

Based on the latest scheme of the CBSE and in accordance with
the latest guidelines & syllabus issued by NCERT



Science FAIR

7
Class



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Teacher's Help Book

- What's New
- Multiple Choice Questions (MCQs)
- Activity / Projects
- Science Olympiad Test Sheet



- A.** 1. There are two modes of nutrition : (i) Autotrophic nutrition (ii) Heterotrophic nutrition.
2. The roots of saprophytes contain living organisms called fungi.
- B.** 1. (b); 2. (b); 3. (a); 4. (b); 5. (a)
- C.** 1. Autotrophs; 2. Starch; 3. Chlorophyll; 4. Parasites; 5. Mistletoe
- D.** 1. True; 2. False; 3. True; 4. False; 5. True
- E.** 1. (ii); 2. (v); 3. (i); 4. (iii); 5. (iv)
- F.** 1. The entire process of taking in food and drink by living organisms and using it for the purpose of growth and daily activities is called nutrition.
2. Stomata are used to exchange gases in plants.
3. The process of using the energy of sunlight to convert water and carbon dioxide into carbohydrates (starch) and oxygen is called photosynthesis.
4. The plant which derive their food from the bodies of the host plants and animals are called parasites.
5. The two different plants which live together as parts of the same plant and mutually help each other are called symbionts and the relationship is called symbiosis.
- G.** 1. The mode of nutrition in which the organism makes its food itself from simple inorganic substances called autotrophic nutrition.
2. Necessary five conditions for photosynthesis are :
- (i) The presence of sunlight
 - (ii) Nature of light
 - (iii) Temperature
 - (iv) The availability of carbon dioxide
 - (v) Availability of water
3. Activity 3
4. The bacteria called Rhizobium can take atmospheric nitrogen and convert it into a soluble form. It provides nitrogen to some plants like peas, gram etc.
5. The plants which derive their food from the dead and decaying organic matter are called Saprophytes, example is mushrooms.
- H.** 1. Insectivorous plants need insects to fulfill the deficiency of nitrogen.
2. Green leaves contain chlorophyll and chlorophyll traps sunlight, so photosynthesis take place in the green leaves.

- A. 1. Goat, cow; 2. Amino peptidase, maltose
- B. 1. (c); 2. (c); 3. (a); 4. (d)
- C. 1. cat; 2. milk; 3. neck; 4. lungs
- D. 1. (vii); 2. (vi); 3. (iv); 4. (i); 5. (ii); 6. (iii); 7. (v)
- E. 1. Salivary; 2. unicellular; 3. gastric; 4. mastication; 5. largest gland
- F. 1. False; 2. True ; 3. True; 4. True; 5. True
- G. 1. Carbohydrate : Simple sugar
Protein : Amino acids
Fat : Fatty acids and glycerol
2. Three enzymes present in pancreas i.e., trypsin, amylase, lipase.
3. Saliva is present in mouth and it is produced by the salivary gland.
4. All the animals who chew and eat grass are called ruminants.
5. Villi is finger like projection which absorb the digested food and pass it into the blood system.
- H. 1. The five steps involved in the digestion of food are :
- (a) Ingestion; (b) Digestion; (c) Absorption; (d) Assimilation; (e) Egestion
- (a) Ingestion : The act of getting and eating food collectively are called ingestion.
- (b) Digestion : The breaking down of food into simpler and soluble molecules inside the body is called digestion.
- (c) Absorption : The process by which soluble molecules present in the digested food pass into the body fluids like blood is called absorption.
- (d) Assimilation : The process in which the absorbed food is used for producing energy from glucose and growth is called assimilation.
- (e) Egestion : The process by which the undigested food materials are carried out through the anus is called egestion.
2. Tongue : The tongue is a muscular and main organ of taste. Different set of taste buds located in the specific area of the tongue distinguish whether the food is sweet, salty, sour, bitter, etc. The taste buds help us to select the right quality of food.
3. In the intestine, the liver secretes bile juice and pancreas secretes pancreatic juice. The bile juice is stored in a sac like structure called gall bladder. The biles juice breaks up fat into tiny droplets which are then acted upon by enzymes and split up into fatty acids and glycerol. The pancreatic juice breaks down starch into simple sugars and proteins into amino acids.
4. All the animals who chew and eat grass are called ruminants. The ruminants consists of four chambers-the rumen, reticulum, omasum and abomasum.
Ruminants quickly swallow the grass and store it in a separate part of the stomach called rumen. Here, it is acted upon by bacteria and microorganisms. This partly digested food is called cud. This half digested food then goes to the second muscular

chamber, the reticulum from where this cud returns to the mouth in small lumps and the animal chews it.

5. See Page-18 Tongue

I. 1. Chewing of Food : Mouth

Killing of bacteria : Stomach

Formation of faeces : Large intestine

Absorption of Food : Small intestine

2. Acid is produced. It effects enamel of the teeth.

3

Chapter

Fibre to Fabric

A. 1. natural fibres, synthetic fibres; 2. silk and wool; 3. Rayon and Nylon

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

C. 1. mulberry silk; 2. softening of sericin; 3. cow; 4. rayon

D. 1. (v); 2. (i); 3. (ii); 4. (iii); 5. (iv)

E. 1. Bombyx mori; 2. heat; 3. fibre; 4. petroleum; 5. wool

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

G. 1. (a) It is comfortable to wear and absorbs moisture.

(b) It is made up of protein, keratin.

(c) It does not burn with a flame but smoulders leaving a black bead like brittle residue.

2. Wool is a natural animal fibre obtained from the hair of animal of shepherd goat.

3. Woolmark that confirms a quality of new and pure wool being used in its making.

(a) Wool is used for clothing, carpeting, felt, insulation and upholstery.

(b) Wool is used to absorb odour and noise in heavy machinery and stereo speakers.

4. Silk is used in making expensive clothes, bulletproof vests, parachutes, etc.

H. 1. There are four steps involved in silk production.

(a) Sorting cocoons; (b) Softening of Sericin; (c) Reeling the filament; (d) Bailing

Sorting Cocoons : The cocoons are sorted according to the colour, size, shape and texture as these affect the final quality of the silk.

