*Enhanced Edition
NEP 2020 Guidelines

FACTS of SCIENCE

Teacher Manual

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YBPL

Chapter - 1 — How do Plants Get their Food?

Page 10

1. The two modes of nutrition are-
   (i) Autotrophic mode of nutrition.
   (ii) Heterotrophic mode of nutrition.
2. Green plants are called autotrophs because they can prepare their own food with the process of photosynthesis.
3. For photosynthesis, chlorophyll is required non-green plants do not have chlorophyll in them therefore non-green plants cannot carry out photosynthesis.

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Rhizobium bacteria converts nitrogen present in air in usable form for plants. Plants cannot take that nitrogen directly from atmosphere so rhizobium bacteria help it.

Exercise

A.	1.	a	2.	c	3.	b	4. d
B.	1.	Chemical	2.	Others, nutrition	3.	Parasites	4. Lichen
C.	(i)	T	(ii)	F	(iii)	T	(iv) T
D.	1.	d	2.	a	3.	b	4. c

E. 1. The process by which food is taken in and used by an organism is called nutrition.
2. Components of food are moisture, protein, fibre, carbohydrates, minerals and vitamins.
3. Different types of heterotrophic nutrition are-
   (i) Saprophytic Nutrition
   (ii) Parasitic Nutrition
   (iii) Symbiotic Nutrition
   (iv) Insectivorous Nutrition
4. Cascuta is a common parasite that climbs on the branches of other plants with the help of its yellow coloured thread like stem. It also develops parasitic roots at vairous places called haustoria which pierce into the host plant to obtain nutrition.

F. 1. The two major modes of nutrition are-
   (i) Autotrophic mode of nutrition.
   (ii) Heterotrophic mode of nutrition.
   The difference between the two mode is as follows:

Autotrophic	Heterotrophic
They have chlorophyll.	Heterotrophic do not have chlorophyll.
Autotrophs can prepare their own food.	Heterotrophic cannot prepare their own food.
For example- plants, algae.	For example- humans, animals.

2. Photosynthesis is important because-
   (i) It serves as the primary energy process for most trees and plants.
   (ii) It is the main source of oxygen in the atmosphere.
   (iii) It contributes to the carbon cycle among biotic and aboitic components.
   (iv) It directly or indirectly affects most life on the earth.
3. Saprophytic nutrition is the one in which non-geen plants live on dead and decaying matter whereas in symbiotic relatioship two organisms depend on each other and fulfil each others needs.

4. Plants that depends on small insects in order to fulfil the deficiency of certain nutrition in their body. Such plants are called insectivorous plants.

G. 1. All green and non-green plants need energy to carry out life process like respiration, excretion, movement, respond to stimuli and to grow.

2. The process by which plants prepare their own food in presence of sunlight is called photosynthesis. Photo means 'light' synthesis means 'to prepare'. Chlorophyll traps sunlight and converts light energy to solar energy. Water is absorbed by the roots. Water molecules present in the cells break up and the oxygen present in water is set free. The hydrogen from the water molecules combines with carbon dioxide from the environment to form glucose, a simple sugar. The glucose molecules are held together by chemical energy. The energy is trapped within the glucose molecules.

3. In saprophytic nutrition, plants or animals derive their nutrion from dead and decaying matter but in parasitic nutrition. Organisms live on or inside the body of living organisms to derive nutrition. Mushroom and yeast are saprophytes whereas fungi and mistletoe are parasites.

4. The mode of nutrition in which two different organisms depend on each other for shelter and nutrition. The organisms are said to be in a symbiotic releationship. For example- Algae and fungi live with close association with each other for nourishment. Algae is an autotroph so it makes food for itself and also for fungi. On the other hand fungi being a saprophyte provides water, mineral and shelter to algae. This is a symbiotic relationship.

Scientific Thinker

Do it yourself

Enrichment Learning

A. Do it yourself

B. Do it yourself

C. Do it yourself

Hots

1. Plants do not need a digestive system because their need for nourishment is fulfilled through the process of photosynthesis and cellular respiration.
2. If the leaves of money plant are coated with vaseline, stomata present on the surface of the leaves will get blocked. Exchange of gases and transpiratin will get affected.
3. 1. (i) Algae (ii) Fungi (iii) Lichen
   2. A is green in colour because it is an autotroph.
   3. Symbiotic Relationship
   4. Rhizobium bacteria and leguminous plants also show symbiotic relationship.

Value Based Question

Do it yourself

Chapter- 2 — How do Animals Get their Food?

Page 23

(i) Digestion (ii) Pseudopodia (iii) Tongue

(iv) 2-3 hours (v) Liver (vi) Gall bladder

Exercise

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

B. 1. Pseudopodia 2. Chew 3. Masticated
4. Absorption 5. Ruminants

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

D. 1. Absorption 2. Salivary gland 3. Starch 4. Rectum

E. 1. Oesophagus connects the mouth to the stomach.
2. Chyme is the undigested food in stomach.
3. Large intestine.
4. Initial digestion of proteins take place in the mouth.

F. 1. Different organs involves in human digestive system are-
(i) Mouth (ii) Oesophagus (iii) Liver
(iv) Stomach (v) Small intestine (vi) Lagre intestine.

2.

Types of Teeth	Number in each jaw	Function
Incisors	4	Biting food
Canines	2	Tearing food
Pre molars	4	Grinding food
Molars	6	Grinding Food

3. The tongue is a fleshy muscular organ present in the mouth. The main function of the tongue is to push the food in between the teeth and mix the food with saliva to help in swallowing the food.
4. Taste buds help to sense four different senses namely sweet, salty, bitter and sour which help us to ascertain the taste of food we eat.
5. Large intestine helps in absorbing waste from waste food and also the waste is stored in large part of intestine called rectum.

G 1. Process of nutrition in Amoeba

Amoeba is a unicellular organism. It food consists of microscopic plants and animals floating in water bodies. When it comes in contact with its food, it throws out finger-like projections from its body. These projections are called pseudopodia which completely enclose the food forming food vacuoles. Food particles engulfed are then digested by digestive juices secreted by cytoplasm. The digested food is then absorbed and given energy to amoeba.

Process of nutrition in Hydra

Hydra is a multicellular organism. It has number tentacles around its mouth which are used to put food particles in its mouth. They catch small animals and kill them to push them into its mouth. Digestion in hydra takes place inside the body cavity. The digested food is absorbed by the process of diffusion.

2. Follwing steps are involved in digestion of food in human beings:
(i) Ingestion: It is taking in of food through the mouth and eating it.
(ii) Digestion: It is the process in which complex food particles are broken into simpler form with the help of digestive juices released by the digested organs.
(iii) Absorption: In this process, finally the absorbed food is converted into the energy required for various activities.
(iv) Egestion: Egestion is the process of elimination of undigested solid parts of the food.

3. a. Functions of stomach

The walls of stomach secrete digestive juices called gastric juices namely hydro-chloric acid and mucus which act on the protein component of the food.

b. Function of pancreas

Pancreas secrete pancreatic juice that help in breaking down of food. It breaks down the carbohydrates into sugars, proteins and amino acids and fats into fatty acid and glycerol.

4. Ruminants have a compound stomach divided into four chambers:
   — Food first goes to the rumen. Here, it is partially digested and sent to the reticulum. From here, partially digested food is sent back to mouth. This food is cud and chewed thoroughly by the mouth. This is called rumination.
   — The chewed food is again taken in the stomach and is properly digested in other chamber omasum and abomasum. Here, digestive juices mix with food and digest the food. Digested food is then sent to the small intestine for absorption. The small intestine leads into large intestine. The large intestine absorbs water from the food and the remaining solid food is excreted from the body.

Scientific Thinkers

Do it yourself

Enrichment Learning

A. 1. Saliva 2. Oesophagus 3. Cud 4. Snake
   5. Canines 6. Villi 4. Egestion 8. Crown

B. Do it yourself

C. Do it yourself

Hots

A. Hiccups occur due to hasty eating because the food particles enter the windpipe. When we swallow, a flap like valve close the passage of the windpipe and guides the food in the food pipe. If by chance food enter the windpipe, hiccups are produced.

B. Glucose is directly absorbed into the blood stream into all the cells. Once inside, the glucose undergoes oxidation that result in the release of Androsine , a high energy molecule that provides energy for the cell. This is why he get instant energy.

C. 1. (i) Salivary Gland (ii) Saliva (iii) Starch (iv) stomach
   2. Digestive juices secreted by stomach act on protein components of the food.

D. 1. (i) Villi (ii) Large Intestine (iii) Rectum (iv) Anus
   2. Egestion is the process of removal of undigested food from the body.

Value Based Question

Do it yourself

Chapter-3 — Fibre to Fabric

Page 31

1. Wool protects us from the cold.
2. Sheep gives the best quality of wool.
3. Angora goat provides us a fibre called Mohair.

Exercise

A. 1. c 2. d 3. d 4. c 5. b

B. 1. shearing 2. grading 3. larvae

4. sericulture 5. filature

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

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

E. 1. Fabric is a material which is made from fine filaments called fibres.
2. The raw wool has yolk, which is an oily substance and dried perspiration of sheep is called suint.
3. Fibres of mixed length are spun to form woollen garments called tweeds.
4. Angora rabbit provides fine quality of wool.
5. The process of rearing silk worms for obtaining silk fibre.
6. Asthma is caused through sericulture.
7. Rearing means to keep animals in a farm and to look after them for their use.
8. Sheep are mostly reared in the states of Jammu and Kashmir, Himachal Pradesh, Arunachal Pradesh, Uttarakhand and Sikkim.
9. Shearing does not hurt sheep because in summer, the sheep feel hot due to the thick coat of fur on their body. Shearing rather helps them to remain cool as fur does not allow the heat to pass out of their body.

F. 1. Five wool yielding animals are camel, Llama, Alpaca, Angora Goat and Cashmere goat.
2. The process of removing fur from the coat of the animal superficially is called sheaving. During the months spring and summer, the sheep are shorn. Blades and razors are used to remove the fur from the body of the sheep.
3. The Angora goat provides us a fibre called Mohair. These goats are found in Angora region of Turkey. This wool is light in weight, durable and very warm.
4. The silkworm swings its head in the form of figure eight. During the movement, it spins the protein fibre around it, forming cocoon.
5. Boiling kills the insects and dissolves the sticky substance that hold he fibre with cocoon.
6. The filaments from the cocoon are taken out by the process called filature. After this, filaments are twisted together to make thread. These threads are then dyed into different beautiful colours.
7. Woollen clothes keep us warm. They protect us from cold. Wool traps the air and traps the air and does not allow it to reach the body or escape away from the body in the form of heat.
8. While combing fibre, long fibres are separted and spun to make yarn. This woollen yarn is used for knitting woollen garment, the short fibre are woven to make soft woollen fabrics. This fabric is called worsted.
9. People engaged in wool sorting get infected during the process by bacteria called anthrax. Anthrax causes a fatal blood disease called sorter's disease.

G. 1. The process of extracting wool involves:
(i) Shearing: The process of removing fur from the coat of the animal is called shearing.
(ii) Scouring: The sheared fur is then washed in machines to remove the other impurities like grease.
(iii) Grading: The scouring wool is straightened to draw them in threads and then grouped and sorted according to their length, colour, texture and compatibility.
(iv) Dying: The wool obtained naturally from the sheep is mostly white, brown or black. This is further dyed to the wool of different colours and shades.
(v) Drying: The wool dyed in colours need to be dried. It is thus put through the rollers to get the water squeezed out to the maximum.
2. The silk moth feeds on mulberry tree leaves. A female silk moth lays about 300 to 400 eggs at time. These eggs hatch to expose the larvae of silk moth. The larva takes three to four weeks to become an adult. The next stage of the silkworm is called pupa. The silkworm swings its head in the form of figure eight. Inside the cocoon, the silk moth develops into the pupa stage called chrysalis which further develops into a moth.
3. — Cocoons are collected and boiled.
— This helps in separating out silk fibres. Silk thread is then separated from the cocoon.

— Then spinning of silk fibres into threads is done.
— The silk threads obtained are woven into the desired cloth.

4. Sericulture includes money health hazards. Handling of dead worms in boiling water causes blisters and wounds in the hands of the workers. The wounds and blisters cause further infections. Vapours from the boiling cocoon cause many respiratory diseases like asthma and bronchial infections. Fuels from the diesel machines also cause respiratory infections. Workers also have to stand for long hours which cause spinal problems like backache and spine injuries. Workers also get vision troubles. Noise in the spinning and winding units also cause hearing loss.
5. Silk is a very costly fibre which we get form silkwork. Silk fibre is a natural protein fibre, which is produced as a cocoon covering of the larva of the silkworm. This fibre is acclaimed for its smooth, lustrous texture that makes it comfortable to wear in both climates and warmer seasons.

