions of Water : (i) It helps in digestion of food and transfer of nutrients from one place to another. (ii) It helps in removing waste materials from the body, for example : urine and sweat. (iii) It helps in cellular functions, blood circulation, etc. (iv) It forms the body fluids, for example : saliva, blood, etc. (v) It regulates the body temperature. 2. *Vitamin : A, Deficiency disease : Night blindness; Vitamin : B1, Deficiency disease : Beriberi; Vitamin : B2, Deficiency disease : Skin disorders; Vitamin : B12, Deficiency disease : Anaemia; Mineral : Calcium, Deficiency disease : Osteoporosis in adults, rickets in children; Mineral : Phosphorus, Deficiency disease : Rickets in children; Mineral : Iron, Deficiency disease : Anaemia; Mineral : Iodine, Deficiency disease : Goitre.* 3. *Energy giving food : Provide energy to body, high energy sources, give taste and flavour, energy reserve and protection to delicate organs. Body building food : Structural components and body building materials for growth, digestion, protection, etc. Essential food or protective food : Essential for body reactions, functions, growth and health, nutritional balance and general maintenance, oxidation of glucose, water retention in body avoids constipation.* 4. Carbohydrates are the main sources of energy in the food. Lack of carbohydrates in diet results in lack of energy and stamina. Overeating of carbohydrates may result in obesity and malfunctioning of breathing system. Growing children need more proteins in their diet. Lack of proteins in the diet causes improper growth, short height and poor muscle development in children. Deficiency of proteins leads to a disease called kwashiorkor. 5. The diet, which contains all the components of food required by the body in adequate quantity, is called a balanced diet. A balanced diet is important because your organs and tissues need proper nutrition to work effectively. Without good nutrition, your body is more prone to disease, infection, fatigue and poor performance. If we do not take a balance diet, deficiency of any one nutrient may lead to abnormal developments in the body.

H.

Vitamins/ Mineral	Sources	Functions	Deficiency Disease	Symptoms
Vitamin A	Green leafy vegetables, fruits	Healthy eyes, hair and skin	Night blindness	Dryness of eyes
Vitamin B1	Eggs, whole grain	Aids in digestion	Beriberi	Digestive problems
Vitamin C	Citrus fruits	Keeps teeth, gums, joint healthy	Scurvy	Loosening of teeth

Vitamin K	Spinach, cabbage	Helps in blood clotting	Haemorrhage	Excessive bleeding
Iron	Cereals, pulses	Formation of haemoglobin	Anaemia	Pale body colour
Iodine	Fish and salt	Proper working of the thyroid gland	Goitre	Mental retardation
Sodium and potassium	Salt	Maintain body's water balance	Paralysis	General weakness

HOTS

1. Eating too much of food items rich in fats can be harmful because too much of certain types of fat can lead to a lot of health problems. A diet rich in saturated fat can raise cholesterol levels in the blood, thus increases the risk for heart diseases. 2. Because Vitamin C helps to resist infections and keeps teeth, gums and joints healthy. It has so many benefits in comparison to Vitamin D which helps in the normal growth of bones in children.

Chapter 2.

Separation of Substances

Test yourself (Page 25)

1. Threshing 2. Sieving 3. Winnowing 4. Magnetic Separation 5. Hand picking 6. Sublimation

Test yourself (Page 32)

1. Water 2. Filtrate 3. Residue 4. Evaporation, distillation 5. Sand, wood 6. Temperature, pressure.

Exercise

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

B. 1. insoluble 2. solvent 3. Winnowing 4. coagulation 5. insoluble, solvent

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

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

E. 1. Coagulation 2. Solute 3. Winnowing 4. Threshing 5. Decantation

F. 1. *Properties of a Pure Substance* : A pure substance : (i) cannot be separated into two or more substances by physical or mechanical means; (ii) is homogeneous i.e, it has uniform composition throughout the whole sample; (iii) has definite chemical composition; (iv) has definite properties like melting point or boiling point. 2. Winnowing is generally used by farmers to separate husk and hay from grains with the help of

wind. This method is based on the property that grains are heavier than husk and hay. **3.** Magnetic separation, as the name suggests is the method of separating a magnetic substance from a non-magnetic substance using a magnet attached to a rod. Iron, nickel and cobalt are magnetic substances. **4.** A solution in which no more solute can be dissolved at a given temperature is called a saturated solution. **5. Hand Picking :** This method is applied to separate unwanted solid impurities from a useful solid by hand. This method is used when one of the components is present in small quantities and differs in colour, shape or size so that it can be picked up manually. *Sieving :* Sieving refers to the separation of a mixture of particles of different sizes using sieves each with a uniform sized holes. **6.** Other than temperature, the following two conditions increase the rate of dissolution : (i) Continuous stirring of the solution (ii) Solute in the powdered form.

- G.** **1. (i) Pure substance :** A substance that contains only one chemical substance. *Mixture :* A substance that can be separated into two or more different substances. *(ii) Homogeneous :* All of the constituents of same kind or similar nature. *Heterogeneous :* Consisting of substances that are not of the same kind. **2.** Refer to Activity 5 on Pg-26 of textbook. **3.** Refer to Activity 8 on Pg-28 of textbook. **4. (i)** Separating funnel **(ii)** Magnetic separation, sieving **(iii)** Magnetic separation, sedimentation and evaporation **(iv)** Sieving **(v)** Threshing **5.** Evaporation technique is used to obtain salt from sea water. To obtain salt, sea water is collected in shallow ponds and allowed to stand. Sun's heat evaporates the water leaving behind the salt. The salt is collected and purified.

HOTS

1. The reason could be the impurity of water. **2.** Solubility of various gases is necessary to many forms of life in water. Aquatic life use dissolved carbon dioxide, oxygen and sunlight to make carbohydrates through the process of photosynthesis.

Chapter 3. Sorting Materials Into Groups

Test yourself (Page 40)

1. (i) Glass; Plastic, **(ii)** Wood; Jute, **(iii)** Gold; Silver. **2.** Some common characteristics of materials are : • All materials have mass. • All materials occupy space. • All materials can be felt by us. **3.** Matter **4. Classification or grouping** is the process of systematically dividing materials into groups in such a way that the members of each group have common properties.