Softening of Sericin : Silk filament is a double strand of fibroin which is held together by a gummy substance called sericin. After sorting the cocoon they are put through a series of hot and cold immersions as the sericin must be softened to permit the unwinding of the filament as one continuous thread.

2. Wool is processed in the following steps :

(a) Shearing; (b) Grading; (c) Washing or cleaning; (d) Sorting and Blending; (e) Carding; (f) Spinning; (g) Dyeing; (h) Weaving and Knitting; (i) Fulling and finishing; (j) Crabbing; (k) Chemical Finisher

3. Uses of polyester :

(a) It is used for manufacturing sarees, dress materials, curtain cloths, etc.

(b) It is used for making sails for sailing boats.

(c) It is used to making conveyor belts.

4. Sericulture : The management and breeding of cocoons of silkworms for their filament to produce silk is known as sericulture.

The life span of a silkworm is of about two months. It is completed into four stages :

(a) Egg; (b) Silkworm; (c) Pupa; (d) Moth

- I. 1. Scouring, sorting, spinning, dyeing, crabbing.

4

Chapter

Heat and Temperature

A. 1. Celsius scale, Fahrenheit scale; 2. Glass, Rubber, Plastic

B. 1. (b); 2. (b); 3. (a); 4. (d)

C. 1. Rubber; 2. land breeze; 3. iron

D. 1. (iii); 2. (iv); 3. (ii); 4. (v); 5. (i)

E. 1. coldness; 2. heat; 3. thermometer; 4. Clinical; 5. cold air

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

G. 1. Relation between Celsius and Fahrenheit Scale : To convert the temperature from

Celsius to Fahrenheit scales, multiply it by $\frac{9}{5}$ and add 32

$$^{\circ}\text{C} \times \frac{9}{5} + 32 = ^{\circ}\text{F}$$

$$\text{or } \frac{^{\circ}\text{C}}{100} = \frac{^{\circ}\text{F} - 32}{212 - 32} \quad [^{\circ}\text{C} \text{ has 100 equal parts and F has 32-212 equal parts}]$$

$$\text{or } \frac{^{\circ}\text{C}}{100} = \frac{^{\circ}\text{F} - 32}{180}$$

$$\frac{^{\circ}\text{C}}{5} = \frac{^{\circ}\text{F} - 32}{9} \quad \text{or } ^{\circ}\text{C} = \frac{5}{9} (^{\circ}\text{F} - 32)$$

2. 10°C

$$\text{F} = \frac{9^{\circ}\text{C}}{5} + 32$$

$$\text{F} = \frac{9 \times 10}{5} + 32 = \frac{90}{5} + 32 = 18 + 32 = 50$$

$$\text{F} = 50$$

50°C

$$\text{F} = \frac{9 \times 50}{5} + 32$$

$$\text{F} = 90 + 32$$

$$\text{F} = 122$$

100°C

$$\text{F} = \frac{9 \times 100}{5} + 32$$

$$\text{F} = 180 + 32$$

$$\text{F} = 212$$

3. Temperature is a measure the degree of hotness or coldness of any object.
4. The process of transfer of heat from one place to another without heating the intervening material medium is called radiation.
5. Example of good conductor : Copper, Silver
Example of bad conductor : Water, Air
Example of insulator : Plastic, Rubber

H. 1. See Page No-41 Activity –3

2. The following precautions should be taken while using a clinical thermometer :

- (a) Ensure that the mercury level is below 35°C before use.
- (b) Thermometer should be washed before and after use, preferably with an antiseptic solution.
- (c) Do not hold the thermometer by the bulb while reading it.
- (d) Read the thermometer keeping the level of mercury along the line of sight.

3. The materials which allow heat to flow through them easily are called good conductors of heat. For example : Silver, iron, steel etc. are good conductors of heat.

The materials which do not allow heat to flow through them easily are called poor conductors of heat. For example : Water air, glass etc. are poor conductors of heat.

Insulators are bad conductors of heat. If handles of cooking utensils are good conductors of heat, then it is difficult to hold. So handles of cooking utensils are made of insulators.

4. See Page No-45 Thermos Flask

I. 1. Clinical thermometer is used by doctors to measure the temperature of the human body. It is marked from 90°F to 110°F. So, a clinical thermometer can be used to measure only low temperature.

2. (a) Winter : Black shirt will made him more comfortable because black colour is good absorber of heat.

(b) Summer : White shirt will made him more comfortable because white colour absorbs less radiant heat.

5

Chapter

Acids, Bases and Salts

A. 1. Sodium hydroxide, Potassium hydroxide; 2. H_2SO_4

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

C. 1. onion; 2. litmus; 3. sulphuric acid; 4. calcium hydroxide

D. 1. (v); 2. (i); 3. (iv); 4. (iii); 5. (ii)

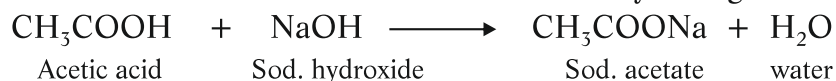
E. 1. salt; 2. sour; 3. hydrogen; 4. natural; 5. hydroxide

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

G. 1. Bases – Substances which have one or more replaceable hydroxide ion which is set free in aqueous solution. Bases are bitter taste.

Example : Sodium hydroxide, Potassium hydroxide etc.

- The naturally occurring substances which change their colour on coming in contact with other substances are called indicators. Example : Litmus solution, phenolphthalein etc.
- Acid is a substances which have one or more replaceable hydrogen atoms. Example : Sulphuric acid, Hydrochloric acid.
- When acid reacts with a base, a salt is a compound produced along with water is called neutralization reaction.
- Basic salts are formed when a weak acid is neutralised by strong base. For example :



H. 1. See Activity 4 at Page No. 57

2. Uses of Acid :

(a) Sulphuric Acid :

- It is used as dehydrating agent.
- It is used in storage batteries.