Enrichment Learning

A. Do it yourself

B. Do it yourself

C. 1. Pashmina 2. Carding 3. Fibroin 4.
5. Cocoon 6. Shearing 7. Mulberry

D. Do it yourself

E. Do it yourself

Hots

A.

B. 1. (i) P — sheep (ii) Q — fur
2. (i) R — Shearing (ii) S — Scouring
3. wool
4. Wool is used to make clothes.

C. 1. A — Silk moth
2. B — Silkworms C — Mulberry
3. Silk. It is smooth
4. Reeling

Value Based Question

Do it yourself

Chapter - 4 — Heat Flow and Temperature

Page 41

1. Temperature is the measure of the average heat or thermal energy of the particles in a substance.
2. Kelvin scale was designed by William Thompson.
3. Temperature is measured with the help of thermometers.

Page 44

1. Heat gets transfered in three ways:
(a) conduction (b) convection (c) Radiation
2. No, transfer of heat depends on nature of different materials.

Exercise

A. 1. c 2. d 3. b 4. d 5. b

B. 1. greater 2. thermometer 3. William Thompson
4. Radiation 5. Silver

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

D. 1. When we heat water, it starts boiling after some time.
2. Celsius scale, Kelvin scale, Fahrenheit scale.
3. Conduction, convection, radiation
4. Silver is costly due to which it is not used in transmission of electricity.
5. The silver coating reduces the radiation of heat from the inner bottle.
6. The degree of hotness or coldness of a body is called temperature.
7. Types of thermometres are-
   — Liquid-in-glass thermometres
   — Clinical thermometer
   — Resistance thermometer
   — Digital thermometer
   — Thermometers for industry
8. Range of clinical thermometer is 35° C to 43° C.

E. 1. An object seems to be cold when the heat from the body flows into it. The flow of heat determines whether the body is hot or cold. There is no such thing as cold. When we say that object A is colder than object B, we means that it has less heat.
2. Clinical thermometer is designed to measure human body temperature. It has a range of 35° C to 43° C. It is a modification of mercury.
3. Kelvin scale was designed by William Thompson in 1848. In this scale absolute zero is taken as – 273.16°C or – 459.7 °F. At absolute temperature, the movement of molecules of body stops.
4. The transfer of heat between two solid bodies is called conduction. It depends on the difference in temperature of the hot and cold body.
5.

Conductors	Insulators
Materials that allow heat to pass through them.	Materials that do not allow heat to pass through them.
For example- silver, copper, brass etc.	For example- rubber, plastic, wood etc.

6. Sir James Prescott Joule proved that a given amount of mechanical energy always produces the same amount of heat. According to this theory, the heat that a body possesses is directly related to the kinetic energy or energy of motion of the molecules composing the body. The greater the kinetic energy involved, the hotter the body is.
7. Mercury and alcohol expands and contracts with the variation in temperatures therefore they are used in thermometers.

F. 1. Thermometer has a constriction in the fire capillary tube. This constriction prevents the mercury from contracting and flowing back when it is removed from human body. This enables the recordingof the maximum temperature of the body without need for haste.
2. a. 15° C

$$F = \frac{9}{\cancel{5}} \times \cancel{15}^{3} + 32$$

$$= 27 + 32$$

$= 59^{o}$ F

b. 35^{o} C

$$F = \frac{9}{\cancel{5}} \times \cancel{35}^{7} + 32$$

$$= 63 + 32$$

$$= 95^{o} \text{ F}$$

3. a. 95^{o} F

$$C = \frac{5}{9}(95 - 32)$$

$$= \frac{5}{\cancel{9}} \times \cancel{63}^{7}$$

35^{o} C

b. 41° F $\quad C = \frac{5}{9}(41 - 32)$

$$= \frac{5}{\cancel{9}} \times \cancel{9}$$

$$= 5^{o} \text{ C}$$

4. When two bodies are at different temperature and seperated by distance the heat transfer between them is called radiation. In case of radiation, it can take place without any medium. Radiation occurs due to the electro magnetic waves that exist in the atmosphere. One of the most important examples of radiation is the heat of the sun coming on the Earth.
5. A thermos flask is a bottle within a bottle but the two being united around the top. The inner bottle contains the outer bottle whose temperature is kept constant. The loss of heat from the material by conduction is greatly reduced by providing no path along which the heat can flow to the outer side except upward along the thin glass walls of the inner bottle and through the cork cover. Both the glass and the cork are poor conductors of heat. Heat cannot be transfered from the inner bottle to outer bottle by convection since there is no medium. Silver coating is done to reduce the radiation of heat from the inner bottle. Because of this three fold protection, the contents of a thermos flask can be kept hot or cold for long period of time.
6.

Conduction	Convection	Radiation
Transfer of heat between two solids.	Transfer of heat between a solid and a liquid.	Transfer of heat in two bodies at different temperatures separated by distance.
Medium is required.	Medium is required	Can take place in refrigerator.
Direct contact is required.	It takes place within the fluid.	Direct contact is not required.
Continues until temperatures are equal.	Cycle occurs while temperatures differences exist.	Can transfer energy through empty space.

7. In a refrigerator, convection is used to circulate cold air around the food. Air is cooled by the freezer compartment at the top of the refrigerator. As it sinks it is replaced by warm air rising from below. The circulating air carries heat energy away from all the food in the fridge.

Scientific Thinker

A. 1. At -273^{o} C, the molecules of all substances stop moving.
2. This temperature is called absolute zero.
3. Lord Kelvin

B. Do it yourself

Enrichment Learning

Do it yourself

Hots

A. Laboratory thermometer does not have a kink which prevent mercury level from falling on its own so it will be difficult to read the temperature.

B. Light coloured clothes reflect heat which help our body to keep cool whereas dark coloured clothes absorb heat and so are worn in winters.

C. Materials like jute sacks and sawdust act as insultors, they do not allow escape or entry of heat.

D. (a) In winter she should wear black dress because dark coloured clothes absorb heat, it will keep her warm.

(b) In summer she should wear white dress, because light coloured clothes are good reflectors of heat thus help the body cool.

E. Do it yourself

Value Based Question

Do it yourself

Chapter - 5 — Acids, Bases and Salts

Page 51

1. citrus 2. acidic substances 3. bitter 4. HCl, H_2SO_4

Page 53

1. Turmeric and china rose are two natural indicators.
2. Litmus paper.
3. China rose.
4. Phenolphthalein does not show any change with acid while it change pink with bases.

Exercise

A. 1. d 2. c 3. d 4. b 5. b

B. 1. acidic 2. basic 3. indicators
4. neutral 5. salt and water

C.

Acid	Base
1. No reaction	turns blue
2. Turns red	no reaction
3. No reaction	turns pink
4. red colour	yellow
5. no change	reddish brown
6. dark pink	green colour

D. 1. Lemon and Orange contain citric acid so they are called citrus fruits.
2. Acids found in plants and animals are called organic acids.
3. Acids are not stored in metallic containers because they are corrosive in nature. They have the ability to corrode metals.
4. Bases that are soluble in water are called alkalis.

5. Indicators are substances that detect if a substance is acidic, basic or neutral.
6. When acids and bases react with each other, they form salts.
7. Reaction of acids built base to form salt and water is called neutralization reaction.
8. Silver chloride and lead chloride are not soluble in water.
9. Substances that are sour in taste are called acids.
10. We apply calamine lotion to reduce the affect of the sting.

E. 1. Three properties of acids are-
   – Acids are sour in taste.
   – Acids are corrosive in nature.
   – Acids are soluble in water.

2. Three properties of bases are-
   – Bases are bitter in taste.
   – They are slippery to touch.
   – They are soluble or insoluble in water.

3. a. HCl — It is used to manufacture ghee.
   It is used to purify salts.
   b. HNO_3 — Used to manufacture TNT
   Used to manufacture nitro-glycerine.
   c. NaOH — Used to manufacture paper, rayon.
   Used to manufacture medicines.
   d. $Ca(OH)_2$ — Used to manufacture bleaching powder.
   Used for white-washing buildings.

4. Sometimes amount of acids in our stomach increases and leads to acidity. To reduce the effect of acids, antacids are taken. Antacids contain salts such as magnesium hydroxide.

5. Sometimes soil become too acidic or basic. To make the soil fit for crop production, farmers use bases like quick lime or slaked lime.

6.

Acidic	**Basic**	**Neutral**
Sour in taste	Bitter in taste	No taste
Turns blue litmus red	Turns red litmus blue	No change on litmus paper
Example- HCl, H_2SO_4	Example- NoOH, $Ca(OH)_2$	Example- water

7.

Organic Acids	**Mineral Acids**
Acids that found in plants and animals.	Acids that are used in laboratory.
Example- Tartaric acid, oxalic acid	Example- Hydrochloric acid and sulphuric acid.

8. Curdling of milk can be prevented by adding a pinch of baking soda to it. Milk has lactic acid in it. Baking soda neutralizes the effect of lactic acid.

F. 1. Litmus paper is an indicator. It is obtained from lichens and is found in two forms- litmus solution and litmus paper. Blue litmus turns red in acidic solution and red litmus turns blue in basic solution. This is how it helps in distinguishing between acids and bases.

2. Reaction between acids and bases to form salt and water is called neutralization reaction.

$$\underset{\text{(Acid)}}{\text{Hydrochloric acid}} + \underset{\text{(Base)}}{\text{Sodium Hydroxides}} \longrightarrow \underset{\text{(salt)}}{\text{Sodium}} + \text{Water}$$

The salt obtained by the reaction is common salt which is the most important food item.

3. – Salts are generally soluble in water.
– Salts are odourless.
– Salts are neutral in nature.

– Salts are brittle, hard and crystlisize.

4. a. An acidic liquid is injected through the sting of the bee, to neutralize it calamine solution is used which is a base.
   b. Baking soda is added to milk to prevent its curdling. Milk has lactic acid and baking soda neutralize the effect of excessively produced lactic acid by bacteria in milk in hot climate.
   c. Industrial waste contains acids, to neutralise the acidic effect, base like slaked lime is added to it before it reaches any water body.

Scientific Thinker

Do it yourself

Enrichment Learning

Do it yourself

Hots

A. Yes, weak acids or dilute acids are the ones in which quantity of water is more than the acid.

B. Vinegar acts as a food preservative that is why it is used in pickles and other packaged foods.

C. 1. Ammonium sulphate 2. Sodium carbonate 3. Sodium carbonate
   4. Sodium carbonate 5. Sodium sulphate

D. 1. Turmeric
   2. Soap is basic in nature
   3. Phenolphthalein will give pink colour with soap solution.

E.

Value Based Question

Do it yourself

Chapter-6 — Matter and its Composition

Page 62

1. According to Indian Philosophers, matter is made of five elements- sky, air, fire, water and earth.
2. An atom is the fundamental unit of matter.
3. Protons, neutrons and electrons are sub-atomic particles of an atom.
4. Dalton's atomic theory states atoms are indivisible.
5. The symbol for water is H_2O.

Page 65

1. Mixture consists of two or more substances simply mixed together but not chemically combined.
2. Mixture of sugar and salt is heterogeneous because they do not have a definite composition.
3. Fe - Iron
   Cu- Copper
   Hg - Mercury
   Ba - Barium
   f - flourine
4. Sir Humphry Davy proved that calcium oxide is a correspond.

Page 68

1. Atomicity tells about no. of atoms present in a molecule.
2. Chemical formula of a compond is a set of element symbols written along with their atoms that make up its one molecule.
3. When electricity passes through water, it splits up into hydrogen and oxygen.

Exercise

A. 1. b 2. b 3. d 4. d 5. a

B. 1. Non-metals 2. Molecules 3. Aurum
4. Henry Cavendish 5. Chemical reaction

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

D.