Test yourself (Page 45)

1. Glass, Diamond **2.** Iron, Glass **3.** Plastic, Wood **4.** Copper, Aluminium **5.** Iron, Nickel

Exercise

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

B. 1. solid 2. Gases 3. soluble 4. non-metals 5. Diamond

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

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

E. 1. Magnetic substances 2. Transparent 3. Insulators 4. Lustrous
5. Immiscible

F. 1. Matter are generally physical substances which occupies space and possesses mass. Characteristics of matter include mass, weight, volume and density. 2. Lusture is the shine of a material. For example : gold and silver. 3. The solid materials that dissolve in water are said to be soluble materials and those which do not dissolve in water are called insoluble materials. For example, common salt is soluble in water and sand is insoluble in water. 4. Luster, malleability and conductivity. 5. *Conductors* : Copper, water, silver, aluminium, mercury; *Insulators* : Plastic, wood, air, rubber gloves.

G. 1. Classification or grouping is the process of systematically dividing materials into groups in such a way that the members of each group have common properties. Some of the advantages of classification are as follows : (i) It helps to understand similarities and dissimilarities among objects. (ii) It allows systematic study of things. (iii) It helps to locate things. (iv) It helps in identification of objects. 2. *Solid* : (i) Definite shape and volume. (ii) Cannot be compressed. (iii) Particles are closely packed. *Liquid* : (i) Definite volume but no definite shape; they take the shape of the container in which they are stored. (ii) Can be compressed to a small extent. (iii) Particles are not as closely packed as in solids. *Gas* : (i) No definite shape and volume. (ii) Highly compressible. (iii) Particles are loosely packed. 3. The materials which allow light to pass through them are called transparent materials. Glass, water, alcohol, etc are transparent materials. The materials which allow only a part of the light to pass through them are called translucent materials. Butter paper, frosted glass, etc are translucent materials. The materials which do not allow light to pass through them are called opaque materials. Wood, cardboard, metals, etc are opaque materials. 4. Some properties on the basis of which materials can be classified are luster, physical state, roughness, hardness, solubility, density, transparency, etc. Lusture is the shine of a material. Some objects shine but some don't shine. For example, all metals in pure state are shiny and said to possess lusture, while some materials like paper, wood, etc, do not have lusture. Materials can be rough or smooth. Roughness or smoothness of a material can be felt by touching it. For example, Sandpaper, wood, rocks, bark of a tree are rough materials while a flower petal, a glass sheet are smooth. Hardness is another property of

materials on the basis of which materials are classified. The ability of a material being scratched is known as its hardness. Remember, hardness is a comparative property.

HOTS

1. All metals are good conductors of electricity while plastic is an insulator. It does not conduct electricity. 2. Materials that allow light to pass through them are called transparent materials. Shopkeepers usually prefer to keep biscuits, chocolates, etc in transparent containers so that buyers can easily see through them. 3. *Cotton* : Cotton fabric is breathable and transmits moisture away from the body and is absorbent and removes liquid from the skin like a towel. *Silk* : It is a light weight delicate fabric that drapes well. It has a slightly shimmery appearance. *Rayon* : Rayon is a smooth, lightweight fabric. It drapes well and is slightly heavier than other fabrics. *Wool* : Wool is very warm and a good choice for colder weather garments.

Chapter 4.

Things Around Us

Test yourself (Page 53)

1. cell 2. Human beings 3. locomotion 4. stimulus 5. photosynthesis.

Test yourself (Page 56)

1. respiration 2. respiration 3. life span 4. reproduction 5. stimuli

Exercise

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

B. 1. stimuli 2. gills 3. asexual 4. Cells 5. tissue

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

D. 1. Excretion 2. Organ 3. Growth 4. Reproduction 5. Autotrophs

E. 1. All living things need food in order to obtain energy, to grow and to repair their worn out cells and tissues. 2. Animals move from place to place in search of food and water and to escape from enemies. 3. Excretion is the removal of waste products by an organism. Some waste products are in the form of urine, sweat, exhaled air and faecal matter. Without the excretory system, many problems can develop in the body. 4. Growth is the increase in the size of an organism as it matures. The growth of plants is different from that of animals. Animals do not grow after reaching a particular age, but plants continue to grow throughout their life. 5. Things can be categorised as living things and non-living things.

F. 1. The process of taking in oxygen and its oxidation to release energy is called respiration. Most organisms have special organs to take in oxygen. All living things respire because they need energy to grow to replace worn

out parts and to move. 2. The process by which a living body throws out the waste products produced inside the body is called excretion. Plants excrete water vapour and carbon dioxide through small pores on their leaves. Rubber plant, excretes latex, a white sticky thick liquid. Trees like acacia, secrete a brown, sticky substance called gum. 3. *Living Things* : (i) Living things are made up of cells. (ii) They prepare or consume food. (iii) They respire. (iv) They give out wastes. (v) They grow. (vi) They show movement. (vii) They reproduce. *Non-living Things* : (i) Non-living things lack cells and are made up of molecules. (ii) They do not produce or take food. (iii) They do not respire. (iv) They do not excrete. (v) In their case, growth is by the addition of external material similar to that of which they consist of. (vi) They move only if external force is applied on them. (vii) They do not reproduce. 4. Plants do not move on their own. However, they exhibit movement of their certain parts, like leaves and roots, in response to changes in their immediate environment. The sunflower turns towards sunlight and the roots of a plant grows towards the water. Leaves of touch-me-not curl up when touched. Here, touch is the stimulus and curling up of leaves is the response. Shoot of a plant grows towards the light and the roots grow towards gravity. Here, light and gravity are the stimuli and plant growth is the response. 5. The process by which leaves make food for the plant is called photosynthesis. This food is also transported to other parts of the plants through tissues present in the plant. Non-green plants and animals do not make their own food. They depend directly or indirectly on green plants for their food.

HOTS

1. No, there are some animals like whale, dolphin, etc., which have lungs so that they breathe the oxygen by coming to the surface of water.
2. When we cut down trees, we are taking a home away from animals. Animals may also encounter dangerous situations when they attempt to migrate some-where else.

Chapter 5.

Getting To Know Plants

Test yourself (Page 64)

1. root system; shoot system
2. tap
3. Shrubs
4. prop
5. stilt.