(b) Hydrochloric Acid :

- It is used for making glucose from starch.
- It is used in the preparation of aqua regia.

(c) Nitric Acid :

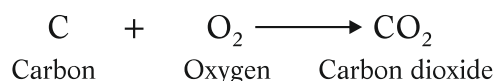
- It is used in the extraction of metals.
- It is used in the manufacture of fertilisers.

3. Uses of salt :

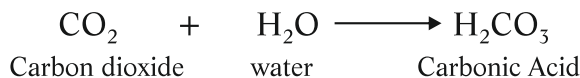
- It is used in food preservation in pickles.
- It is used in curing meat and fish.
- It is used for manufacture of chemical such as washing soda, baking soda, etc.
- It is used in medicines as well as in fire extinguishers.
- It is also used in glass industry and as a fertiliser.

4. Acids can be prepared from non- metals by two stage process.

(a) Firstly the non-metals are burnt in air and form oxides of non- metal. Example :



(b) Secondly the oxides of non- metals are dissolved in water, they form acids. Example :



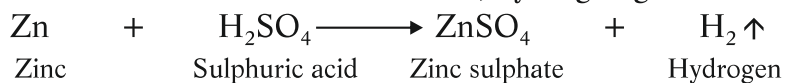
- I. 1. (a) soap – basic
 (b) vinegar – acidic
 (c) baking soda – basic
 (d) tea – acidic
 (e) curd – acidic
 (f) lime water – basic
 (g) proteins – acidic
 (h) shampoo – basic

2. Antacid tablets which containing magnesium hydroxide are given to person suffering from acidity to neutralize excess acid.

Physical and Chemical Changes

- A.** 1. Formation of clouds, melting of wax.
2. Curdling of milk, photosynthesis, rusting of iron
- B.** 1. (b); 2. (c); 3. (c); 4. (a)
- C.** 1. (iv); 2. (i); 3. (ii); 4. (v); 5. (iii)
- D.** 1. absorbed; 2. zinc; 3. irreversible; 4. corrosion; 5. rusting
- E.** 1. Hydrogen chloride – HCl 2. Sodium carbonate – Na_2CO_3
3. Ammonia – NH_3 4. Glucose – $\text{C}_6\text{H}_{12}\text{O}_6$
5. Sugar – $\text{C}_{12}\text{H}_{22}\text{O}_{11}$ 6. Copper sulphate – CuSO_4
7. Calcium chloride – CaCl_2 8. Zinc oxide – ZnO
- F.** 1. Cobalt – CO 2. Sodium – Na
3. Oxygen – O 4. Nitrogen – N
5. Iron – Fe 6. Carbon – C
7. Copper – Cu 8. Sulphur – S
9. Zinc – Zn 10. Potassium – K
- G.** 1. A change in which one or more new substances formed is called chemical change.
Example : (a) curdling of milk ; (b) rusting of iron
2. Melting of ice to form water is a physical change because on heating, ice melts and water evaporates. On cooling, water vapour cools to form water and on further cooling, water freezes to form ice.
3. Characteristics of chemical changes :
(a) The change is irreversible (b) The change is permanent.
(c) Total mass remains the same.
4. Sea water contains 97% of the total water on the Earth. Sea water is saline because it contains salt. In addition to salts, sea water has many impurities. Salinity and impurities in sea water makes it unfit for human consumption.
- H.** 1. Characteristics of physical change :
(a) During physical change, no new substance is formed.
(b) It is either reversible or irreversible.
(c) During physical change, only physical properties change.
(d) No or very small amount of energy is either absorbed or evolved during a physical change.
2. Characteristics of chemical reaction.
(a) Evolution of Gas, (b) Change in Colour, (c) Formation of Precipitate, (d) Energy change or Transfer of Energy
(a) Evolution of Gas : During a chemical reaction, gas may evolve. If one of the reactants is a liquid, evolution of gas is marked by effervescence (bubbling) in the liquid. The evolution of gas is shown by an arrow pointing upward ($\uparrow$).

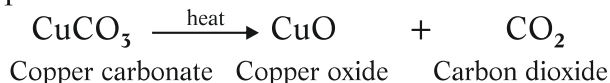
Example : When a metal reacts with an acid, hydrogen gas is evolved.



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

In such a case, change in colour accompanies the chemical reaction.

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



3. Differences between physical and Chemical changes.

Parameters	Physical Change	Chemical Change
1. New substance	No new substance is formed.	One or more new substance are formed.
2. Nature of change	It is a temporary change.	It is a permanent change.
3. Reversibility	Easily reversible	Irreversible
4. Physical and chemical properties	Only the physical properties of the substance get changed.	Both the physical & chemical properties of substances are changed.
5. Amount of energy.	Very little energy is absorbed or given out.	Large amount of energy is absorbed or given out.

4. See Activity 5 at P. No. 72

- I. 1. Because the moisture content is more in coastal areas in comparison to desert areas.
2. Sea water is salty because of great capacity of water to dissolve substances, especially the salt in it.

7

Chapter

Weather, Climate and Adaptation of Animals to Different Climates

- A. 1. The wind, the rain, humidity; 2. Polar bears, penguin
B. 1. (a) 2. (b); 3. (d); 4. (c)
C. 1. (v); 2. (i); 3. (ii); 4. (iii); 5. (iv)
D. 1. cold; 2. climate; 3. Tundra; 4. middle; 5. tropical
E. 1. True; 2. True; 3. False; 4. False
F. 1. Camel is an animal able to live in extreme hot desert by following ways :
(a) Camel can drink 50 litres of water in one gulp whenever water is available.
(b) The hump stores fat which gets converted into metabolic water when needed.
(c) It exerts very little urine and dry during when it does not get water to drink.
2. Macaque, Elephant have adapted to live in tropical rainforest region.