CO_2	Carbon, Oxygen
NH_3	Nitrogen, Hydrogen
H_2SO_4	Hydrogen, Sulphur, Oxygen
$KMnO_4$	Potassium, Manganese, Oxygen
HNO_3	Hydrogen, Nitrogen, Oxygen
HCl	Hydrogen, Chlorine
P_4O_{10}	Phosphorus, Oxygen
$C_{12}H_{22}O_{11}$	Carbon, Hydrogen, Oxygen
$CuSO_4$	Copper, Sulphur, Oxygen
H_2CO_3	Hydrogen, Carbon, Oxygen
NaOH	Sodium, Hydrogen, Oxygen

E.
1. Anything that has weight and occupies space is called matter.
2. A material which is hard, opaque, shiny and has good electrical and thermal conductivity is a metal.
3. An atom is the basic fundamental unit of matter.
4. Atoms are made up of electrons, protons and neutrons.
5. An element is a pure substance that consists of only atoms with same number of protons. Iron and copper are elements.
6. A metalloid is a chemical element which enhibits some properties of metals and some of non-metals. For example- germanium and silicon.
7. Sir John Dalton.
8. (i) $2H_2 + O_2 \longrightarrow 2H_2O$
   (ii) $2Mg + O_2 \longrightarrow 2MgO$
   (iii) $N_2 + 3H_2 \longrightarrow 2NH_3$

F.
1. According to Dalton's Atomic Theory.
   (i) Each element is made up of very small and individual particle called atoms.
   (ii) Atom is an extremely tiny particle that could not be further sub-divided.
   (iii) Atoms of the same element are identical in every aspect having same mass, size and chemical properties.
   (iv) Atoms can neither be created nor can be destroyed.
   (v) In chemical reactions, atoms are combined separated or rearranged.

2.

Heterogeneous	Homogeneous
A mixture that shows visible that shows visible boundaries of its constituents when examined closely.	It does not show any visible boundaries of its constituents when examined closely.
Example- mixture of air and carbon particles	Example- salt solution

3. Properties of chemical compounds are-
   - Every compound has its components present in a definite ratio.
   - Every compound has its properties that differ from those of its components and cannot be detected separately.
   - A compound may be solid, liquid or gas.
   - The smallest particle of a compound is a molecule, not atom.
   - Compound occur in a variety of colours.
4. A chemical change that gives off heat is called an exothermic reaction while one that absorbs heat is called an endothermic reaction.
5. Atomicity is the number of atoms present in a molecule. For example, oxygen exists as a diatomic molecule which means that a molecule of an oxygen contain two atoms. Hence, its atominity is 2.
6.

	Metals	Non-metals
•	All metals are solid except mercury.	Non-metals are brittle in nature.
•	Metals are malleable.	Non-metals are not malleable.
•	Metals are ductile.	Non-metals are non-ductile.
•	Metals have high boiling and melting point.	Non-metals do not have high melting and boiling point.
•	Metals are good conductors of electricity.	Non-metals are generally bad conductors of electricity.

7. Physical properties of non-metals are-
   - Non-metals are brittle in nature. They cannot be beaten into sheets.
   - They do not possess lusture and cannot be polished.
   - They are generally bad conductors of heat and electricity.
8. An atom itself is made up of three tiny kinds of particles called sub-atomic particles- protons, neutrons and electrons. The protons and the neutrons make up the centre of the atom called the nucleus and the electons fly around above the nucleus in a small cloud. The electrons carry a negative charge and the protons carry a positive charge. In a normal atom, the number of protons and the number of electrons are equal.
9. Iron can be seperated from powdered sulphur by bringing a magnet near the mixture. It will attract the iron dust that will stick to it leaving the sulphur-powder behind.

G. 1. Physical properties of metals are:
   - All metals are solid except mercury which is a liquid.
   - Metals have high boiling and melting paint.
   - Metals are malleable, i.e., they can be beaten into sheets.
   - Most of the metals are ductile, they can be drawn into the wires.
   - Metals are the good conductors of heat and electricity.

2.

Atom	Molecule
An atom is the smallest particle of an element which cannot exist alone.	A molecule is the smallest particle of a substance which has an independent existence.
It takes part in a chemical reaction.	A molecule may also take part in a chemical reaction.
An atom is composed of electrons, protons and neutrons.	A molecule is composed of atoms of some or of different elements.
An atom does not decompose in chemical reaction.	A molecule can decompose in chemical reaction.

3. Properties of mixture are:
   - It has its constituents present in any ratio.
   - A mixture is generally made up of atoms of more than one element particle of compound or both.
   - Its constituents can be separated by simple mechanical methods.
   - Heat is generally not involved in the formation of a mixture.
   - A mixture can be a solid, liquid or gas.
4. Type of chemical reactions are:
   (i) $A \longrightarrow B$

   In this, a single substance undergoes a chemical reaction to become a new substances, e.g., a piece of paper burns into ash.

   (ii) $A \longrightarrow B$

   In this, a single substance breaks up into new substances.

   (iii) $A + B \longrightarrow C$

   In this, two substances react to form a new substance.

   (iv) $A + B \longrightarrow C + D$

   In this, two substances react to form two new substances.
5. Some compounds with their chemical composition are:
   - Water is a compound of hydrogen and oxygen in the ratio 2 : 1.
   - Sugar is a compound of carbon, hydrogen and oxygen in the ratio 12 : 22 : 11
   - Carbon dioxide is a compound of carbon and oxygen in the ratio 1 : 2
   - Methane is a compound of carbon and hydrogen in the ratio of 1 : 4.
   - Ammonia is a compound of nitrogen and hydrogen in the ratio 1 : 3.

Scientific Thinker

A. Do it yourself.
   - 3. Lower than that of separate atoms.
   - 1. (Mass of liquid A) + (Mass of liquid B) - Mass of solid

B. $N_2 + 3H_2 \longrightarrow 2NH_3$

Enrichment Learning

Do it yourself.

Hots

A. Steel reacts with acids present in the pickle and forms rust therefore we should never put steel spoons in pickle containers.

B. Burning of LPG involves both physical and chemical change. When it comes out of cylinder it is converted into liquid form which is a physical change and when it burns in air, it is a chemical change.

C. Yes, it is possible that the formula of the element will also be x. For example- all monoatomic atoms C, He, Na, Ca etc.

D. Helium atoms are very small that they cannot be retained by Earth's magnetic field. It's atoms are small and travel fast enough to escape the pull of Earth's gravitational field.

Value Based Question

Do it youself.

Chapter-7 — Climate and Adaptation

Page 75

1. Element of weather are air, temperature, humidity, amount of precipitation, wind speed and direction.
2. The scientists who study the weather are called meteorologists.
3. (a) Minimum and maximum thermometers
   (b) hygrometer
   (c) rain guage

Exercise

A. 1. c 2. d 3. d 4. b 5. d

B. 1. Earth 2. Tilt
   3. 21st March, 23rd september 4. Cooling 5. Inactive

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

D. 1. Place near the sea have moderate climate.
   2. Humidity is the amount of moisture present in air.
   3. Penguins huddle together in a group to stay warm and fight against animals.
   4. The way that the colour of an animal appears to mix with its natural environment to prevent it from being seen and attacks is called camouflage.
   5. Polar bears have fury paws to walk on the snow.
   6. Instrument used to measure humidity is called hygrometer.
   7. Rain gauge is used to measure rainfall.
   8. An imaginary line joining the North pole with South pole is called axis.
   9. Temperature depends upon lattitude, altitude and distance from the sea.

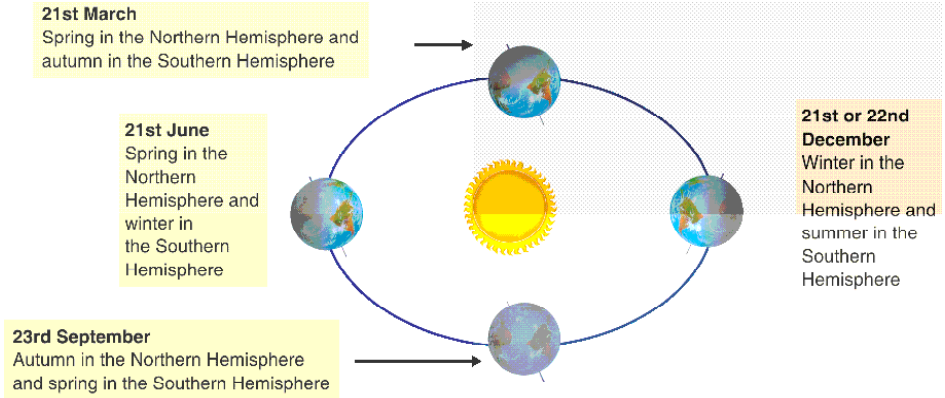
E. 1. Weather forecast tells us about the weather conditions to prevail during the day.
   Following information about weather is given in weather bulletins:
   - Maximum and minimum temperatures.
   - Time, sunrise and sunset.
   - Maximum and minimum humidity.
   - Information about weather like hot, cold, foggy, rainy, cloudy etc.

   2. The tilt in the Earth's axis and the resolution of the earth around the sun causes the formation of seasons on the earth. The part of the earth tilted towards the sun has summers and the part tilted away from the sun has winters. Thus, with the movement of the earth around the sun the seasons also get changed.
   3. Northern hemisphere is closer to the sun from 21st March to 23rd September, so it's hot during this period.
   4. Places near the equator are hot as they receive heat of the sun directly. Mumbai is near the sea bodies therefore the temperature is moderate there but Delhi is away from sea. So, there is a temperature difference between Delhi and Mumbai.
   5. Adaptations of Polar bears are:
      - It has a thick layer of fat called blubber that keep its body insulated from cold.
      - They have white coat of fur to keep themselves warm.
      - They hibernate during very cold weather.
   6. The places closer to equator are not as they recieve heat from the sun directly. Places which are located away from the equator are near the poles are cooler as they do not recieve the heat of the sun directly.
   7. Animals which can regulate their body temperature by loosing water regularly by evaporation are found in hot and humid climate.
   8. Toucan has a long beak which helps it to get fruits from the far and weak branches.

F. 1.

Weather	Climate
Short-term condition of the atmosphere in a particular place.	Weather pattern of a particular place of a long period.
Measured over a short period of time.	Measured over a long period of time.
Affected by temperature, air, pressure, moisture etc.	Affected by the climate system as well as lattitude and altitude.

2. Factors that determine the climate of a place are:
   - Distance from the equator: Places which are closer to equator are hot as they recieve heat directly from the sun and places near the poles are cool.
   - Height above the sea level: The places which are higher from the sea level are colder than the places at the sea level.
   - Distance from the sea: The places near the coastal area have moderate climate. The places away from the sea have extreme climate.



Change in seasons of the Earth

3. Same as 2.
4. The weather of a place is controlled by the temperature and humidity at that place. Temperature of a place depends on the amount of sunlight recieved by that place. It may be very hot or pleasant depending upon the temperature. Humidity is the amount of moisture present in the air,. Dry places have less humidity than the coastal area.
5. Adaptations of camel are:
   - Camel can store water in their stomach and use this water in dry conditions.
   - Camel have wide feet help them to walk on the sand.
   - Camels have long eyelashes do not allow the sand to enter in their eyes.
   - Camel can feed on prickly thorns growing widely in the desert, without being hurt as they have very thick lips.

Scientific Thinker

Do it yourself.

Enrichment Learning

Do it yourself.

Hots

A. Urbanisation has never taken place in polar regions because there won't be any industrial growth.

B. If earth was not tilted, this would no longer be season as we know them. There won't be such variation in temperature and precipitation.

C. 1. June 21 is the longest day in the nothern hemisphere.

2. The longest day in southern hemisphere is 22 December and the shortest day is 21 June.

D. Antarctica is the coldest and windest place on the earth due to which it is not easy for humans to live there.

E. 1. Porcupines 2. Sword-billed humming bird 3. Polar bears
4. Whales 5. Ostriches 6. Insects
7. Monarch butterfly 8. Elephant

F. 1. Toucan 2. It has long beak 3. Red-eyed frog
4. It has sticky pads to climb on trees

Value Based Question

Do it youself

Chapter-8 — Soil

Page 86

1. Weathering 2. Humus 3. Soil profile 4. Bedrock

Exercise

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

B. 1. Mineral, humus 2. colour and size of particles
3. sandy, clayey and loamy 4. clayey
5. Deforestation, overgrazing

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

E. 1. The uppermost layer of the Earth which is composed of mineral particles and humus is called soil.

2. The four layers of soil are:
   - Topsoil
   - Subsoil
   - C horizon
   - Bedrock

3. Bedrock is the hardest layer.
4. The rate at which water is absorbed by soil is called its percolation rate.
5. Soil is formed by continuous weathering of rocks.
6. Dead remains of organisms in the sort is called humus.
7. The disintegration of rocks on the surface of earth due to various natural reasons in called weathering.
8. The water absorbing tendency of the soil makes it favourable for the growth of plants.
9. Removal of trees on a large scale is called deforestation.

F. 1. Soil is helpful for living being as:
   - It is required for the growth of plants.
   - It is home to many insects, reptiles and other animals.
   - Different types of plants grow in it. All the animals depend on plants for the survival.

2. The earthworms dig burrows, which act as tunnels through which water crosses. This gives pathway to roots of the plants. Earthworms also help in decomposition of animals and plants. So earthworms are also called farmer's friends.