Test yourself (Page 57)

1. Leaves
2. chlorophyll
3. modes
4. Stem
5. stomata.

Test yourself (Page 71)

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

Exercise

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

B. 1. Stem 2. Roots 3. tap 4. Leaf 5. anther, stigma

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

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

E. 1. Fibrous 2. Stamen 3. Lamina 4. Transpiration 5. Venation

F. 1. The taproot is the main root from which many branching roots grow sideways. It grows vertically down into the soil when a seed germinates. It is also called the primary root. Pea, marigold, tulsi, carrots are some examples of plants with taproots. Fibrous roots grow as a cluster of thin fine roots at the base of the stem when seeds of grass or cereals germinate. These roots spread out in soil in all directions. Plants of wheat, maize, millet, etc have fibrous roots. 2. *Annual plants* : Those plants whose life cycle from seed germination to the fruit formation, is completed in one season are called annual plants. *Biennial plants* : Those plants whose life cycle requires two seasons for completion are called biennial plants. *Perennial plants* : Those plants whose life cycle runs for more than two seasons are called perennial plants. 3. Chlorophyll is the green colouring pigment present in the leaves. It is essential for the production of carbohydrates by photosynthesis. 4. The transfer of pollen grains from the anther of a stamen to the stigma of the pistil is called pollination. Pollination is important because it leads to the production of fruits we can eat and seeds that will create more plants. 5. *Herbs* : Herbs are soft and short plants and live for a few months. Mint, spinach, brinjal, coriander are examples of herbs. *Shrubs* : Shrubs are medium sized plants about 1-3m in height. Shrubs live for some years. Rose, jasmine, lemon, henna, cotton, etc are examples of shrubs. *Trees* : Trees are tall and generally over 3m in height. They live for many years. Mango, neem, banyan are examples of trees. *Creepers* : Creepers are weak plants that cannot stand erect because their stems are not strong. They creep on the ground. Pumpkin, watermelon, etc are examples of creepers. *Climbers* : Some plants like pea and money plant also have weak stems that take support of the neighbouring plant or walls to climb up. Such plants are called climbers.

G. 1. In some plants, roots are modified to perform additional functions. Some types of modified roots are : (i) For storage of food : The roots of some plants like carrot, radish, turnip, sweet potato and beetroot have swollen roots. These roots store food produced by the plants. Such modified roots are also used by us as food. (ii) To provide additional support to the plant : In plants like sugar cane and maize, the long and thin stem cannot be supported by its fibrous roots. Many thick roots arise from the lower nodes of the stem and penetrate into the soil and support the stem. Such roots are called stilt roots. In banyan tree, rope-like roots form the main branches. These roots on reaching the ground

penetrate into it and provide support to the heavy branches. These roots are called prop roots. **2.** Stems of certain plants are modified to perform some special functions. Some of the modifications of the stem with their functions are as follows : (i) For storage of food : Potato, onion and ginger are modified stems that store food. (ii) To prepare food : Plants like cactus, prickly pear can perform all the functions of leaves by their modified stems. Stems prepare food for these plants. (iii) For support : Stems of some climbers like grapes and passion flower are modified to form special structures called tendrils. These help the climber plants like, which have weak stems, attach themselves to others for support. (iv) For reproduction : Rhizomes, bulbs and tubers also help in the multiplication of plant. Stem cuttings of some plants like rose, jasmine, and hibiscus grow into new plants. **3.** Leaves are the most important part of the plant. They are known as the food factories of the plant. A leaf is a flat, lateral out growth of the stem. They always grow at the nodes of the stem. They have a characteristic shape and size. The flat, green portion of the leaf is called leaf blade or lamina. Petiole is a narrow, stalk-like structure that connects the leaf to the stem. A network of branching veins forms a supporting framework and also serves to transport raw materials and manufactured food into and out of the lamina. Midrib, a continuation of the petiole, is the central vein of the leaf. Smaller veins grow from the midrib. **4.** A typical flower has four main parts : (i) **Calyx** : It is the outermost whorl of the flower and is generally green in colour. It is made up of leaf-like structures called sepals. It protects the flower in bud stage. (ii) **Corolla (Petals)** : It is next to the calyx. It is made up of petals which are brightly coloured and scented. Its main function is to attract insects for pollination. (iii) **Stamens** : Many little stalks with swollen tops around the centre of the flower are called stamens. Stamens are the male parts of the flower. Each stamen consists of a thin green stalk called filament with a bag-like top, called anther. The anther carries several pollen grains. Pollen grains are dust-like particles and take part in reproduction. (iv) **Carpels (Female Reproductive Organs)** : A carpel is a simple pistil or an element of a compound pistil. It consists of four parts. The narrow elongated part of the pistil between the ovary and the stigma is called style. The apical end of the style where deposited pollen enters is called the stigma. The oval structure is called an ovary. An ovary contains egg-like structures, which are called ovules. For diagram, refer to Pg. 69 of our textbook. **5.** (a) Roots anchor the plant firmly in the soil i.e. they fix the plant to the soil. (b) It supports branches, leaves and flowers. (c) Leaves are known as the food factory or Kitchen of the plant because

leaves prepare food for the plants. (d) A flower is the reproductive part of a plant. On maturity, pollen grains from the anthers are transferred to the carpels. The process is called pollination.

HOTS

1. (a) The seeds were old. (b) The soil was too wet / too dry. (c) The seeds were sown at the wrong depth. 2. A herb is a plant whose stem does not contain any woody tissue. The banana stem also does not contain any wood in it. That's why it is considered as a herb.

Chapter 6.

Body Movements

Test yourself (Page 77)

1. earthworm 2. streamlined 3. hollow 4. snail 5. Vertebrates; invertebrates

Test yourself (Page 82)

1. Skeletal system 2. Joint is a place where two bones meet. 3. There are two different types of joints in the body. (a) Immobile joints or fixed joints (b) Movable joints. Some movable joints are : (i) Ball and socket joint, (ii) Pivot joint, (iii) Hinge joint, (iv) Gliding joint 4. Lungs and heart. 5. Hinge joint.