3. Seal have streamlined body. Under the skin, they have a layer of fat called blubber which helps them to keep warm in the cold.
 4. Animals are migrate to survive in favourite climate and in favourable surroundings. Animals search those regions which are suitable for them to survive.
 5. The movement of water in the oceans are called ocean currents. Warm ocean currents make the climate warm and wet. Cool ocean make the climate colder and dry.
- G.**
1. Climate of a place depends upon a number of factors are :
 - (a) Distance from the Sea, (b) Ocean Currents, (c) Mountains, (d) Direction of Prevailing Wind, (e) Distance from the Equator, (f) El Nino Effect.
 - (a) Distance from the Sea : Coastal areas are cooler and wetter than inland areas. Clouds are formed when warm air from the inland areas meets cool air from the sea.
 - (b) Ocean Currents : Warm ocean currents make the climate warm and wet. Cool ocean currents make the climate colder and dry.
 - (c) Direction of prevailing wind : They are from the sea/ocean side bring rain to the coastal areas and dry weather to inland areas. As a result, the climate of the areas near sea is moderate.
 2. Weather changes very frequently as compared to climate. Weather include changes in temperature, rainfall, and sunshine. Even during a single day, the weather may change several times whereas climate is the common average weather condition at a particular place over a long period of time.
 3. The adaptations are as follows :
 - (i) Animals which live in cold regions bear a coat of thick fur.
 - (ii) Animal have a thick layer of fat under the skin and birds are with more down feathers.
 - (iii) Animals in cold climates have small ears and tails and short legs due to this, the heat loss gets reduced.
 4. Tropical rainforests have a large population of animals because this region supports wide variety of plants, therefore a large number of animals are adopted to living on trees. The climatic condition of that is humid climate. The temperature ranging from 15°C to 40°C.
- H.**
1. Polar regions : reindeer, penguin, seal, siberian crane, arctic fox.
Tropical rainforest : lion-tailed macaque, gorilla.
 2.

(a) short ears : cold climate	(b) sensitive hearing : tropical rainforest
(c) long leg and tail : hot climate	(d) sharp claws : tropical rainforest
(e) curved claws : tropical rainforest	(f) thick layers of fur : polar region
(g) sharp eyesight : tropical rainforest	(h) blubber : polar region

8

Chapter

Natural Disasters : Winds, Storms and Cyclones

- A.** 1. Storms, cyclones, Earthquakes; 2. Japan, Phillippines
- B.** 1. (b); 2. (a); 3. (a); 4. (a)

- C. 1. Flood; 2. Willie willy
- D. 1. typhoon; 2. Anemometer; 3. high; 4. flood; 5. America
- E. 1. True; 2. False; 3. True; 4. True; 5. False
- F. 1. Powerful winds are called storms. It blow very fast. e.g. cyclones, hurricanes etc.
 2. Tornado in meteorology is violent whirling wind accompanied by funnel shaped cloud extending down from a cloud. Commonly known as cyclone, it can move over land to many kilometres causing great damage.
 3. Floods occur when water overflow beyond its normal course. The region of flood is heavy rain, river over flows etc.
 4. Precautions against flood :
 (a) Keep a first-aid kit handy.
 (b) Keep medicines for snake bites and diarrhoea.
 (c) Drink only boiled water and eat only freshly cooked food.
 (d) Listen to radio and watch television for warning and advices.
- G. 1. Floods can be caused due to :
 (a) blocking of river channel by landslide.
 (b) strong tides and storms in the sea.
 (c) cyclones and tsunamis over the water bodies.
 (d) change in course of a river.
 (e) less discharging capacity of the channel.
 2. Activity 1 on Page no-87
 3. Precautions against cyclones :
 (a) Keep on emergency kit ready at home.
 (b) Listen to the TV and radio weather bulletins regularly and carefully.
 (c) Store enough food, articles in waterproof bags.
 (d) Do not venture into the sea.
 (e) Avoid flood water and be careful of snake bites.
 4. Answer on Page No. 87
- H. 1. The thunderstorms are accompanied by heavy rains and high speed winds, so bus or car is the best place to take shelter during a thunderstorm.
 2. The Sun is responsible for unequal distribution of temperature on Earth. Some regions are heated more and throughout the year while other regions remain cold.

9

Chapter

The Soil

- A. 1. Physical, chemical; 2. Sandy soil, clayey soil
- B. 1. (a); 2. (d); 3. (a); 4. (c); 5. (b)
- C. 1. (iv); 2. (iii); 3. (ii); 4. (i)
- D. 1. air; 2. soil water; 3. clay and silt; 4. soil erosion, 5. B- horizon
- E. 1. False; 2. False; 3. True; 4. False; 5. True

- F.** 1. Wind, water, frost, roots of plants are the factors which contribute to formation of soil.
 2. Humus is rotting dead matter present in the soil.
 3. A vertical section through the soil showing the different layers of the soil is called the soil profile. Each layer differs in feel (texture), colour, depth and chemical composition.
 4. The uppermost layer of the soil is called topsoil. It is also called A-horizon.
- G.** 1. Soil conservation : Preventing erosion of soil is known as soil conservation. Some methods of soil conservation are as follows :
 (a) Afforestation (b) Shelter Belts
 (c) Contour Ploughing (d) Terrace Farming
 (e) Preventing Overgrazing.
2. Soil formation is a slow and stepwise process. It takes thousands of years to form a layer of soil just a few centimetres thick. It is a result of continuous breaking down of rocks by a process called weathering. Weathering is the disintegration (breakdown) of rocks on the Earth's surface caused by exposure to natural forces such as wind, water, frost, roots of plants, etc. Weathering is of two types : physical and chemical.
3. The main causes of soil erosion are :
 (a) Falling of trees and shrubs (deforestation) take place at large scale.
 (b) Rain strikes bare soil.
 (c) Poor farming methods are adopted.
4. Soil is the greatest natural resource because we derive all the essential needs of our life from soil directly or indirectly. It provides food both for humans and animals. Cereals such as wheat, rice, millets, oil seed, pulses and beverages like tea and coffee, vegetables and fruits are obtained from soil. We get fibres like cotton, flax, jute etc., for our clothes from soil. The soil provides us fuel and timber, tobacco, rubber, etc., known as primary food products.
- H.** 1. Sandy soil : It contains about 80% of sand along with clay and silt. The pore spaces are large and hence it has low water retention capacity.
 Clayey soil : It is the soil with large proportion of clay particles and a little sand. It has good water holding capacity.
 Loamy soil : It is the soil with fairly equal proportion of sand and clay. It is the best soil for plant growth.
2. Sample-X : Loamy soil ; Sample-Y : Sandy soil