3. Acids produced by certain living organisms growing on the surface of rocks corrode the surface. Living organisms living in the fine particles of the corroded rocks die and due to action of the microorganisms these dead bodies get converted into humus. Thus, more soil is formed. This type of weathering is called biological weathering.
4. The layer of dead and decayed plant and animal matter found in the soil is called humus. The plant and animal remains are also broken down by the bacteria and other microorganisms to form humus.
5. Weathering is the process of disintegration of rocks on the surface of the earth by the exposure to natural processes like air, winds, water, roots of plants etc.
6. The process of weathering in which the chemical changes are involved is called chemical weathering. In this, the minerals break down into mineral components, which are caused by weathering agent, water.
7. A vertical section of soil, which we cut straight down into the soil and that shows the distinct layers or horizons is known as soil profile.
8. Removal of topsoil by blowing wind and flowing water is called soil erosion.
   Two measures to prevent soil erosion are:
   – Overgrazing by animals should be stopped.
   – Plantation should be done regularly.

G. 1.

Claying soil	Loamy soil
It is shiny.	It is not shiny.
It consists of two-third of clay.	One-fifth of loamy soil is clay.
It is good for growing paddy, grams and wheat.	Cotton, lentils and other pulses grow in such soil.

2. The huge pieces of rock begin to break near the surface due to physical or chemical weathering. These smaller rocks continue to weather away due to different weathering agents. This makes a layer of very small rock particles on the surface. The plant and animal remains are also broken down by the bacteria and other microorganisms to form the humus. Further the minerals and the humus seep down inside the soil with water and thus soil becomes ready for plantation.
3. Factors responsible for weathering are:
   (i) Temperature change: The heat of the sun makes the surface layers of the rocks expand more than the lower layers. These change cause the weathering.
   (ii) Water: Powerful flow of water breaks down the biggest rocks into smaller rock particles.
   (iii) Frost: The rainwater gets trapped in the crevices of rock and due to the low temperature in winters, the water freezes in them to become ice. This ice exert pressure on the rock by expanding and due to this, the crevices of plant rocks open and the process of weathering starts.
   (iv) Wind: Blowing winds affect the surface of the rocks causing weathering.
   (v) Living Organisms: Living organisms also cause weathering called biological weathering.
4. Do it youself.
5. The main causes of soil erosion are:
   – Deforestation: Cutting down of trees loosen the hold of the roots on the soil and soil is easily caused away by wind amd water.
   – Overgrazing: Due to overgrazing the land is not allowed to grow more grass and the land becomes barren. Barren land is prone to soil erosion by wind and water.
   – Rainfall and floods: Excessive rainfall causes the topsoil to get drained with water. It also causes floods which wash away the top furtile land due to erosion.
   – Improper farming: If farming is not done properly in the fields, the soil becomes prone to erosion. Dry soil is swept away by winds.

Scientific Thinker

Do it yourself

Enrichment Learning

Do it youself

Hots

A. Humus is formed by dead and decaying plants and animals. When small plants die, they mix with the soil to form humus. These plants and animals are confined to topsoil. Hence, topsoil has more humus than subsoil.

B. Mass of soil sample = 250 g

Mass of dived soil = 220 g

Mass of water der = 250 – 220

= 30 g

Percentage of water $= \frac{3\cancel{0}}{25\cancel{0}} \times 100$

$= \frac{300}{25} = 12\%$

C. $\frac{100-90}{80} \times 100$

$\frac{10}{8\cancel{0}} \times 10\cancel{0} = \frac{100}{8} = 12.56\%$

Value Based Questions

Do it yourself

Chapter-9 — Respiration in Living Organism

Page 97

1. We breathe 22,000 times a day.
2. Chemical equation involved during respiration is $C_6H_{12}O_6 + 6O_2 \longrightarrow 6H_2O + 6CO_2 +$ energy.
3. Respiration that takes place in absense of oxygen is called anaerobic respiration.

Page 99

1. Larynx is voice box which lies at the top of trachea.
2. Epiglottis is the flap that closes the wind pipe when we swallow food.
3. The fluid is called pleural fluid. It protects the lungs from mechanical injuries.
4. Haemoglobin helps in transporting oxygen.

Page 103

1. Exchange of gases in Amoeba takes place through diffusion and in cockroaches through spiracles.
2. Roots taken in oxygen present in the gaps of soil particles by diffusion. The oxygen diffused through the root hair passes into the roots and end product CO_2 moves out.
3. Stomata

Exercise

A. 1. d 2. c 3. c 4. c

B. 1. Chemical 2. aerobic 3. Diapgragm 4. glottis 5. dark

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

D. 1. Two types of respiration are:
   - Aerobic respiration
   - Anaerobic respiration

2. The glottis is protected by a leaf shaped flap of cartilage called epiglottis.
3. The other name of larynx is voice box.
4. Animals and plants that use oxygen for respiration are called aerobics.
5. We breathe in and out for 22,000 times a day.
6. The end products of aerobic respiration are carbondioxide, water and energy.
7. The main organs of respiratory system are lungs, nasal cavity, pharyx, larynx, tranchea and bronchi.
8. At the end of bronchioles, there is a cluster of tiny and thin-walled sacs called alveoli.
9. Movement of air out of the bronchiole tubes is called exhalation.

E. 1. Respiration is a series of chemical reactions which help in the release of energy. It is a chemical process in which food breaks down into simpler substances and release energy essential for life.

2. a. Nostrils: Air containing oxygen enters the body through nostrils.
   b. Pharynx: It is a common passage for both the respiratory and digestive system.
   c. Larynx: It is also called voice box. When air passes through the larynx, vibrations are produced in the local cords which results in production of sound.

3. There is a pair of vocal cord present inside the larynx. When air passes through the larynx. Vibration are produced in the vocal cords and it results in production of sound.
4. Sugars are broken down by yeast, through anaerobic respiration into ethyl alcohol in browing industries. This process is called fermentation. It is used in bread making industries and also used to make cake.
5. Trachea is 10-12 cm long tube with a diameter of 2-3 cm. It is supported by 15-20 cartilaginous rings. At its lower ends, it divides into bronchi. Each bronchies further divides into bronchioles At the end of each bronchioles, there is alveoli and each alveoli is surronded by blood capillaries.
6. Cartilaginous rings support the walls of bronchi.
7. Blood enchange oxygen and carbondioxide during breathing through alveoli.
8. When dust particles, pollen or smoke enters the nostrils, the nose may become irritated or tickle. When this happens, we sneeze to clear our nose. When a forign object lodges in the throat or windpipe, it blocks the flow of air due to which we choke.
9. Trees release carbondioxide at night. That is why people are advised to not sleep under a tree during the night.

F. 1. In humans, a pair of lungs is present in the thoracic cavity. One on each side of the heart. These are called right lung and left lung respetively. The right lung has three lobes and two fissures while the left lung has two lobes and only one fissure. Below the lungs is present a doms-shaped muscular sheet called diaphragm. Diaphragm help in process of breathing.

2. While doing physical activities, our body needs more energy. Energy is released in the body when oxygen breaks down the food taken. So, to obtain more energy, more oxygen is required. To meet the required amount of oxygen, we breaths rapidly.
3. To show that air exhailed by us contains CO_2, breathe out air through your mouth so that it can react inside the test tube that contains lime water. The lime water will turn milky showing that the air breathed out contains CO_2.
4. Amoeba lives in fresh water. The outer covering of its body has plasma membrane through which oxygen present in water diffuses into its body. Besides, it also breathes out CO_2 through plasma membrane. In this way, the process of respiration is carried out by amoeba.

5.

Breathing	Respiration
It is a physical process of inhalation and exhalation. No chemical reaction takes place.	It is a series of chemical reactions that result in the release of energy by the breakdown of food molecules.
No enzymes or other catalysts are involved.	Enzymes and other catalysts are involved.
It takes place outside the cells.	It takes place inside the cells.
No energy is released during this process.	Energy is released during this process.

6.

Aerobic Respiration	Anaerobic Respiration
Respiration in the presence of oxygen is called aerobic respiration.	Respiration in the absence of oxygen is called anaerbic respiration.
Large amount of energy is released.	Little amount of energy is released.
End products are carbon dioxide, water and energy.	End products are ethyl alcohol and lactic acid.
Animals and plant breathe anarbically.	Yeast and bacteria breathe anarbically.

7. In the process of internal respiration, food is broken down into simple substances and energy is produced. During the process of inhalation, air reaches the lungs. Here, oxygen from the air is diffused in the blood and combines with haemoglobin to form oxyhaemoglobin. On reaching the tissue capillaries, oxyhaemoglobin dissociates to release oxygen. This oxygen released in the tissues is the utilized breaking down of food, releasing energy, waste products, carbon dioxide and water.

   The carbon dioxide formed enters the blood from the tissues. Carbon dioxide is released from the lungs into the atmosphere during exhalation.

8. Exchange of grass takes place in fish through gills. A fish takes in water through its mouth, the water passes through the gills where oxygenated water give oxygen to the blood. A pumping mechanism then carries the oxygenated blood throughout the body of the fish. similarly carbon dioxide is given out. Frogs have dual mode of breathing. They can live on land as well as in water. They have thin and moist skin for exchange of gases. They also have lungs to breathe on land.

9. In plants, each part can independently taken in oxygen from air and utilize it to obtain energy and give out carbon dioxide. Plants can respire through roots, stems and leaves.

Scientific Thinker

Do it yourself

Enrichment Learning

Do it youself

Hots

A. Yawning helps in bringing more oxygen to the blood and move more carbon dioxide out of the blood. When we are bond or tired, we don't breathe as deeply as we usually do therefore we yawn.

B. Fish die when taken out of water because gill arches of fish collapse, when taken out of water, leaving the blood vessels no long expand to oxygen in air.

C. Sportsperson get cramps in their legs because while doing physical activities muscles respire anaerobically due to which lactic acid is produced which leads to cramping.

D. 1. Animals B 2. Animal C 3. Animal A 4. Dolphin

E. 1. Earthworms 2. Frog 3. Man 4. Fish 5. Cockroach

Value Based Questions

Do it yourself

Chapter- 10 — Transportation in Plants

Page 110

1. Mineral are present in the form of dissolved salts in the soil.
2. Root hair absorb minerals from the soil by the process called active transport.

Exercise

A. 1. c 2. c 3. b 4. b 5. c.

B. 1. Vascular 2. sugar 3. diffusion, osmosis
4. swell, turgid 5. permanent

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

D. 1. The other name of transportation system is vascular system.
2. The upward movement of water and minerals is called ascent of sap.
3. There is a network of phloem tubes spread throughout the plant body which is called sieve tubes.
4. Plants make the food by the process called photosynthesis.
5. Xylem.
6. Phloem transports sugar from the leaves to other parts of the plant.
7. When the rate of absorption is lower than the rate of transporation, the leaves of the plants drop and strart wilting.

E. 1. Plants in deserts hair thorns to reduce the rate of transpiration so that they could survive even in the scarcity of water.

2. a. Imbibition: Absorption of water by both living and dead tissue of the plant when soaked in water is called imbibition.
   b. Translocation: The movement of carbohydrates to different parts of plant is called translocation.

3. Movement of molecules from the region of greater concentration to region of lesser concentration is called diffusion and movement of water molecules from a region of lower concentration to a region of higher concentration through the semi-permeable membrane.

4.

Xylem	Phloem
It transport water and minerals from the roots to the leaves of the plant.	It transport food from leaves to other parts of a plant.
It transports water and mineral salts in one direction only.	It transports in both upward and downward direction.

F. 1. Transporation of water and mineral salts in the plants take place through xylem. Xylem carries water and minerals from the roots to the leaves of the plant. It is made up of dead cells and transports water and minerals salts only in an upward direction.

2. Plants absorbs water from the soil continuously. A small amount of this water is used up by plants in photosynthesis and the rest of water is lost from the plants through transpiration.

3. Effects of transpiration are:
   – It is responsible for maintaining turgidity and thus helps in growth of plants.
   – Transpiration has cooling effect on the plant and maintains proper temperatures for other physiological activities.

– It creates low pressure in upper portion of the plants that helps in transportation of water and minerals upward.

4. Activity

Aim: To show that plants carry on the process of transpiration.

Method: Take a small potted plant and water it. Now cover the plant with a glass jar. Cover the soil of the plant with a polythene bag. Keep this set-up in the sunlight for a few hours. You will observe water droplets on the inner walls of the glass jar. Actually during transpiration water from the leaves is released in the form of water vapour which condenses when comes in contact with the inner wall of the jar. This proves that plants carry on transpiration and water is lost from the plant in the process.