Exercise

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

B. 1. invertebrates 2. ball and socket 3. 12 4. ligaments 5. nervous

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

D. 1. Vertebrates 2. Lower jaw bone 3. Hinge joint 4. Excretory system 5. Locomotion

E. 1. Animals move from one place to another : (i) in search of food and water, (ii) to protect themselves from other animals, (iii) to move to favourable environment from unfavourable environment, and (iv) to find suitable place for laying eggs. 2. The wings are moved down and forward, lifting the body in the air. This movement is termed downstroke. The wings are lifted upwards, in preparation for another downstroke. This movement is termed upstroke. 3. Skull is the bony framework of the head. It has two main parts : cranium and facial bones. Cranium is the upper part of the skull which is made up of 8 flat bones joined together. It encloses the brain. The face and the jaw contain 14 bones. The lower jaw bone is the only movable bone in the skull. The skull protects the brain. 4. Girdle is any encircling structure or part. There are two types of girdles: the pectoral girdle and the pelvic girdle. 5. X-rays are the special photographs of the body. X-rays are used to find out any fracture in the bone. X-rays were discovered by German physicist W. C. Roentgen in 1895.

F 1.

Body system	Main organs	Functions
Nervous system	brain, spinal cord and nerves	Senses what is going on around you; coordinates what you need to do and transmits messages to different parts of the body telling them what to do.
Skeletal system	bones	Hard, jointed framework that supports and protects the body; muscles are connected to parts of the skeleton enabling the body to move.
Muscular system	muscles	Muscles contract to move parts of the body.
Reproductive system	Female : ovaries, oviducts, uterus and vagina Male : testes, sperm tube, urethra and penis	Produces offspring.
Circulatory system	heart, blood vessels and blood	Delivers food and oxygen to body cells and carries carbon dioxide and waste products away from the body cells.
Digestive system	mouth, <i>oesophagus</i> (food pipe), stomach, small intestine and large intestine	Digests food so that it can pass into the blood.
Respiratory system	nose, windpipe (trachea) and lungs	Transfers oxygen into the blood and gets rid of carbon dioxide and water vapour from the blood.
Excretory system	kidneys, ureter, bladder, urethra and skin	Gets rid of waste products from the body.

2. (i) Earthworms move on the ground with the waves of muscular contractions which alternately shorten and lengthen the body. They also have stiff hair like projectors called setae to grip the ground and

enable the expansion and contraction of muscles to move their body forward. (ii) Fish use their fins and muscular tail for swimming. During swimming, the front part of the body and the tail part curve in opposite directions. This makes a jerk and pushes the body forward. A series of such jerks make the fish swim ahead. The paired and unpaired fins help to keep the balance of the body and to keep direction. (iii) Snakes have a large number of vertebrae. They have large number of slender body muscles that interconnect the adjoining vertebrae, ribs and skin. Snakes move by making loops. These loops give a forward thrust against the surface and the snake crawls or slithers in the forward direction. **3. Joint** is a place where two bones meet. Ligaments hold the bones together at the joints. (i) *Ball and socket joint* : The ball and socket joint is present in the hip and the shoulder joints. The end of one of the bones is round like a ball and fits into a hollow part (socket) in the other bone. This joint allows movement in all directions. (ii) *Pivot joint* : The joint between the skull and the spine is a pivot joint. It allows the head to turn to the left and right, and also move up and down. (iii) *Hinge joint* : This joint can move in one plane only. For example, our elbow, knee, ankle and fingers have hinge joints. It allows the body parts to bend and straighten. (iv) *Gliding joint* : In a gliding or plane joint, the bones slide past each other. These are found in your wrists and ankles. **4.** The backbone, also called vertebral column or spine is made up of 33 small bones called vertebrae. It runs from the base of the skull to the lower back. It is strong and flexible. There are twenty-six vertebrae in the spine. The backbone holds the head and body upright. It encloses and protects the delicate spinal cord. For diagram, refer to Pg-79 of our textbook. **5. Hindlimbs** : The hip bones help us to move. They support much of the body's weight. Each hip is made up of three bones. These bones are called the ilium, ischium and pubis. When we are born, these three bones are separated. As we grow, they begin to join together with the last two parts of the backbone which is a large bony bowl. It is known as pelvis. *Forelimbs* : These bones are also very flexible. The arm is made up of three bones. The single bone of an upper arm is called a humerus which is attached to the shoulder blade.

HOTS

1. Yes, there are some animals which lack a bony skeleton but are capable of movement. For example : earthworm.
2. We will not be able to bend our body if vertebrae were absent and a long bone was present.

Chapter 7.

The Habitat and Adaptation

Test yourself (Page 88)

1. Biotic and abiotic components.
2. **Biotic components** include all

living organisms i.e. plants, animals, insects, human beings, etc. **Abiotic components** include all non-living things like soil, water, atmosphere, sunlight, etc. **3.** Marine and fresh water. **4.** Deserts, Grasslands, Tropical Rainforests, Tundra, Mountains. **5.** Food, shelter and favourable climatic conditions.

Test yourself (92)

1. (v) 2. (iv) 3. (i) 4. (vi) 5. (ii) 6. (iii)

Exercise

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

B. 1. biotic, abiotic 2. warm, wet 3. streamlined 4. blubber 5. deserts

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

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

E. 1. Habitat 2. Blow holes 3. Hibernation 4. Camouflage 5. Hydrophytes

F. 1. A habitat is a natural surrounding (area or an environment) where an organism is normally found. There are two main types of habitats in the biosphere : (i) Terrestrial habitat or land habitat (ii) Aquatic habitat or water habitat. 2. The organisms that live and breed in water are called aquatic organisms and the habitat is called aquatic habitat. A large number of plants and animals are found in water. Plants growing in aquatic conditions are called hydrophytes. These plants are either submerged or float on water. Aquatic animals show a variety of adaptations to survive in water. 3. The ability of certain animals to blend with the surroundings, making them difficult to spot is called camouflage. This adaptation enables them to hide from predators. 4. The trees are mostly cone shaped with sloping branches. The leaves of some trees are needle like. This helps the rainwater and snow to slide off easily. Boreal trees get less sunlight and, therefore, consume less energy. Some plants are also able to grow under a layer of snow. 5. Hibernation is the condition or period of an animal or plant spending the winter in a dormant state. For example, bear.