10

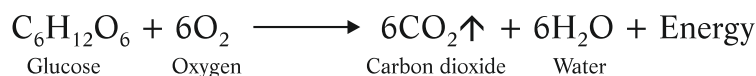
Chapter

Respiration in Organisms

- A.** 1. Nose, Trachea
- B.** 1. (c); 2. (b); 3. (a); 4. (c); 5. (c)
- C.** 1. photosynthesis; 2. fish; 3. intestine; 4. stomach
- D.** 1. (v); 2. (iv); 3. (i); 4. (ii); 5. (iii)
- E.** 1. spiracle; 2. haemoglobin; 3. oxygen; 4. carbon dioxide; 5. inhalation

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

- G. 1. Respiration is the process of taking in oxygen, using it for the release of energy by oxidation of food and eliminating the waste products, carbon dioxide and water.
2. The end product of aerobic respiration are carbon dioxide and water.
The end product of anaerobic respiration are ethyl alcohol and lactic acid.
3. The respiration process can be expressed in chemical equation as :



4. Gills are respiratory organs in fishes. These are feathery structures behind the head usually are covered by a flap called operculum. The gills are fed with blood from the heart.
5. The main respiratory organs in human beings are nose, throat, trachea, bronchi and lungs.
- H. 1. Respiration in Stems : The stems of herbaceous plants have stomata. The exchange of respiratory gases oxygen and carbon dioxide in the stem of herbaceous plants takes place through stomata by the process of diffusion.
Respiration in Leaves : The lower surface of all the leaves of a plant have tiny pores called stomata. Some plants have stomata on the top surface of their leaves. The exchange of respiratory gases in the leaves take place by the process of diffusion through stomata. The diffused oxygen is used in respiration. The carbon dioxide produced during respiration diffuses out from the leaf into the air through the stomata.
2. Differences between breathing and cellular respiration :

Breathing	Cellular respiration
1. It takes place outside the cells in the lungs.	It takes place within the cells.
2. It is physical process of diffusion. Oxygen diffuses in, carbon dioxide diffuses out.	It is a biological process in which glucose is oxidised and carbon dioxide and water are released.
3. There is no release of energy.	There is a gradual and stepwise release of energy.
4. Enzymes are not involved.	Several respiratory enzymes are involved in the process.

11

Chapter

Transportation in Plants and Animals

- A. 1. Plasma, Corpuscles; 2. Amoeba, Paramecium
B. 1. (a); 2. (c); 3. (b); 4. (a); 5. (b)
C. 1. blood; 2. carbohydrates; 3. nutrition; 4. blood
D. 1. (iv); 2. (v); 3. (ii); 4. (iii); 5. (i)

- E. 1. Plasma; 2. Sieve tubes; 3. Platelets; 4. transportation; 5. translocation
- F. 1. True; 2. True; 3. False; 4. False; 5. False
- G. 1. Stethoscope is an instrument used to measure heartbeat.
 2. The process of losing water in the form of water vapour from living plant is known as transpiration.
 3. A build up of waste product is harmful to the body therefore, it is necessary to excrete waste products from the body.
 4. Function of Phloem : The function of phloem is to transport the food and water in plants in upward and downward directions.
 Function of Xylem : The function of xylem is to transport the water and minerals in upward direction.
 5. The tubes that enclosed and transport blood from one organ to another is called blood vessel. The blood vessels are of three types : (a) Artery (b) Vein (c) Capillaries
- H. 1. Blood is a liquid tissue. It consists of a fluid known as plasma in which three types of blood cells float.
 (a) Red Blood Cells (RBCs) : They are disc shaped cells. They contain a red-coloured protein called haemoglobin. It is the pigment that absorbs oxygen and transfer it to the cells all over the body.
 (b) White Blood Cells (WBCs) : They are slightly larger than red blood cells. They are fewer in number than red blood cells. Their function is to fight against diseases by destroying harmful bacteria and other foreign material.
 (c) Platelets : They help the blood to clot whenever there is wound on the body.
 2. A badly injured person may lose blood. A blood loss of 40 percent may cause death. The doctor must give the patient blood, donated by another person (called donor) to make up for the blood loss. This procedure is called blood transfusion.
 There are four kinds of blood groups known as A, B, AB and O. Different persons have different blood groups.
 3. See Page-124 Diagram Excretory system in Human
 4. See Activity 2 at Page No. 121
- I. 1. (a) left auricle; (b) right ventricle; (c) left ventricle; (d) right auricle
 2. If blood does not have enough platelets then the flow of blood will not be blocked and will result in blood loss. Platelets help blood to clot whenever there is wound on the body.