Enrichment Learning

A. Do it yourself

B. Do it youself

C. 1. Xylem 2. Osmosis 3. Diffusion
4. Phloem 5. Root hair 6.

Hots

1. Due to transpiration of water leaves, the suction pressure is created which pulls water upwards from the roots. As water is released out through transpiration, more water is absorved by the roots.
2. Xylem transports water and minerals in upward direction only learn all the other parts of the plants are in upward direction. Phloem transports food prepared by the leaves in both direction because each part whether upward or downward, needs food.

Value Based Question

Do it yourself.

Chapter - 11 — Transportation in Human Beings and Animals

Page 116

1. Blood is composed of red blood cells, white blood cells and platelets.
2. WBCs are produced in bone marrow.
3. Platelets help in clotting.

Page 121

1. A streaming movement of the cell substance is called cyclosis.
2. The insects such as cockroach, ant and grasshoppers have open circulatory system.

Exercises

A. 1. c 2. a 3. d 4. a

B. 1. Oxyhaemoglobin 2. Soldiers 3. Transfusion 4. Simple diffusion

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

D. 1. Circulation is the process by which nutrients, respiratory gases and waste products are transported through living organisms.
2. The three types of blood vessels are: arteries, veins and capillaries.
3. An instrument used to listen to the heart beat is called stethoscope.

4. The two types of blood circulation are-
   – Pulmonary circulation of blood
   – Septemic circulation of blood
5. Red blood cells are responsible for transport of oxygen.
6. WBCs are called soldiers of the body because they fight against disease by destroying harmful bacteria and other foreign materials.
7. The number of times our heart beats in a minute is called pulse.
8. William Harvey
9. A fluid equivalent to bood in organism such as ant and cockroaches is called haemolymph.

Page 120

1. Heart
2. Arteries, veins and capillaries
3. Hepatic vein
4. Heart beat- stethoscope
   blood Pressure - sphygmo-manometer.

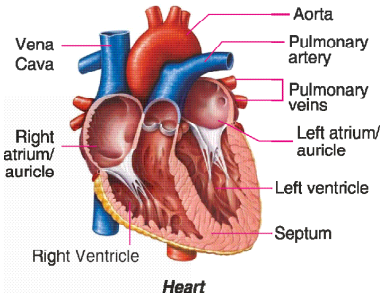
Exercise

E. 1. Blood is composed of a fluid portion plamsa and three types of corpuscles namely RBCs WBCs and blood platelets.
2. Plasma acts in blood clotting and in defense of the body against disease.
3. The circulatory system carries oxygen, nutrients and harmones to cells and removes waste products like carbondioxide. Hence, it is important.
4.

RBCs	WBCs
Red blood cells are also called erythrocytes.	White blood cells are called leukocytes
They are very small in size.	They are comparatively larger.
They help in transport of oxygen.	They help in fighting against diseases.

5. Capillaries form a network of extremely thin walled blood vessels which act as a medium between arteries and veins. An exchange of materials between the blood and the cells of the tissues take place easily through diffusion.
6. One complete pulsation of the heart is called a heartbeat.
7. Earthworms have a well-developed circulatory system. It consists of a network of blood vessel which is in contact with almost all cells of the body. Blood is also present inside the tubes in earthworms consists of mainly water dissolved substances and the pigment called haemoglobin which helps in transportation of oxygen and nutrients.

F. 1. Heart is a muscular organ located in the chest-cavity between the lung. It is positioned slightly towards the left in the thoracic region and is enveloped by the pericardium. The human heart works tirelessly throughout its life- It is divided into four chambers- two upper chambers called atria and two lower chamber called ventricles.



Heart

2.

Arteries	Veins
They carry blood from heart to different part of the body.	They collect blood from different parts of the body and take it to the heart.
They are thick walled tubes.	They have thinner walls.
They are deeply placed under the skin.	They are placed closer to skin.
The blood in them moves with pressure.	The blood in them does not move with pressure.
They carry oxygenate blood except pulmonary artery.	They carry deoxygenated blood except pulmonary vein.
There are no valves inside the arteries.	There are series of valves inside the veins.

3. The liver receives its blood supply through the hepatic artery, a small branch of aorta Blood from the intestine is also brought to the liver where excess of certain nutrient is converted into suitable forms for storage. The blood vessel carries the blood from the intestine to the liver is called the hepatic vein. Blood from the liver is carried by hepatic vein that joins the injuries vena cava.

   Renal arteries arising from the dorsal aorta supply the blood to the kidneys and renal veins that join the inferior vena cava carry the blood away from the kidneys.

4. In case of heavy blood loss, the patient is provided with the blood from a healthy person. The blood is transfered through the veins of the patient. This is called transfusion of blood. Different persons have different blood groups such as A, B, AB and O. These blood groups can either be + ve or -ve. In case of blood transfusion, the recepient and the donor must be of the same blood group. If the blood group of donor does not match properly with that of the recipient, the red blood cells can sick together and may cause death.

5. There are two types of blood circulation in our body.
   Pulmonary Circulation of Blood
   Systemic Circulation of Blood

   Pulmonary Circulation of Blood: Deoxygenated blood is collected form different parts of the body by veins and this blood is sent to right auricle. This is then transfered to the right ventricle and is pumped into th right pulmonary artery which carries it into the lungs. In lungs, the blood is oxygenated and is carried by pulmonary vein to the left auricle.

   Systemic Circulation of Blood: The oxygenated blood from the left auricle passes to the left ventricle and is then pumped to all parts of the body to supply oxygen and other materials. This process goes on and on and our body gets required amount of oxygen.

Scientific Thinker

Do it yourself.

Enrichment Learning

A. Do it yourself. B. Do it yourself. C. Do it yourself.

D. 1. Haemoglobin 2. Platelets 3. Donor 4. Veins
   5. Dialysis 6. Artery 7. Ventricles

Hots

1. The venticles of the heart have thick muscular walls than the avricles because the blood from the ventricles of the heart is pumped out of the heart at greater pressure compared to aricles.
2. Oxygenated and deoxygenated blood will get mixed both lungs and tissues would receive blood wih same amount of oxygen which would affect the efficiency of O_2 to the tissues of the body.
3. 1. (i) Heart (ii) Blood 2. Red
   3. (i) Oxygen (ii) Nutrients 4. Carbon dioxide

Value Based Question

Do it youself

Chapter - 12 — Excretion in Human Beings and Animals

Page 129

1. If both the kidneys of a person get damaged there are two option:
   a. Dialysis b. Kidney Transplant.
2. Excretion takes place through diffusion in unicellular organisms.
3. Excretory organs of insects is malphighian tubules.

Exercise

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

B. 1. Egestion 2. Kidneys 3. Nephron
4. Urinary bladder 5. Blood

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

D. 1. Urine and sweat are the two types of liquid wastes.
2. Sweat comes out of the body through the small pores present in our skin.
3. Human excretory system consists of kidney, ureter, urinary bladder and urethra.
4. Expulsion of faccal wastes out of our body is called egestion.
5. Nitrogeneous waste such as ammonia, urea and uric acid is excreted from our body.
6. Kidney are present in the abdomen, just above the waist on either side of the backbone.
7. Urine and sweat contain waters dissolved salts and urea.
8. Ureters join two kidneys to the urinary bladder.
9. Nephridia helps earthworms in excretion.

E. 1. When gases are exchanged by respiration, oxygen is utilized to produce energy from the food. It results in the form of carbondioxide and water. Carbon dioxide is a gaseous waste which is expelled out of the body. This process is called exhalation.
2. If urine test shows that it contains glucose, it is considered that person is suffering from diabetes. Frequent discharge of urine also indicate that the man may be suffering from diabetes.
3. Excretion is a life process of removing solid, liquid and gaseous waste.
   – Liquid wastes are removed in the form of urine or sweat.
   – Gaseous wastes are removed by the process called exhalation.
   – Solid wastes are removed in the form of faeces.
4. Kidney contains functional unit called nephrons. They are tine filtering unit of the kidney. Each nephron has bowman's capsule at one end and the rest part of the nephron is differtiated into a pronimal convoluted tubule, a v - shaped thin tubule and a distal tube. Nephrons filter blood which passes through the kidneys.
5. During dialysis, blood from the arm is allowed to flow into a dialysis machine. This is made up of a long cellophane tube coiled in a chamber with a dialysing solution. When the blood passes through this machine, the impure substances are separated and the pure blood is sent to patient's body.
6. Fish produce large volumes of dilute urine and take in salts from water through specialised cells in their gills. Nitrogenous waste is diffused as ammonia through skin.

F. 1. The components of food that remain undigested get collected in the last part of the large intestine called as rectum and comes out of the body through anus. This process is called egestion.
Types of waste products thrown out of the body are-

Solid wastes : Undigested food in the form of faecus
Liquid waste: Urine and sweat
Gaseous waste: Carbon dioxide

2. Do it yourself.
3. Any type of malfunction of kidneys can be dangerous for life.
   - If urine test shows glucose, person may suffer from diabetes.
   - Frequent discharge of urine also indicate that the man may be suffering from diabetes.
   - If urine contains blood, the person may have infection in excretory system or kidney failure.
4. Excretion in Amoeba
   It is a unicellular organism. It lives in fresh water. Waste products which mainly contain ammonia gets out of its body through the process of diffusion or with the help of contractile vacuole.
5. Excretion in cockroach
   In insects, the excretory system constitutes a bunch of long tubules called malphigian tubules. The waste inside insect's body contain mainly uric acid which is discharged along wih faces.

Scientific Thinker

Do it yourself.

Enrichment Learning

Do it yourself.

Hots

A. During summers we sweat more in order to maintain our body temperature. If we do not drink more water we excrete yellowish urine.
B. Regular exercise and low fat-oils.
C. Injecting medicines in the blood allow rapid absorption.
D.
E. P - kidneys
   Q - Nitrogeneous waste
   R - Nephrons
   S - Dialysis

Value Based Question

Do it youself

Chapter - 13 — Reproduction in Plants

Page 135

1. Reproduction is a life process which enables an organism to reproduce its own offspring.
2. Plants reproduce by three different ways-
   - Asexual reproduction
   - Vegetative reproduction
   - Sexual reproduction
3. When plant cells divides its body into two cells it is called binary fission and when parent cells divide its body in multiple cells it is called multiple fission.

4. a. Amoeba - Binary fission
   b. Yeast - Budding
   c. Mould - Sporulation
   d. Spirogyra - Tragmentation

Page 138

1. Grafting 2. Layering 3. Tissue curture

Page 141

1. Fusion of gametes is called fertilization. The process in which haploid male and female gametes meet and fix together to from a zygote is called fertilization.
2. Two types of pollination are there-
   – Self pollination
   – Cross pollination
3. When seeds spread, it is called dispersal of seeds.
   a. water - coconut seeds
   b. animals - spines
   c. explosion of fruits - balsam

Exercise

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

B. 1. Reproduction 2. Scion, stock 3. Zygote
   4. Pollination 5. Wings

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

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

E. 1. Life process of producing one's own kind is called reproduction.
   2. Vegetative Parts: Roots, stems and leaves
   Reproductive Parts : Flowers
   3. Fragmentation occurs in algae.
   4. The process of fusion of male and female cells is called fertilization.
   5. In asexual reproduction single parent is divided by itself and reproduce its offspring.
   6. Yeast reproduce through budding.
   7. It is a type of asexual reproduction in which new plants are produced from the vegetative parts of parent plant.
   8. The transfer of pollen grains from the anther of one flower to the stigma of the same or another flower is known as pollination.
   9. Pollinating agents are insects and wind.
   10. The process in which the haploid male and female gametes meet and fuse together to form a zygote is called fertilization or syngamy.

F. 1. Amoeba reproduces through budding. The parent cell divide its body into two cells and each of them grows to the size of the parent cell. The process goes on and the species continue to exist. The word fission means division.
   2. Regeneration is regaining of the best parts of a plant. The grass on a lawn is moved and it grows again with more vigor. Trees pruned or cut down during winters grow bitter during summers. The lost branches and leaves are regenerated from time to time to give shape and keep them full of green leaves.
   3. (i) Grafting Mango Guava

Cutting	Rose	Sugar cane
Layering	Jasmine	Azalea
Tissue culture	Orchids	Chrysamthemuns

4. Some organisms like yeast glow small outgrowth from their body. This outgrowth is a bud. The nucleus of the parent divides and one of the nuclei moves into the bud. The nearby formed bud either detaches from the parent or starts producing another bud.
5. The methods of artificial propagation are-
   (i) Grafting (ii) cutting (iii) Layering (iv) Tissue culture.
   Cutting- Stem cuttings with joints in them are buried in the soil in this method. In due course, a plant grows out of the joint. Rose plants, sugarcane grow in this manner.
6. After the development of the zygote, the flower slowly withers and only the ovary is left back. The zygote in each ovule slowly develops into a seed.
7. If seeds won't get dispersed then they will fall at the same place and there will be competition of sunlight, water and nutrients. Therefore, they need to be dispersed.
8. The different ways of seed dispersal are-
   Wind- Seeds of drumstick and maple have wings that help them move with air.
   Water- Some seeds and fruits are carried to long distances by water before they develop into new plants.
   Animals- Animals are an important medicines for the dispersal of seeds.
   Explosion- Fruits of some plants burst when they ripen. This result in scattering of seeds in adjoining area.