G. 1. Depending on the living conditions, terrestrial habitats are of many types. **I. Deserts** : (i) These are dry areas as they get very little rain. (ii) They can be very hot or very cold. (iii) Camels, cactus, etc are found in hot deserts while penguins, seals, polar bears are found in cold deserts. **II. Grasslands** : (i) These are windy areas with few trees. (ii) Grasses, zebras, deer are commonly found here. **III. Tropical Rainforests** : (i) These are warm and wet areas. (ii) They get plenty of rain throughout the year. (iii) These are generally close to the equator. (iv) Tall varieties of trees, creepers, monkeys, lions tigers, snakes are main organisms of these areas. **IV. Tundra** : (i) These are very cold and dry areas. (ii) Vegetation is scanty. (iii) Different types of grasses, polar bears,

reindeer are commonly found here. **V. Mountains :** (i) These are rocky cold and windy areas. (ii) Pine, yaks, sheep are commonly found here.

2. Plants : Plants growing in desert areas are called xerophytes. These plants show the following adaptations to store water and avoid loss of water. (i) Most plants have long roots, to penetrate deep into the soil in search of water. (ii) The stem is thick and fleshy for conserving water. (iii) The stem has a waxy coating which prevents water loss through transpiration. (iv) The leaves are reduced to spines. **Animals :** The camel is the most common animal of deserts. Camel is called the 'ship of the desert'. It is adapted to the desert conditions because of the following :

(i) Its limbs contain large pads which help it to move on hot and sinking sand. (ii) The hump of the camel is a reservoir of food in the form of fat. (iii) It drinks a large quantity of water and stores it in water-cells, muscles and connective tissues. (iv) It can live without drinking water for about two weeks. It excretes very little water in the form of urine. (v) It can adjust its internal temperature according to the surrounding air. It sweats profusely in the bright sun to maintain its body temperature. Some animals here like coyotes remain inactive during the hot day. **3.**

Plants : The trees are mostly cone shaped with sloping branches. The leaves of some trees are needle like. This helps the rainwater and snow to slide off easily. Boreal trees get less sunlight and, therefore, consume less energy. Some plants are also able to grow under a layer of snow. **Animals**

: Polar bears, yaks, mountain goats are commonly found in these areas. They show the following adaptive features. The animals in these regions are usually white or light coloured. This helps them to camouflage with the surroundings. This also helps them in thermal regulation. They have thick skin or fur to protect them from cold. Yaks have long hair. This keeps them warm. Snow leopard has thick fur over its whole body. The mountain goat has strong hooves which help it in running up the rocky slopes of mountains. **4.** Fish have a streamlined body that helps them in swimming. They have special organs called gills to breathe in water. Fish also have fins and a tail. They help the fish to swim and maintain the balance.

HOTS

1. All animals that hibernate eat a lot before hibernation and store it in their body because they have to hibernate for a long time means they will not eat anything during that time, their body will need energy for survival which they get from the stored food. **2.** Camels are known as ships of the desert because they can move across desert easily providing a mode of transportation for people in desert areas. They can eat almost anything and drink from waterholes.

Chapter 8. Measurement and Moving Things

Test yourself (Page 100)

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

Test yourself (Page 103)

1. Rotatory motion 2. Rotatory motion 3. Periodic motion 4. Rectilinear motion 5. Oscillatory motion

Exercise

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

B. 1. physical 2. vibratory 3. measurement 4. rotatory 5. rectilinear

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

D. 1. 8.864 2. 0.27 3. 1120000 4. 6400000 5. 0.6

E. 1. Curvilinear 2. Oscillatory 3. Periodic 4. Rectilinear 5. Measurement

F. 1. Any quantity that can be measured is a physical quantity. Length, mass, time, etc are some quantities that can be measured. They are called physical quantities. 2. The first form of transport was human foot. However people eventually learned to use animals, such as donkeys, horses, camels for transportation. Meanwhile about 3,500 BC, the wheel was invented in what is now Iraq which was used in carts for carrying loads from one place to another. About 3,100 BC the Egyptians invented the sailing boat and about 2700 BC. The Egyptians began using wooden ships for trade by sea. Around 1763 AD, the development of steam engine by James Watt opened the door to fast moving transport, vehicles on land and water. People began to make use of motorboats, ships and locomotive engine-run trains for transportation. 3. Measurement is the process of finding the length, weight, area, volume and even temperature of things around us. Measurements play an important role in our everyday life because they are useful in doing basic tasks such as : (i) To know the distance between two cities, the length of path/line joining the two cities should be measured. (ii) To know a patient's body temperature. (iii) When you buy a piece of cloth from a shop, the shopkeeper measures the length of the cloth. (iv) To know the capacity of your container. (v) When you buy groceries from the market, the shopkeeper measures its weight. (vi) To take medicines in the proper amount. 4. Each measurement consists of : (i) a number describing the numerical value of the measure; and (ii) the unit in which that quantity is measured. A fixed quantity with respect to which a quantity is measured is called a unit. 5. The same object may be at rest with respect to a fixed point but may be in motion with respect to another. Let us imagine that you are sitting in the compartment of a running train. Now, when you see around yourself in the compartment, you will find that each passenger is at rest with respect to other passengers.

But, if you consider any point outside the compartment like trees, poles, platform, etc, then you and other passengers are in motion. This example shows that the rest and motion are relative terms.

- G.** 1. Each measurement consists of : (i) a number describing the numerical value of the measure; and (ii) the unit in which that quantity is measured. A fixed quantity with respect to which a quantity is measured is called a unit. In ancient times people measured length by comparing the length of the object with the length of the certain body parts such as, the hand span, the cubit, the fathom, the foot, etc. **Hand span** is the distance between the tip of the thumb and the tip of the little finger of a fully stretched hand. **Cubit** is the distance between the tip of the middle finger (outstretched) and the elbow. **Fathom** is the length of the outstretched arms. Foot, pace, and yard are some other units of length based on body parts. However, these units are not reliable as the length of body parts varies from person to person. Therefore, people realized the need for standard units of measurement. The units that could be used everywhere as a basic unit of measurement are called standard units. These units have a fixed quantity and do not vary from person to person and place to place.