12

Chapter

Reproduction in Plants

- A. 1. Radish, Bryophyllum; 2. Stamens, Pistil
- B. 1. (a); 2. (a); 3. (a); 4. (a); 5. (a)
- C. 1. carpel; 2. stamen; 3. bryophyllum; 4. flower
- D. 1. (iii); 2. (iv); 3. (ii); 4. (i)

- E. 1. bisexual; 2. unisexual; 3. Carpel; 4. grafting ; 5. sexual
- F. 1. False ; 2. True; 3. True; 4. True; 5. False
- G. 1. Pollination : The transfer of pollen grains from the anther to the stigma of a flower is called pollination.
Fertilisation : The fusion of male gamete with the female gamete to produce zygote is called fertilisation.
2. Reproduction that involves fusion of male and female gamet is called sexual reproduction.
A mode of reproduction in which a plant gives rises to new plants without seed is called asexual reproduction.
3. Grafting : This method is employed to develop new varieties of plant. Many new varieties of fruits like mangoes and grapes have been produced by this method.
4. Answer on Page No. 138
5. The ability of living things to repair themselves or grow lost parts is called regeneration. e.g., grass and trees regenerate from time to time after pruned or cut down.
- H. 1. Answer on Page No. 132
2. Dispersal by Animals :
- (a) Many fruits are dispersed by animal when they are moved from one place to another. Seeds of fruits like guava and tomato, when eaten, pass undigested through the digestive tract and reach the soil.
- (b) Squirrels and mice store nuts in their burrows. Sometimes they germinate under favourable conditions e.g., walnut, oak etc.
3. Artificial method of vegetative reproduction involve several methods such as cutting, grafting, layering and tissue culture, advantage of Artificial Method of Vegetative Reproduction are as follows:
- (i) In plant which do not produce viable seeds, it is a convenient method for growing new plants.
- (ii) It is easier, rapid and less expensive method of reproduction.
4. Answer on Page No. 137 and 138
- I. 1. Some seeds have wings and hair. This make the seeds light and thus they can be carried easily by wind to long distances.
2. (a) Drumstick, cotton seeds.
(b) Guava and tomato.

13

Chapter

Motion and Time

- A. 1. Motion of the stars, Motion of the Earth
2. Seconds, Minutes, Hours
- B. 1. (b); 2. (c); 3. (c); 4. (c)
- C. 1. second; 2. odometer; 3. light year; 4. snail

D. 1. oscillatory; 2. time; 3. short time intervals; 4. Galileo, Galilei; 5. Water clock

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

F. 1. To record the speed of the vehicle, a meter is used. This meter is called speedometer.

2. The condition of motion in different objects is of two types. These are :

(i) The object which do not change their positions with time are said to be at rest.

(ii) The object which change their positions with time are said to be in motion.

3. Units of measuring time : second, minute, hour

Units of measuring speed : metre/second, kilometre/hour.

4. Speed is defined as the ratio of the total distance travelled by a body to the total time taken to do so. Mathematically, it is given by the expression :

$$\text{Speed} = \frac{\text{Total distance covered}}{\text{Total time taken}}$$

The S.I. Unit of speed is m/s.

5. Differences between uniform and non-uniform motion

Uniform Motion	Non-uniform Motion
1. An object moving along a straight line with a constant speed is said to be in uniform motion.	1. If the speed of an object moving along a straight line keeps changing, it is said to be in non-uniform motion.
2. Distance-time graph for uniform motion is a straight line.	2. Distance-time graph for non-uniform motion is not a straight line.

G. 1. Differences between rest and motion :

Rest	Motion
1. An object is said to be at rest if its position does not change with time in relation to stationary objects in its surroundings.	1. An object is said to be in motion if its position changes with time in relation to stationary objects in its surroundings.
2. Examples : Trees, pillar	2. Examples : Car crosses the tree.

2.

$$\begin{aligned}\text{Distance} &= 75 \text{ Km} \\ \text{Time} &= 5 \text{ hours} \\ \text{Speed} &= ? \\ \text{Speed} &= \frac{\text{Distance travelled}}{\text{Time taken}} \\ &= \frac{75 \text{ km}}{5 \text{ h}} \\ \text{Speed} &= 15 \text{ km/h} \\ \text{Speed} &= \frac{15 \times 1000}{60 \times 60} = \frac{25}{6} = 4.16 \text{ m/s}\end{aligned}$$

Thus, Speed in km/h = 15 km/h

$$\begin{aligned}
 \text{Speed in m/s} &= 4.16 \text{ m/s} \\
 \text{3. Distance} &= 800 \text{ km} \\
 \text{Time} &= 16 \text{ hours} \\
 \text{Speed} &= ? \\
 \text{Speed} &= \frac{\text{Distance travelled}}{\text{Time taken}} \\
 &= \frac{800 \text{ km}}{16 \text{ h}} \\
 &= 50 \text{ km/h}
 \end{aligned}$$

4. Galileo, an Italian scientist, discovered the pendulum. A pendulum is a heavy point mass suspended by a weightless inextensible and a perfectly flexible string from a rigid support. The first use of pendulum was made by the Galileo. At Italy in a church there he saw a chandelier hanging from ceiling with a long chain swinging slowly. There was no watch at that time to measure time. So Galileo timed the oscillations by counting beats of his pulse. He found that while the oscillations of the chandelier gradually slowed down, the time taken by one oscillation still remained the same. In other words, a pendulum of a given length took always the same time to complete one oscillation. This observation led to the development of pendulum clocks.

- H. 1. rabbit : km/hr tortoise : cm/s snail : cm/s cheetah : km/hr
 2. (a) uniform; (b) non-uniform; (c) Rest

14

Chapter

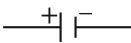
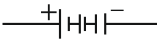
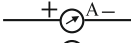
Electric Current

- A. 1. Positive terminal, Negative terminal; 2. Electric bells, Telegraphs
 B. 1. (c); 2. (a); 3. (d); 4. (c)
 C. 1. electromagnet; 2. oven; 3. bulb; 4. wood
 D. 1. (ii); 2. (i); 3. (v); 4. (iii); 5. (iv)
 E. 1. Electromagnet; 2. circuit; 3. on line; 4. tungsten; 5. Iron
 F. 1. True; 2. True; 3. False; 4. False; 5. True
 G. 1. Open circuit : When the electric path is broken at some point, it is an open circuit. The current does not flow through the broken circuit.
 Closed circuit : Electric current from the source starts from a (+ve) terminal. Electric current passes through the gadgets and ends at the (-ve) terminal without any break.
 2. Conductors and Insulators : The materials which allow the electric current to pass through them are the conductors of the electricity and the materials through which electric current does not pass are the non-conductors. Non conductors are also called insulators.
 3. Resistor : A resistor is a circuit element designed to offer a certain resistance to the flow of electric current. Resistors can be fixed or variable.