G. 1. Different types of vegetative propagation are-
   Roots- The swollen roots of plants like sweet potato, dahlia etc buried in the soil give new plants. A new plant grows out of these roots because these roots have food stored in them.
   Stem- Some plants reproduce through stem. The swollen parts of these plants are their stems. For example: Potato.
   Runners- Grass and oxalis are runner. Thin stems grow horizontally and are parallel to the ground.
   Rhizomes- Ginger, turmeric and banana have buds which give size to new plants. Outgrowth are produced from the buds and a new plant in bom.
2. Advantages of vegetative propagation are-
   It is a faster and more certain method of reproduction. Sometimes the seed may not germinate due to unfavourable conditions. But in this case, a new plant directly grows from a part of the parent plant. New plants exactly resembling the parent plants are formed. Thus it helps in conserving characteristive features of the parent.
   Plants which do not have flowers or seed can reproduce with this method.
3. a.

Unisexual	Bisexual
A flower that has either male or female gametes is called unisexual flower.	A flower that has both male and female cells is called bisexual flowers.
They are called incomplete flowers	They are called complete flowers.
Flowers in papaya, watermelon, corn and mulbury are some example of unisexual flower.	Flowers in rose, lily mustard are example of bisexual flowers.

b.

Self Pollination	Cross-Pollination
Pollen of one flower is transfered to the stigma of the same flower.	Pollen of one flower is transferred to the stigma of another flower.
It occurs in flowers which are genetically identical.	It occurs in flowers which are genetically different.
Self pollination is observed in orchids, sunflowers, pea etc.	Cross pollination is observed in tulips apples, plums.

c.

Internal Fertilisation	External Furtilisation
It takes place inside the female's body.	It take place outside the female's body.
Large number of eggs are not released.	Large number of eggs are released.
Examples- Tiger and piegon.	Examples- Fish, frog

4. The process in which haploid male and female gamete meet and fuse together to form a zygote is called fertilisation.

   There are two types of fertilisation-

   (i) Internal fertilisation

   (ii) External fertilisation

   Internal fertilisation- When fertilization takes place inside the animal's body it is called internal fertilization.

   External fertilisation- When fertilisation takes place outside the animal's body, it is called external fertilization.

Enrichment Learning

Do it yourself

Hots

A. If pollination does not occurs fertilisation cannot take place because without pollination male and female gametes cannot come closer.

B. Insect-pollinated flowers cannot be pollinated by wind because the anther and pistils remain covered by petals.

C. 1. Sporangia 2. Hyphae 3. Sporangium

D. 1. By wind- Maple, drumstick, sunflower.
   2. By water- coconut, oak (Madar)
   3. By animals - Urena, xanthium
   4. By explosion - Balecsm, castor

Value Based Question

Do it yourself

Chapter - 14 — Time and Motion

Page 148

1. Sundials were based on change in the length of the shadow with change in the position of the sun.
2. There are 60 minutes in an hour.
3. Stopwatch is used for measuring short intervals of time accurately.

Page 152

1. To measure distance, odometer is used.
   To measure speed, speedometer is used.
2. $\text{Speed} = \frac{\text{distance}}{\text{time}}$

   $= \frac{720}{6}$

   $= 120$ km/hr

3. For uniform motion we will get a straight line.

Exercise

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

B. 1. Jantar Mantar 2. rotation 3. Christiaan huygens
4. Digital 5. non-uniform

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

D. 1. In ancient time, people got a rough idea about time from sunrise, sunsets etc.
2. Water clock worked on the principle of regulated flow of water.
3. The time taken by a pendulum for one oscillation is known as its time period.
4. Two time measurement devices are- quartz clock, digital watch.
5. If the length is increased time period also increases.
6. The balance wheel works in the same way as a pendulum in a clock.
7. Stopwatch is used to measure short interval of time accurately.
8. Distance covered by an object in unit time is called speed.

E. 1. Sand clock is based on the principal that a certain quantity of sand falls from the upper chamber into the lower chamber in an hour.

2. An object is said to be at rest if its position does not change with time with respect to the observer.
An object is said to be in motion if its position changes with time with respect to the observer.

3. Speed $= \frac{\text{distance}}{\text{time}}$

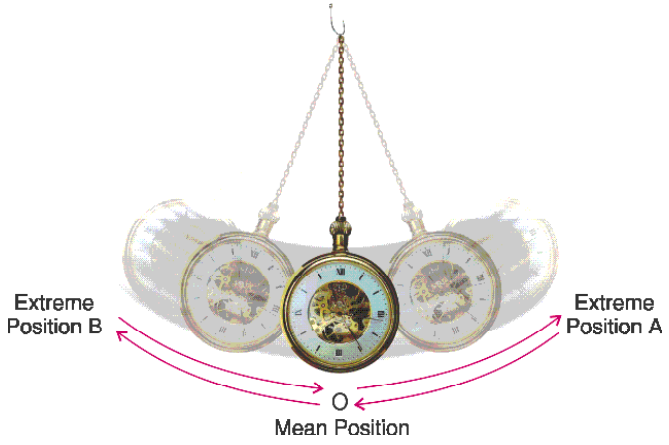
$= \frac{360}{6}$

$= 60$ km/hr

4.

Uniform Motion	Non-uniform Motion
When an object move with a constant speed and covers equal distances in equal intervals of time.	When an object covers unequal distances in equal intervals of time.
Example- motion of car on a straight road.	Example- motion of a bee.

F. 1. A pendulum consists of weight tied to a string at the lower end. The metal ball is called the bob of the pendulum. The upper end of the string is attached to a support. When the pendulum is at rest, it is in its mean position 0. If the bob is given a small push from itss position of rest, the pendulum makes to and fro movements about its mean position. This is how a pendulum works.

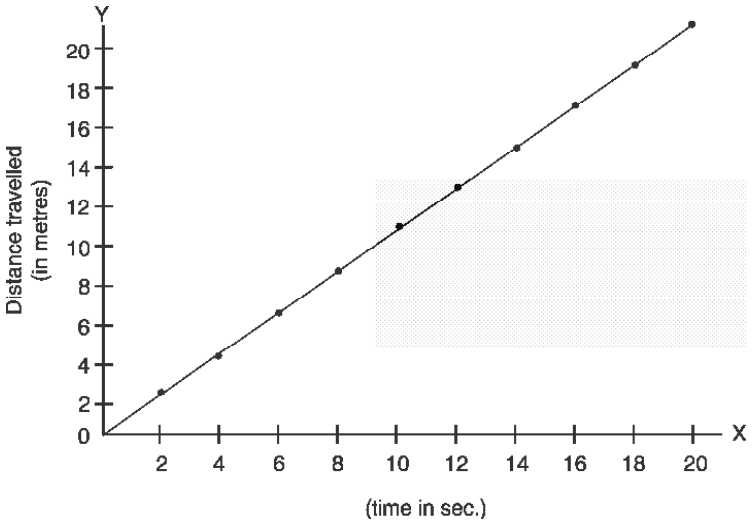


2. Quartz clock- These clocks work on the basis of vibration certain crystals of a substance. The

crystals are called quartz and the watches in which there quartz are used are called quartz watches. These watches and clocks are widely in use. They can give time in fraction of second.

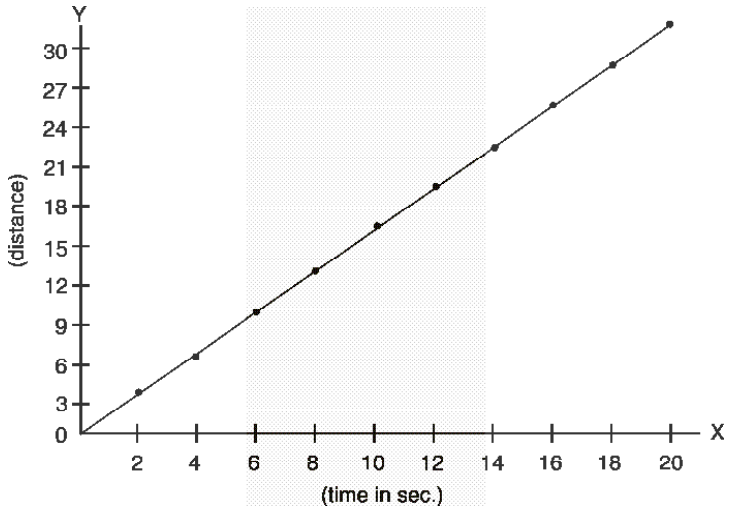
Digital watches: These watches displaying time in digits. They do not have hour, minute or second hands. Most of the scientific equipment consists of digital watches.

3. a.



This shows uniform motion.

b.



This shows uniform motion

Scientific Thinker

Do it yourself

Enrichment Learning

Do it yourself

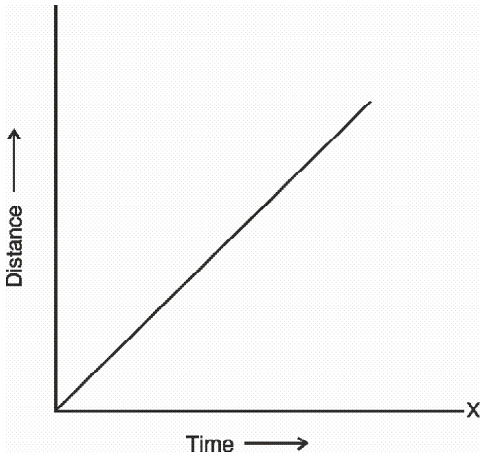
Hots

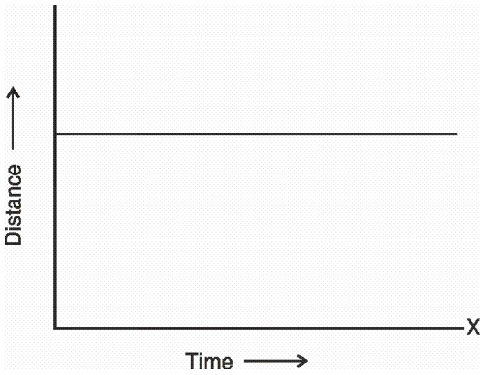
B. More is the speed, more will be the slope.
So, X won the race.

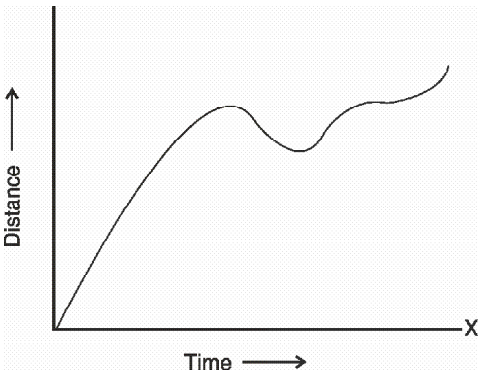
C. Average Speed = $\frac{30 + 25 + 35}{3}$

$= \frac{90}{3} = 30$ km/hr.

D. 1.







E. C

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

Value Based Question

Do it yourself

Chapter - 15 — Electric Current and Its Effects

Page 161

1. Battery 2. Ammeter 3. Galvanometer 4. Tungsten 5. Fuse

Exercise

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

B. 1. Voltmeter 2. ISI 3. Concentric
4. Gong 5. Increases

C. 1. Batbay 2. Switch 3. Bulb
4. Ammeter 5. Galvanometer 6. Voltmeter

D. 1. Some circuit element are bulb, switches, batteries, wire etc.

2. Flow of electric current from the positive terminal to the negative terminal of a battery is called an electric circuit.

3. The three of electric current are-
   (i) heating effect of electric current
   (ii) Magnetic effect of electic current
   (iii) Chemical effect of electric current

4. The degree to which a material opposes the passage of current through itself is called its resistance.

5. Heating effect of electric current is used in room heater, electric toasters, hot plates, electric irons etc.

6. Unbroken path is called closed circuit.

7. The wire through which current passes in a bulb is called filament.

8. Filament in electric bulb utilize heating effect of electric current.

9. 

10. The tightly wound coils found in the appliances which heats up is called heating element.

E. 1. When the circuit is completed all electric elements start working. This type of electric circuit is called closed electric circuit.