Physical Quantity	SI Unit	Abbreviations
Length	Metre	m
Mass	Kilogram	kg
Time	Second	s
Temperature	Kelvin	k

2. To measure length of a pencil accurately, you should follow the following suggestions : (i) The scale should be placed along the length to be measured. The scale should be placed very close to the object to be measured. (ii) Keep your eye in line with the point of measurement. If the eye is not in line with the point of measurement, the measured length will be either shorter or longer than the actual length. (iii) Do not start measurement from the worn out or damaged end of the scale. If the zero end of the scale is damaged, start measurement from some other mark of the scale. Then the actual length of the object is equal to the difference between the readings at the two points. 3. (a) *Rectilinear Motion* : If a body moves in a straight line, its motion is said to be rectilinear. For example : A motorcycle moving along a straight road. *Curvilinear Motion* : If an object moves along a curved line, its motion is said to be curvilinear. For example : A stone throw up in the air at an angle. (b) *Periodic Motion* : A type of motion that repeats itself after a regular interval of time is called periodic motion. Some examples of periodic motion are : (i) Motion of the Earth around the Sun. (ii) Heartbeat in a healthy person. (iii) Motion of the pendulum of a clock. *Non-periodic Motion* : A motion which does not repeat itself after a regular interval

of time is called non-periodic motion. Some examples of non-periodic motion are : (i) Children playing in the park. (ii) Vehicles running on the road. (iii) A footballer running in a field. 4. (a) The to and fro motion of an object along its mean position is called oscillatory motion. Some examples of oscillatory motion are : (i) Motion of a pendulum of a wall clock. (ii) Vibration of stretched wire. (iii) A child on a swing. (b) The motion of a body without changing its place, in which every particle on it moves along a circular path about a fixed axis is called rotatory motion. Some examples of rotatory motion are : (i) Motion of a spinning top. (ii) Motion of a merry-go-round. (iii) Rotation of the Earth about its axis. (iv) Motion of the blades of a fan. 5. Open out the divider so that the legs are about 5 mm apart. Place one of the legs at one end of the line, and the other leg on the line and put a mark at this point. Without altering the distance between the legs of the divider, continue moving the divider along the line until the entire curved line is divided into equal segments. Count the number of steps taken to cover 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 = Number of segments \times 5 mm + length of the left over portion.

HOTS

1. Scientists use the SI method to give consistency when exchanging information across countries. This prevents errors in basic exchanges of units of measurement also, by having the common measurement system, they can share measurement results with any scientist in the world even if they don't speak the same language. 2. If the zero end of the scale is damaged, start measurement from some other mark of the scale. Then the actual length of the object is equal to the difference between the readings at the two points.

Chapter 9.

Electric Current And Circuits

Test yourself (Page 110)

1. positive 2. current 3. Electric bulb 4. battery 5. Current

Test yourself (Page 113)

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

Exercise

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

B. 1. circuit 2. conductors 3. switch 4. two 5. battery

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

D. 1. Copper, aluminium 2. Glass, air 3. Dry cell, battery 4. Battery, cell 5. Manganese dioxide, ammonium chloride.

- E.** 1. Switch is a device that makes or breaks a circuit. The on-off mechanism in any electric circuit is controlled by a switch. When the switch is in 'on' position, the circuit is closed and the current flows through the circuit. When the switch is in 'off' position, the circuit is open and the current does not flow through the circuit. 2. The complete path from one terminal of an electric cell through the bulb and back to other terminal of the electric cell is called electric circuit. 3. A diagram which shows the arrangement of various components of electric circuit with the help of their symbols, is called circuit diagram. 4. Bulb has a small filament inside it. As long as this filament is intact, it glows when connected to a cell. A bulb is said to be fused when its filament is broken. The broken filament cannot complete the circuit. As a result, current cannot flow through the filament and the fused bulb does not glow. 5. A battery is the combination of cells in such a way that the positive terminal of one cell is in contact with the negative terminal of the other. A battery is used to generate more voltage because a single dry cell can generate a voltage of just 1.5 V.
- F.** 1. The battery cells supply the required electricity to the bulb. These batteries are connected to the bulb with the help of a switch. As soon as the torch is switched on, the chemical present inside the batteries produced an electric current. Thus, the bulb in an electric torch starts glowing. 2. Some materials allow electric current to pass through them whereas other materials do not allow electric current to pass through them. On the basis of this property materials can be classified as conductors and insulators. Conductors are materials which allow electric current to flow through them. All metals, alloys of metals, graphite and some liquids are examples of conductors. Insulators do not allow electric current to flow through them. Non-metals (except graphite), wood, glass, plastic, pure water and dry air are examples of insulators. 3. A dry cell consists of a zinc container that acts as a negative terminal. Inside this a paste of ammonium chloride is filled. A carbon rod having a brass cap is placed at the centre of zinc container. This carbon rod with metallic cap acts as a positive terminal. The carbon rod is surrounded by a mixture of manganese dioxide (MnO_2) and powdered charcoal. The cell is sealed from the top with pitch. The outer side of the zinc container (except button) is covered with a cover. In a dry cell when the carbon rod (+) and zinc contain (—) are connected to an external circuit, the electric current flows from carbon electrode to zinc electrode. Advantages : (i) Small in size and light in weight. (ii) No fear of leakage/spillage. (iii) Can be easily transported from one place to another. 4. For symbols, refer to Pg 111 of our textbook. 5. Electricity is the flow of electrical charge or power through a conducting medium. It is one of the most useful forms of energy. It is obtained by converting primary sources of energy such as energy obtained through coal, nuclear energy, hydro energy, etc.

Based on this, the power plants (where electricity is generated) can be classified as : (i) Thermal Power Plants : These are based on coal, diesel or natural gas. (ii) Atomic Power Plants : These are based on nuclear fission of Uranium-235 or plutonium. (iii) Hydroelectric Power Plants : These are based on the force of water. In these plants kinetic energy of moving water is used to generate electricity.

HOTS

1. Dry cells are not actually dry as they contain electrolyte in the form of paste or gel with enough moisture. The cell is called dry because it does not contain any liquid chemical. 2. Symbols are used in circuit diagrams to save space. A simple symbol can convey a large amount of information. 3. Human body is a conductor as those objects which have water in them are conductors.