4. Uses of Electromagnet :

- They are used in motors that drive fans, mixers etc.
- They are also used in electric bells, telegraphs, loud speakers.
- They are used to separate magnetic materials like iron and steel objects from a heap of junk metal scrap.

H. 1.

Name	Symbols
Cell	
Battery	
Resistor	
Ammeter	
Voltmeter	
Connecting wire	

2. See Page No.162 Diagram of an electric bell.

3. See Page No.155 Activity -1

4. An incandescent light bulb contains a thin wired filament that glow hot when an electric current is passed through it. In the presence of oxygen, the filament would burn up as a result of high temperature. A glass bulb, then is used to keep oxygen away from the filament. When electric current is passed through an electric bulb or lamp, it heats up the tungsten filament of the lamp to a high temperature. At this temperature, the filament emits both heat and light.

I. 1. An electromagnet is made by wounding a few turns of wire around a piece of iron.

2. Iron has strong magnetic field as compared to steel so we use iron for making electromagnet and not steel.

15

Chapter

Light, Mirrors and Lenses

A. 1. Sunlight, Headlight of vehicle

2. Concave mirror, convex mirror

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

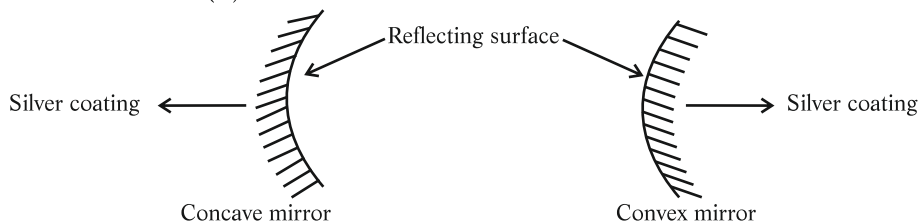
C. 1. (iii); 2. (v); 3. (i); 4. (ii); 5. (iv)

D. 1. outside 2. concave; 3. straight; 4. mirror

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

F. 1. A spherical mirror is a part of a spherical reflecting surface. Spherical mirrors are of two types :

(a) Concave mirror (b) Convex mirror



2.	Real Image	Virtual Image
	1. It is one in which light rays actually intersect or pass through the image point. 2. It can be obtained on a screen. 3. Image is always inverted and it formed in front of mirror.	1. It is one in which the light rays do not really pass through the image point. 2. It cannot be obtained on a screen. 3. Image is erect and far behind the mirror as the object is in front of it.

3. The image of this word is seen by a vehicle by a rear-view mirror. Because of lateral inversion, the word on the rear view mirror will be seen as AMBULANCE.

4. Uses of lens

(a) Lens can be used to converge the image i.e., convex lens.

(b) Lens can be used to diverge the image i.e., concave lens.

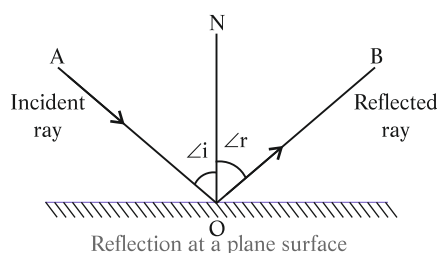
5. Do it yourself.

G. 1. Laws of Reflection :

The rays of light after reflection from reflecting surfaces obey the following two laws called the laws of reflection :

(a) The incident ray, the reflected ray and the normal at the point of incidence all lie in the same plane.

(b) The angle of incidence (i) is equal to the angle of reflection (r) that is ($\angle i = \angle r$)



2. See Page No.167 Activity -1

3. Uses of concave mirror :

(a) It is used in flood lights.

(b) It is used in torches, headlights.

(c) It is used to collect heat radiations in solar devices.

Uses of convex mirror :

(a) It is used as a reflector in street lamp.

(b) It is used as security mirror in slopes and on roads.

(c) It is used as a rear view mirror in automobiles.

4. When the white light passes through the prism, it splits up into its constituents colours. This is known as dispersion.

Light of all colours travel at the same speed in vacuum. But in any transparent medium, the light of different colours travels with different speeds and causes dispersion.

5. (i) Incident ray : It is the ray of light which strikes the reflecting surface.

- (ii) Pole : The centre of the mirror/lens is called pole.
- (iii) Centre of curvature : The centre of the sphere of which the mirror forms a part is called the centre of curvature (c).

H. 1. (a) an inverted image smaller than the object : Convex lens

16

Chapter

Water : A Natural Resource

- A. 1. 100°C
2. Surface water, Underground water
- B. 1. (b); 2. (d); 3. (c); 4. (a)
- C. 1. (iv); 2. (iii); 3. (v); 4. (ii); 5. (i)
- D. 1. 70 ; 2. vapours; 3. water cycle; 4. 97.5; 5. oceans
- E. 1. True; 2. True; 3. False; 4. True; 5. False
- F. 1. Underground water comes from rainwater that percolates into the soil and gets collected there.
2. Water is made up of two elements i.e., hydrogen and oxygen in the ratio of 2: 1 by volume and 1 : 8 by mass.
3. Due to the presence of salt in sea water, sea water is salty.
4. Rainwater harvesting is a method of conserving ground water. The falling of rainwater on roofs of building to flow into a deep trench in the ground.
5. Drip irrigation is used to provide water to the soil by slowly drop by drop near the plant roots. There is no loss of water due to seepage, run off or evaporation.
- G. 1. Importance of water are as follows :
(a) Water provides habitat for several plants and animals.
(b) Water provides a medium for all biochemical reactions taking place inside our bodies.
(c) Water is a good medium for the transportation of people and goods.
(d) Water is essential for germination of seeds and growth of plants.
2. Overuse and misuse of available drinking water has led to its acute shortage of all over the world is called scarcity of water. Water is wasted in almost all human activities in domestic, agriculture or industrial.
Effect of water scarcity are as follows :
(i) acute shortage of water for everyone.
(ii) drying up pump and lakes.
(iii) death of men and cattle.
(iv) failure of crops leading to shortage of food.
3. The constant circulation of water (from the Earth to the air and back again) is known as the water cycle. The water in the seas, rivers, lakes, ponds or any other sources

evaporates because of the heat of the Sun. The water vapour rises up. The air, higher up in the atmosphere is cooler. This cools the water vapour and it condenses to form tiny drops of water as small dust particles. These drops of water together form clouds. As the clouds get cooled further, the water drops become bigger. When they become too heavy, they fall on the Earth as rain. The rain water enters the seas, rivers, lakes, ponds and streams and then evaporates again. Thus the water cycle in the nature goes on.