   If the flow of current is broken at any point of the circuit, it is called an open electric circuit.

2. When a bulb fuses it does not glow because a broken filament breaks the circuit and current can no longer flow in it.

3. A soft iron piece with coiled wire, behave like a magnet when electric current is passed through it. It is called an electromagnet.

4. An element which comes in the path of an electric circuit such as lamps, conducting wires, switches etc., are called element of electric circuit.

5. A fuse is a safety device which works when a sudden flow of high electric current passes through the circuit.

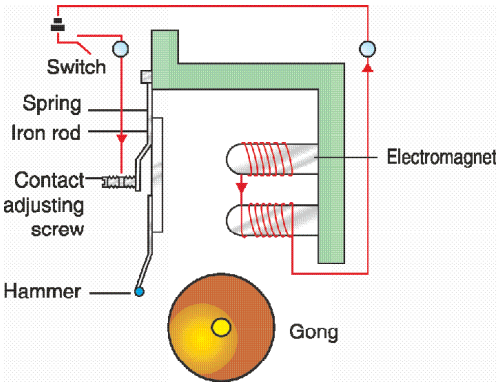
6. MCBs are switches which turn off automatically when there is an overflow of current or when current exceeds the safety limit.

7. MCBs last longer than fuses. Fuses need to be replaced after single operation whereas MCBs work for longer time. MCBs are much safer than the fuses.

8. Three uses of electromagnets are:
   (i) Electromagnets are used to separate iron from the scrap.
   (ii) They are attached to the large cranes to carry heavy loads of iron in shipyard.
   (iii) They are used in number of appliances like fans, electic motors, T.V., electric generators.

F. 1. A fuse is a safety device which works when a sudden flow of high electric current passes through the circuit. When heavy current passes through a fuse, it heats up and melts down. When fuse melts, the electric circuit breaks and saves the appliance from heavy current which is more than the capacity of the appliance so fuse saves an appliance from over loaded circuit.

2. a. Overloading- When current flows in a circuit and becomes more than the capacity of components in the circuit to resist the current. It is called overloading.
   b. Short circuit- When wires heat up due to over loaded electric circuit, their outer insulating coating melt down and wires come in contact with each other. This causes sparking of fire and it can cause electric fire in the wiring of the appliance. It is called short circuit.
   c. Electromagnet: A soft iron piece with coiled wire, behaves like a magnet when electric current is passed through it. It is an elecromagnet.
   d. Solenoid: A solenoid is a device which can be used as an electromagnet. It is made of a long wire that has been wound many times into a tightly packed coil; it has the shape of long cylinder.
3. Take a cardboard and make a hole in its centre. Now, pass a wire through the hole vertically. Sprinkle some iron fillings on the board and complete the circuit of the wire by connecting the wire to the batery. The iron fillings have arranged themselves in concentric circles around the wire showing the magnetic lines in the magnetic field formed by the lines in the magnetic field formed by the flow of electric current through by the flow of electric current through the wire.
4. Working: When we switch on the current, it starts flowing through the electromagnet. The electromagnet attracts the soft iron rod towards it and hammer strikes on the gong to make the sound of the bell.



In the mean time, the amature looses its contact with the screw causing break in circuit and hammer comes back to its position. Once again the current passes through the elcromagnet and the magnetic field causes the hammer to strike the gong.

Scientific Thinker

Do it yourself.

Enrichment learning

Do it yourself.

Hots

A. Electric cell does not cause the flow of electricity with high voltage. MCBs are used in the circuit with high voltage of electricity. So, fuse wires are not used in the a circuit containing electric cells.

B. Copper wire has very low resistance. Therefore bulb will not glow until the current is removed. Therefore, copper wire cannot be use to create on electric bulb.

C. Do it yourself.

Value Based Questions

Do it yourself.

Chapter - 16 — Wind, Thunderstorms and Cyclones

Page 171

1. The pressure enacted by the atmosphere on the surface of the Earth is called the atmospheric pressure.
2. Cyclone starts over the sea.
3. Tornadoes occure in cold countries.

Exercise

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

B. 1. High pressure, low pressure 2. air, cumulonimbus 3. hurricanes typhoons
4. eye 5. Spiral, eye

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

D. Polar Easterlics, Westerlics, North eastery trade winds, Equator, South easterly trade winds, Westerlics, Polar Easteries

E.
1. The pressure exerted by the atmosphere on the surface of the Earth is called the atmospheric pressure.
2. The wind which is strong and makes us uncomfortable is called storm.
3. Wind is the movement of air in the atmosphere.
4. Typhoon and Hurricanes
5. Cyclones, Earthquakes and Tornadoes
6. Air exerts equal pressure in all directions.
7. tornaodes are dark, violent funnel-shaped clouds that reach from the sky to the ground.
8. The entire eastern coastline and the coastline along Gujarat is vulnerable to cyclones.
9. The news is broadcasted 48 hours before the expected arrival of the cyclone.

F.
1. Take a balloon, press it so that it is flat and there is no air inside it. Tie the mouth of the balloon to that of an empty bottle with the help of a rubber band so that no air can escape. Now boil some water and place the bottle in the boiling water. The air in the bottle was heated by the boiling water. The heat made the air expand and thus some air went into the balloon. So, it can be said that air expands when heated.
2. Precautions to be taken during a thunderstorm are:
   - If you are in water, get out of it as quickly as possible.
   - Do not take shelter under a big tree or in a high rise building as they likely to be struck by lightning.
   - Do not stand erect or lie flat on the ground.
   - Do not take shelter under an umbrella with a metallic rod.
   - Do not sit near a window, open garage storage sheds with tin roof.
3. The air does not stay still for long time because the molecules of air are loose and drift away easily. Moreover, temperature of the Earth also has an effect on these winds. The heating of the sun raises the air temperature and world's wind pattern occur.
4. Moving air is called wind. Wind is not uncomfortable and dangerous whereas strong wind which is uncomfortable and dangerous for us is a thunderstorm. It is characterized by heavy rain, thunder and lightning.
5. All storms are low pressure systems. Destructive capacity of wind storm increases with

the increase in wind speed. So, it is important to measure wind speed before we take some precautionary measures.

6. The eye is a region of mostly calm weather at the center of tropical cyclones. It is a circular area.
7. If the cyclone is moving towards the coast, the news is immediately broadcast from a chain of radio stations at least 48 hours before the expected arrival of the cyclone.

G. 1. Thunderstorms are formed inside the cumulonimbus cloud. The air which is warm and full of water vapour rises up fast and water vapours inside it condense to form ice. During this process, a big amount of heat energy is produced. It further worms up the air and it moves with much more speed. Meanwhile, the water particles and ice particles rub against each other and build up negative electric charge in the could. Then clouds show great lightning to release this negative charge. The heat of negative electric charge, heats up the air and it starts moving very fast, so fast that the bombardment of the air molecules with each other produces a great sound which is called thunder. Thunderstorm cause a lot of damage due to heavy rains and fast winds. These winds uproot the trees, break away weak buildings and also blow away the roofs of the houses.

2. Hurricanes are a cluster of violent thunder-storms which encircle around an eye in a speial pattern while winds blow constantly at the rate of at least 119 km/hr. Hurricanes develop over oceans. The main reason behind the hurricanes are the hot water vapors, strong air and large air pressure differences.
3. Hurricanes ends up when it reaches the land, because it cannot get more warm water vapours to sustain it.
4. The government of India help people to face cyclones in following ways:
   - This is continuously broadcast on hourly or half - hourly basis so that everybody knows about the impending disaster and moves out.
   - If the cyclone is moving towards the coast, the news is immediately broadcast from radiostation.
   - District administration activity helps people to move to the safe places.
   - Government of India has sit up weather observation radars which detect the formation of cyclones and thier movement.
5. Precaution for cyclone prone areas are:
   - Avoid flood water and be careful of snake bites.
   - Do not touch electric polls, fallen electric wires or wet switches.
   - Do not put pressure on the reserve workers for taking you to safety.
   - Co-operate with your fellow neighbours.
   - Do not drink water which is contaminated by flood water.

Scientific Thinker

Do it yourself

Enrichment learning

Do it yourself

Hots

A. In winter, land cools down faster than the water in oceans. The warm air over the ocean rises up creating a region of low pressure and cooler air from the land rushes towards the sea.

B. 1. Winter
   2. Summer

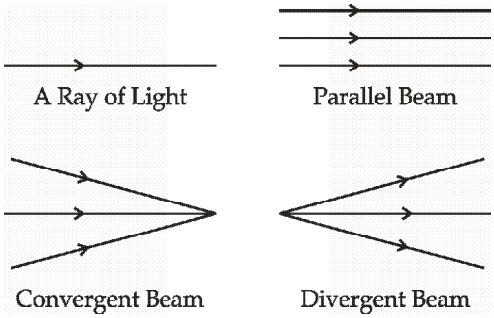
C. High speed wind passing over the umbrella creates low pressure. Therefore, the umbrella upturns.

Value Based Questions

Do it yourself.

Chapter - 17 — Light

Page 180

1. Rectillinear propagatioon of light.
2. A very thin path of light represented by a thin straight line with an arrow head at one end is called a ray of light.
3. 

Page 183

1. Natural inversion is a phenomenon in which left hand side of an object appears as right hand side and vice-versa.
2. Kalaeidoscope was developed by Sir david Brewsten in 1917. It is used in creating patterns of ring, wallpaper and fabrics.
3. They help the object at the water surface to be seen easily.

Page 185

1. Concave mirrors give real image.
2. Concave mirror are used in automobiles because they form small, erect and diminished image close to the eyes of driver.
3. Dentists use concave mirrors.

Exercise

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

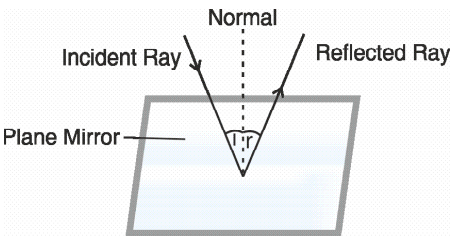
B. 1. visible 2. luminous 3. straight line, rectillinear propagation of light.
4. convex 5. concave

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

D. 1. When light strikes on any object, it bounces off in all directions. This is called scattering of light.
2. The light which has no heat is called cold light.
3. When several rays of light run parallel to each other, they form a beam of light.
4. An object that emits light from its own body is called a source of light.
5. The objects both natural and man-made that give out light from their bodies are called luminous bodies.

6. Light reflected by moon has no heat therefore it is called cold light.
7. When light falls on a surface, it bounce off the surface. This is called reflection.
8. (a) Plane mirror are used as looking glasses.
   (b) They are used to maintain a set distance of the chart used for testing eye-sight.
9. Kaleidoscope and Periscope

E. 1. The unit used to measure brightness is called lumen.
2. Kaleidoscope is an optical device and works on the principle of multiples reflection.
3. (a) Uses of concave mirror:
   (i) Used as showing mirrors.
   (ii) Headlights of automobiles are made by concave mirror.
   (b) Uses of convex mirror:
   (i) Used in rear view mirrors of automobiles.
   (ii) It is used as a street light reflector.
4. The characteristics of image formed by convex mirrors are:
   (i) It is virtual.
   (ii) It is erect.
   (iii) It is diminished.
   (iv) Image is formed before principal focus, behind the convex mirror.
5. Natural sources of light include the sun, stars, fire flies and animals that give out light from their bodies. Artificial sources of light are man-made such as electric lights, candles, oil-lamps etc.
6. $$\text{Time} = \frac{\text{distance}}{\text{speed}}$$
$$= \frac{6{,}50{,}000 \times 1000}{3 \times 10^8}$$
$$= \frac{65 \times 10^7}{3 \times 10^8}$$
$$= 21.6 \times 10^{-1}$$
$$= 2.16 \text{ seconds}$$
7. The two laws of refection are:
   - The normal, the incident ray and the reflected ray, all lie in the same plane.
   - The angle of incidence is equal to the angle of reflection, *i.e.*, $\angle i = \angle r$.



8. Characteristics of image formed by plane mirror as:
   - Upright and virtual image is formed
   - The image is of the size as that of the object.
   - The distance of the image formed behind the mirror equals the distance of the object in front

of the mirror.

9. The word ambulance is written laterally inverted so that it may appear correct in the rear view mirror of the vehicle moving ahead.

F. 1. The terms related to reflection are:

(i) Normal - The perpendicular line is called normal.

(ii) The ray's path along which it strikes the floor is called incident ray.

(iii) The point where the incident ray strikes the surface is called point of incidence.

(iv) The angle made by incident ray with the normal is called angle of incidence.