Chapter 10.

Fun With Magnets

Test yourself (Page 121)

1. magnetic substances 2. Magnetite 3. two 4. Like; unlike 5. poles

Test yourself (Page 123)

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

Exercise

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

B. 1. attracted 2. repel, attract 3. artificial 4. Magnetic compass 5. magnet

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

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

E. 1. Iron, cobalt 2. Wood, paper 3. Magnetic compass 4. ATM card, hard disk 5. North, south

F. 1. The property of a substance to attract iron and other magnetic substance is known as magnetism. 2. A magnetic compass is a device used to find directions. It is used by sailors, travellers and navigators. It consists of a flat circular case of brass or aluminium with a glass top. A small, magnetised needle is pivoted at its centre. The base of the case is marked with directions. 3. (i) When magnetic materials are brought near a magnet, they stick most at the poles. (ii) The poles of a magnet always occur in opposite pairs and cannot be separated. (iii) Like poles repel and unlike poles attract each other. 4. A magnetic substance is attracted by both the poles of a magnet. The unlike poles of two magnets also attract each other. Like-poles of two magnets repel each other. Thus, a magnet always attracts a piece of any magnetic substance and the unlike-pole of another magnet. A magnet repels another magnet if their like poles are brought nearer. Therefore, repulsion is a sure test of magnetism.

- G.** 1. The word magnet is derived from the word magnetic which refers to all materials that attract iron. There is an interesting story about the discovery of magnets. It is believed that the first magnet was discovered by a Greek shepherd named Magnets about 2800 years ago. It is said that the iron tip of his staff and the iron nails in his shoes got stuck to a rock on which he was standing. Greeks named this rock 'magnetic'. This was the first magnet discovered by a man. 2. The process of destroying the magnetic properties of a magnet is called demagnetisation. A magnet can be demagnetised by : (i) Dropping from a height (ii) Hitting with a hammer (iii) Applying heat (iv) Improper storage can also cause loss of magnetic properties. (v) Keeping two magnets side by side with like poles next to each other. 3. Refer to Activity 3 on Page 119 of our textbook. 4. (i) Electricity meters, refrigerator doors and the dynamos of bicycles and automobiles use magnets. (ii) Magnetic tapes used as audio and video tapes consist of a magnetic material coated on a plastic tape. (iii) Computer hard disks used in computers to store information consist of a magnetic material coated on plastic disks. (iv) Nuclear Magnetic Resonance (NMR) imaging is used to study the brain. (v) Magnets are used in bulletin boards and toys. 5. Refer to Activity 6 on Page 121 of our textbook.

HOTS

1. Maglev trains float on a guideway using the principle of magnetic repulsion. Each magnet has two poles. When you keep two magnets side by side, you will realize that opposite poles attract, whereas similar poles repel. This repulsive property of magnets is used in Maglev trains.
2. Bring one end of the iron piece towards the bar magnet. Both will get attracted towards each other. Now bring the other end of the bar magnet towards the iron piece. If it again got attracted then the iron piece is not a magnet and if not, it is a magnet.
3. First locate the north-south direction, then face north and your left hand will face west. The opposite side of west direction is east.

Chapter 11. Light, Shadows and Reflections

Test yourself (Page 131)

1. Sun, star
2. The non-luminous objects are visible when they reflect or scatter the light falling on them from some luminous object.
3. (i) Sun, star (ii) Candle, torch.
4. A group of light rays moving in an organised manner is called a **beam of light**.
5. Parallel beam, Convergent beam, Divergent beam.

Test yourself (Page 136)

1. The bouncing back of light after striking a surface is called reflection.

2. Regular reflection and irregular (diffuse) reflection. 3. Pinhole camera is based on the principle of rectilinear propagation of light. 4. Shadow is a dark image of an object formed when the path of light is blocked by an opaque object. 5. To form a shadow of an object, following three things are required : • a source of light • an opaque object and • a screen behind the object.

Exercise

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

B. 1. Luminous 2. straight 3. rectilinear 4. opaque 5. Shadow

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

D. 1. Objects which allow most of the light that falls on them to pass through are called transparent objects. For example : water, air and glass are transparent. 2. Objects which allow only a part of light to pass through them are called translucent objects. For example : wax paper and frosted glass are translucent. 3. Objects which do not allow light to pass through them are called opaque objects. For example : wood, walls, books, etc are opaque. 4. The objects which give out their own light are called luminous objects. The sun, stars, electric bulb, candle, etc are luminous objects. Infact all sources of light are luminous objects. 5. The objects which do not give out their own light are non-luminous objects. The non-luminous objects, however, shine or are visible because they reflect or scatter the light falling on them from some luminous object. Table, chair, moon, pencil, paper, etc are non-luminous objects.

E. 1. Light is the form of energy that gives us vision and enables us to see the things around us. It is essential for life to exist. The Sun is the ultimate source of light energy. With the help of sunlight, plants are able to prepare food through photosynthesis giving out oxygen that we breathe. Light also enables us to see our image in the mirror. Thus we can say that light is essential for life to exist. 2. *Natural Sources* : The Sun, the stars. *Man-made Sources* : Candle, electric bulb. 3. An opaque object blocks the path of the light falling on it. This creates a dark area on the side of the object away from the source of light. This dark area is known as the shadow of an object. Hence a shadow is formed when the path of light is blocked by an object. 4. A smooth surface (highly polished surface) such as a mirror reflects the parallel beam of light in one direction. This is called regular reflection. For diagram, refer to Pg 135 of our textbook. 5. A rough surface (or irregular surface) reflects the parallel beam of light in all directions. This kind of reflection is called diffuse reflection. For diagram, refer to Pg 135 of our textbook.