(v) The path along which the light ray reflects is called reflected ray.

(vi) The angle made by the reflected ray with the normal is called angle of reflection.

2.

Regular Reflection	Irregular Reflection
• When a parallel beam of light strikes a smooth surface and bounces back as a paralle beam of light, it is called regualar reflection.	When parallel beam of light strikes a rough surface and bounces back in different direction, it is called irregular reflection.
• Mirror, water, oil cause regular reflection.	Concrete floor, water, stone etc., cause irregular reflection.

3.
- The central point of a spherical mirror is its pole and it is denoted by P.
- The centre of a sphere of which the spherical mirror is a part is called centre of a curvature (C).
- Straight line joining the pole and centre of curvature is called principal axis.
- When parallel rays strike at a spherical mirror, they reflect to meet at a point called the focus (F).
- The radius of the sphere of which the spherical mirror is a part is called radius of curvature (R).
- The distance of the focus from the pole of the mirror is the focal length (f).

4.

Location of Object	Location of Image	Nature of Image	Size of Image
• Beyond C	Between C and F	Real, Inverted	Diminished
• At C	At C itself	"	Equal
• Between C and F	Beyond C	"	Enlarged
• At F	At infinity	"	Enlarged
• Between F and P	Behind the mirror	Vertual, erect	Enlarged

5

Real Image	Virtual Image
• It can be obtained on screen.	It cannot be obtained on a screen.
• It is always inverted.	It is always upright.
• It is formed on the same side of the mirror.	It is formed on the back side of mirror.
• Its size depends on the distance of object.	Its size depends on type of mirror.

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Hots

A. Infinite number of images

B. Convex mirrors are used in rear views mirrors. Convex mirrors form erect and smaller images of object. This warning is written because vehicles will appear to be coming at a long distance but they are actually closer. To avoid accidents, it is written.

C. The distance between mirror and image = 6 – 2

= 4 m

The Distance between the mirror and object and the image formed is equal = 4 m.

The distance between the person and image = 4 + 4 = 8 m

D. A, V

Value Based Questions

Do it yourself.

Chapter - 18 — Water

Page 193

1. Water table is the name given to the level at which ground water is found.
2. 97.2% of water is present in the seas and oceans.
3. World water day is celebrated every year on 22nd March to highlight the importance of water.

Exercise

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

B. 1. Aquifer 2. Oxygen 3. thermal power, hydroelectric
4. 2.07 5. fertilizers pestisides

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

D. 1. Underground water is also called aquifer.
2. World water day is celebrated on 22nd March.
3. (i) Water is used for cooking.
(ii) It is also used for bathing.
(iii) Water is used to wash clothes.
4. The top level of underground water is called water table.
5. Circulation of water in the nature is called water cycle.
6. Water fit for drinking is called potable water.

E. 1. Aquatic animals feed on the nutrients dissolved in water and breathe the oxygen dissolved in it to survive.
2. India is an agricultural country and farmers have to depend on rains for irrigatin their fields. Erratic monsoons result in excess use of groundwater thereby decreasing the underground water.
3. Sources of water are:
   - Water present on the surface of the earth is called surface water. Rainwater, water in rivers, lakes, seas and oceans are sources of surface water.
   - Groundwater is the water present under the ground, this is also a source of water.
4. Scarcity of potable water is due to:

(i) Increasing Population
(ii) Increasing Industries
(iii) Increasing Pollution
(iv) Agricultural Activities
(v) Deforestation

5. Causes of water scarcity are:
   (i) Destruction of natural water reservoirs
   (ii) Misuse of water
   (iii) Overpopulation
   (iv) Over irrigating for agriculture
   (v) Indiscriminate cutting of trees
   (vi) Climate change and variability
6. Rainwater harvesting is a technique to recharge groundwater. Most of the rainwater in towns and cities is not utilized in any way. This water generally goes out of the cities through drains. To make use of this water, this technique has been adoted in which rainwater is callected in a low lying land.

F. 1.
- About 71% of the Earth's surface is covered with water.
- About 97.2% of the total avaiable water is present in the seas and oceans.
- About 2.07% of the total water is locked in glaciers and ice-caps.
- The remaing water which is less than 1% is available in rivers, lakes, ponds and in the form of groudwater.

2. Water is used in industries on a large scale to produce goods as well as electricity. Water is used on a large scale in textile and paper industry. It is needed in both thermal power plant and hydroelectric plants. In thermal power plant, water is converted into steam which is futher used to rotate turbines. But in hydroelectric plants, the force of moving water is used to rotate turbines. Thus, water is the most important natural resources which is essential for economic development of a country.
3. Scarcity of water is defined as a situation when there is insufficient water to satisfy normal requirements. There are various factors responsible for it:
   (i) Increasing Population – Growing population has resulted in a growng demand for houses, offices, shops, roads etc. this reduces the surface of water into the ground.
   (ii) Increasing Industries – Growing population has also resulted in an increase in the number of industries. Water is used in almost every stage of production of things.
   (iii) Increasing Pollution – Increasing demand is creating pollution of the freshwater resources.
   (iv) Agricultural Activities – Erratic monsoons result in excess use of groundwater which reduces underground water.
4. Following are the ways to save water:
   - Households can save water by promptly fixing leaks or dripping taps.
   - By improving the methods of irigating the fields such as drip-irrigation.
   - By installing rain water harvesting systems.
   - By constructing dams and embankments to save rain water.
   - Instead of taking a shower bath, use buckets and mugs.
5. Causes of water pollution are:
   - Sewage flows from homes, hotels, and other buildings.

- Defacation in the open fields.
- Germs from filth and dung enter into water.
- Dumping of factory-wastes in the water bodies.
- Excess of fertilizers, pesticides and insecticides used by farmers.

6. The following are ways to present water pollution:
   - Filth and dung should not be allowed to reach the water bodies.
   - Sewage from homes, hotels etc. should be properly treated before being released into water courses.
   - Poodles of stagnant water must not be allowed to develop.
   - Factory wastes must be recycled or treated duly.
   - Use of chemical fertilizers and pesticides should be minimised.
   - Purification of water bodies should be carried out off and on.

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Hots

A. Flooring ground with concrete has reduced the water table because such areas reduce the seepage of rainwater into the ground.

B. Wells dry up after some time due to scarcity of rain and depletion of water take. Wells can be refilled by rain water or by digging deeper.

C.	A. Water	B. Photosynthesis	C. Food Products	D. Oxygen
D.	P. Aquifer	Q. Soil	R. Rocks	S. Soil

Value Based Questions

Do it yourself.

Chapter - 19 — Forests–Nature's Gift

Page 201

1. One third of the world's land is covered with forest.
2. Bamboos are used in rafters, roofing, walling, flooring and basketry.
3. Vanilla, rusha grass and khus are used in manufacturing of cosmetic soaps, inscense stick etc.

Exercise

A.	1. (a)	2. (d)	3. (a)	4. (d)	5. (b)
B.	1. food web	2. polination	3. Deforestation	4. Overgrazing	5. flora, fauna
C.	1. F	2. T	3. T	4. T	5. F

D. 1. A suitable place where particular organisms grow, live and reproduce is called a habitat.
   2. Timber, wood, latex and spices.
   3. Timber is used to make furniture, doors, windows, carts, ploughs etc.
   4. The flow of energy between plants and animals is called a food chain.

5. Deforestation is the clearing, destroying or otherwise removal off trees through deliberate, natural or accidental means.

E. 1. Trees form three layers in the forest. These are:
   - The uppermost layer of branches which sewes as dense roof of trees over the ground in a forest is called canopy.
   - The layer where trees branch off from the tree trunk is called crown.
   - The shaded layer of the forest where low light is available is called understory.

2. Many animals and plants live in forest. They depend on each other. Animals depend directly or indirectly upon plants and plants also depend on animals for carbon dioxide. This is how forests regulate food chain.
3. Deforestation occurs for a number of reasons, including farming, urbanisation and logging of materials and development.
4. Wide variety of animal have vanished due to deforestation. Animals lose their natural habitat due to which they either move to other places or die.
5. Afforestation means planting more trees.

F. 1. Forests are usful for us in many ways.
   - They provide habitat for millions of plants and animals.
   - Forests maintain the environment balance in nature. They help in cycling nutrients, producing oxygen and reducing pollution.
   - The main source of wood are forests.
   - Timber is also obtained from forests which is used to make furniture, doors, windows etc.
   - Forests also provide resins, thatch, fruits, rubi, herbs, meddicines, oil, commerical flower, spices and syrups.

2. All animals are dependent on plants for their food. Plants give us food grains, fruits, vegetables, spices, tea, coffee etc. Some animals directly eat plants while other eat flesh of those animals which each plants. Thus they directly or indirectly depend on plants for food. Animals get oxygen from plants. Animals also get shelter from plants.
3. Plants depend on animals in following ways:
   - Plants need CO_2 for the process of photosynthesis. This CO_2 comes from animals during respiration.
   - Animals like bees, butterflies, moths etc. help in pollination which is necessary for furtilisation.
   - Disperssal of seeds depend on animals. Birds and other animals are the important agents of seed dispersal.

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Enrichment learning

Do it yourself

Hots

A. If all the rabbits disappeared, lions will be disappeared too because lions eat rabbits, therein population will get affected due to lack of food.

B. Yes, if forest areas decrease, the maintainence of carbon dioxide and oxygen gets affected. The carbon dioxide released by humans and animals will not be absorbed which will increase global warming.

C. 1. (i) worm (ii) Insect 2. Decomposers 3. (i) minerals (ii) nutrients 4. Plants

D. 1. Scavengers . Jackal 2. Decomposers . Earthworms

Value Based Questions

Do it yourself.

Chapter - 20 — Waste Management

Page 210

1. It takes 1 million years to biodegrade glass bottles in soil.
2. Carbon dioxide, sulphur dioxide and carbon monoxide are gaseous wastes produced in environment.
3. Three liquid wastes are:
   - Waste discharged from kitchen
   - Waste discharge from bathrooms
   - Effluent dischaged from factories.

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

Exercise

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

B. 1. healthy 2. non-biodegradable 3. Deforestation
4. sewer 5. scraper

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

D. 1. Unwanted and discarded material is referred to as waste.
2. Dealing with wastes properly and efficiently to reduce their impact on the environment is called waste management.
3. The domestic liquid waste is called sewage.
4. Cholera, diarrohoea, dysentry are caused by contaminated water.
5. Chlorine, Chlorine dioxide and Ozone are used to disinfect waste water.

E. 1. Basic objectives of waste management are:
   - To protect our environment from any harm so that one can transfer a healthy environment to the coming generation.
   - To develop cost effective and modern technique for the disposal of wastes properly.
   - To convince people not to make any harm to the environment.

2.

Bio-degradable	Non-biodegradable
Waste material that are decomposed by microorganisms are called biodegradable waste.	Waste materials that cannot be decomposed by microorganisms are called non-biodegrable waste.
Example – cotton, paper, rope etc.	For exmaple — plastic bottle, cans etc.

3. Eutrophication is a process by which water bodies becomes excessively rich in nutrition. This leads to growth of algae. Algae consume a large part of dissolved oxygen which result in O_2 in water. Due to acute shortage of O_2, many aquatic plants and animals die.

F. 1. **Solid wastes** constitutes large part of wastes. these are generated from household and industrial

wastes. Example – plastic bottles, tin cans, glass bottles etc.

Liquid wastes include domestic wastes discharge from kitchen, bathrooms, toilets besides the effluent discharge from factories.

Gaseous waste are generated by chimneys, factories, vehicles etc. Example - Carbon dioxide, Sulphur dioxide etc.

2. Harmful effects of sewage are:
   - Open drains or sewage are breeding ground for flies, mosquitoes and other microorganisms that spread diseases like cholera, jaundice, diarrhoea etc.
   - Sometimes wastewater enter the pipes of water supply and contaminate it. This contaminated water if consumed can cause severe health hazards.
   - Wastewater also leads to pollution of groundwater.
3. Book Pg 211, 212 — blue table

Enrichment learning

A. Do it yourself

B. Do it yourself

C. Do it yourself

D. 1. Sewage 2. wastewater 3. 4. WWTP
5. Septic Tank 6. Sewer 7. Typhoid 8. Drainage

Hots

A. Storm drains are designed to drain excess rain and ground water from surfaces such as parking lots, footpaths, sidewalks etc.

B. Eucalyptus trees are planted along sewage ponds because these trees absorb the surplus waste water rapidly and release water vapour into the atmosphere.

C. 1. (i) Bar screen (ii) Grit and sand removable tank
(iii) First sedimentation tank (iv) aeration tank
(v) second sedimentation tank
2. First sedimentation tank

Value Based Questions

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