F. 1. (a) **Parallel Beam** : The collection of rays travelling parallel to each other is known as parallel beam of light. The distance between the rays remains the same. (b) **Convergent Beam** : When the rays in a beam come

towards each other and the distance between the rays goes on decreasing till all the rays converge or meet at a point, the beam is called a convergent beam. (c) **Divergent Beam** : In a divergent beam the rays spread out or diverge from a point and the distance between the rays goes on increasing. For diagrams, refer to Pg 130 of our textbook. 2. **Shadow** : (i) It is black. (ii) It is of the same shape as the object but shows no other details about the object. (iii) The size of the shadow depends on the position of the source of light and may be bigger or smaller than the object. (iv) It is formed when light from a source is obstructed by an opaque object. (v) A shadow is the area where no light falls. Therefore it is black. **Image** : (i) It is of the same colour as the object. (ii) It is of the same shape as the object and shows all the details of the object. (iii) The image is of the same size as the object. (iv) It is formed when light from the object reaches our eyes after reflection from the plane mirror. (v) Since light from the object actually falls on our eyes, you can see all the details of the object in the image. 3. Fix a lighted candle on a table. Stretch a narrow rubber tube straight and look through it at the flame. The light coming from the flame is visible. Now coil the rubber tube and look through it at the flame. The light coming from the flame is not seen. This experiment shows that light travels in a straight line. 4. **Principle** : Pinhole camera is based on the principle of rectilinear propagation of light. **Construction** : It consists of a cardboard or wooden rectangular box in which the inner surface is painted black. It has a tiny pinhole on one of its walls to let the light through. The wall of the box in front of the hole has a translucent screen made of ground glass or greased paper. **Working** : When an object is seen through the pinhole camera, an inverted image is formed on the ground glass plate. 5. A solar eclipse occurs when the Moon passes in front of the Sun causing a shadow to fall on certain portions of the Earth. The eclipse is not seen from every place on the Earth, but only from the locations where the shadow falls. It appears as if the Sun has gone dark. There are three main parts of the Moon's shadow during an eclipse called the umbra, penumbra and antumbra. Umbra is the portion of the Moon's shadow where the Moon completely covers the Sun causing a total eclipse. Penumbra is the area of the shadow where only a portion of the Moon is in front of the Sun resulting in partial eclipse. Antumbra is the area of the shadow beyond the point of umbra. Here the Moon is completely in front of the Sun, but does not cover the entire Sun. The outline can be seen around the shadow of the Moon causing an annular eclipse. For diagram, refer to Pg 133 of our textbook.

HOTS

1. Its image will get diminished. 2. Since the glass window pane is transparent, light simply passes and hence no image is formed.

Test yourself (Page 144)

1. mixture 2. Nitrogen; oxygen 3. atmosphere. 4. smoke 5. humidity.

Exercise

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

B. 1. oxygen 2. nitrogen 3. pollution 4. humidity 5. wind

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

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

E. 1. Atmosphere 2. Respiration 3. Carbon dioxide 4. Oxygen 5. Ozone layer

F. 1. The main constituents of air are : (i) Nitrogen : 78% (ii) Oxygen : 21% (iii) Carbon dioxide : 0.03% (iv) Noble gases (Argon, Neon) : 0.94% (v) Water vapour : variable (vi) Smoke and dust particles : variable.

2. A thick blanket of air, surrounding our earth is called the atmosphere. This layer extends to hundreds of kilometres above the earth's surface.

However, its thickness decreases as you go higher and higher above the surface of the earth. Therefore it becomes very difficult to breathe at high altitudes.

3. There are some bacteria found in soil and in roots of some plants like peas that convert nitrogen into a form that can be used by plants. Human beings and animals also obtain nitrogen in the form of proteins from their food. When plants or animals die, this nitrogen is released back to the atmosphere. In this way nitrogen circulates on earth. This is known as nitrogen cycle.

4. Some ways to reduce air pollution are : (i) Planting more and more trees. (ii) Regular checking of vehicles for emission of harmful gases. (iii) Limit driving by carpooling, using public transport, biking and walking. 5. Water is present in air in its gaseous state, i.e., water vapour. The amount of water vapour present in air is called humidity. Air contains varying amounts of water vapour depending on the weather of a place. As the temperature increases, more water changes into water vapour and is absorbed by the atmosphere. As a result, the humidity increases. In winters, water does not evaporate easily hence the humidity is low.

G. 1. The cycle, by which oxygen is utilised by plants and animals during respiration and generated by plants during photosynthesis such that the level of oxygen in air remains same is called oxygen cycle. For diagram refer to Pg 143 of our textbook. 2. Air pollution is the addition of undesirable substances in air which make it harmful for living beings. These undesirable substances are known as pollutants. Causes of Air Pollution : (i) Burning of fossil fuels (ii) Smoke from automobiles and industries (iii) Burning of wood, cow dung, etc. (iv) Volcanic eruptions

also release harmful gases in air. (v) Forest fires (vi) Decay processes of vegetation. Effects of Air Pollution : (i) It makes breathing difficult. (ii) It causes lung diseases like asthma. (iii) It also damages crops. 3. (i) Living things need oxygen for respiration. (ii) Soil also holds some air in the spaces in between its particles. Dry soil has air. It is required for the living beings in the soil and also for the roots of the plants. Hence, oxygen is essential for the survival of living beings. (iii) Atmospheric oxygen O_2 is used for combustion to produce energy in automobiles, aeroplanes, ships, generators, industrial process, etc. (iv) Besides respiration, medical oxygen is supplied in cylinders to help people who face breathing problems due to inadequate amount of oxygen, for example patients in hospitals, mountaineers at high latitudes, divers under water, astronauts in space, etc. (v) Oxygen helps in burning. (vi) Oxygen is used as a fuel in rockets. (vii) Oxygen is used in many process industries. 4. Moving air is called wind. Many processes like winnowing, storms, etc show the presence of wind around us. Uses of wind are : (i) Wind helps in the movement of gliders, aeroplanes, parachutes, sailboats, etc. (ii) Air helps birds, bats and insects in flying. (iii) Wind energy is used for pumping out underground water, grinding of grains, generating electricity by using windmills. (iv) Air helps in seed dispersal. (v) Wind helps in pollination.

HOTS

1. An excess of CO_2 causes climate change, altering Earth's ecological balance and threatening most living things. The major threat from increased CO_2 is the greenhouse effect. CO_2 is a greenhouse gas. It traps the Sun's energy as it strikes the Earth, warming the atmosphere. An increase in CO_2 can increase temperatures further, causing changes in weather patterns. 2. Air inhaled through the nose is warmed and moistened, so it doesn't irritate the sensitive airways. Also, air inhaled through the nose is filtered.