See Page No. 185 Diagram of water cycle

4. There are mainly two types of sources of water :

(a) **Surface Water** : The water present on the surface of Earth is called the surface water. It is of three types :

(i) **River and lake water** : The water in river and lakes come from rain and melting of snow.

(ii) **Sea Water** : Water from rivers, lakes and streams flow into the sea.

(iii) **Rain water** : It is the purest form of water.

(b) **Underground Water** : A part of the rainwater percolates into the soil and gets collected there and is called the underground water. It is derived from springs or wells.

H. 1. In India, there is uneven rainfall on the Earth. While some places receive plenty of rainfall, some do not receive any rain.

2. Deforestation leads to decrease in rainfall. We know that the groundwater is replenished by the seepage of rainwater into the soil. Hence deforestation can lead to

17

Chapter

Forests : Our Lifeline

A. 1. Vultures, Jackals; **2.** Forest fire, Construction of dams

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

C. 1. Grasshopper; **2.** Insect ; **3.** Wax; **4.** bull

D. 1. natural; **2.** food web; **3.** rainfall; **4.** consumers

E. 1. Four layers are found in a forest. These are :

(a) Canopy layer; (b) Understorey layer; (c) Forest floor; (d) Emergent layer

2. Green plants are the producers in food chain as they can produce their own food.

3. Special drives of planting more and more trees to save environment from the bad effects of deforestation is called afforestation.

4. The microorganisms which convert the dead plants and animals to humus are known as decomposers. e.g., bacteria, algae.

5. Forests prevent soil erosion. The roots of trees bind the soil and save it from being washed away by water or rain or blown away by the wind.

- F. 1.** Importance of forests : Forests provide us many things that we need. The forests are very important to us. Some are as follows :
- (i) A source of variety of products; (ii) A sources of wood; (iii) Maintain balance of gases; (iv) Prevent soil erosion; (v) Provide food and shelter to Forest-dwelling people; (vi) Maintain Water cycle in nature; (vii) Prevent Floods and replenish ground water.
- 2.** A series of organisms linked together by the process of eating and being eaten for food is called a food chain. A food chain always begins with producers.
- Example :
- Grass $\longrightarrow$ Grasshopper $\longrightarrow$ Frog $\longrightarrow$ Snake $\longrightarrow$ Eagle
 (producer) (herbivore) (Carnivore) (large carnivore) (top carnivore)
- 3.** When several food chains of a region interconnect, then it is called food web.
- We see that to eat and to be eaten, to grow and die and get decomposed is the law of nature. Through foodweb a balance in nature is maintained.
- 4.** Forests provide us many things that we need. Since forests are very beneficial to us, other animals and to the environment so it is necessary to conserve forests.
- Ways to conserve forest are :
- (a) Excessive cutting down of forest and trees should not be allowed by the government.
 - (b) The use of wood as a fuel should be discouraged.
 - (c) Paper products should be recycled to conserve forests.
- 5.** Answer on Page No. 191 and 192.
- G. 1.** Forests maintain the natural balance of carbon dioxide and oxygen in the atmosphere by using up carbon dioxide and releasing oxygen during photosynthesis. In this way, forests serves as green lungs in nature.
- 2.** Paper comes from the wood. Wood comes from the forest. If paper is recycled, then more trees will not be cut down by us. So recycling of paper helps in the conservation

18

Chapter

Waste Water Story

- A. 1.** Human excreta, soaps; **3.** Cooking oil, fats
- B. 1.** (d); **2.** (b); **3.** (a); **4.** (d)
- C. 1.** human excreta; **2.** inlet; **3.** digesters; **4.** water bodies; **5.** chlorination
- D. 1.** False; **2.** True; **3.** False; **4.** False; **5.** False
- E. 1.** Sewage is the waste water from homes (domestic liquid waste) as well as from industries. It includes human excreta, soaps, industrial wastes. Most of waste water outlets industries are connected to drainage pipes. These smaller drainage pipes are then connected to the large ones in the area. This is known as sewerage system.
- 2.** Sewage contains large number of disease-causing germs which can spread diseases.

Hence, sewage is taken to the water treatment plant before being discharged into a water body.

3. Answer on Page No. 201.

4. Examples of Biodegradable waste : Wastes from kitchen, sewage excreta

Examples of Non-biodegradable waste : DDT, plastic

F. 1. Answer on Page No. 198.

2. Answer on Page No. 199 and 200.

3. For sewage treatment plant see Page No. 200.

4. Septic tank is a large concrete tank which is built under the ground with inlet and outlet pipes attached to it. They are useful to carry the household sewage. The solid matter from the sewage settles at the bottom of the tank. The excess water flows out of tank through the outlet pipe into the soil. Add answer from page no. 202.

G. 1. Cooking oil and fats should not be released into the drain because they can harden and block the pipes. In an open drain, the fats block the soil pores reducing its effectiveness in filtering water.

2. Chemicals should not be released into the drain because they may kill the useful microbes that help to decompose the wastes present in the sewage and purify water.

Science Olympiad Test Sheet-I

1. (B); 2. (A); 3. (B); 4. (D); 5. (A); 6. (D); 7. (C); 8. (A); 9. (D); 10. (C); 11. (B); 12. (B); 13. (D); 14. (A); 15. (A); 16. (B).

Science Olympiad Test Sheet-II

1. (A); 2. (B); 3. (A); 4. (B); 5. (A); 6. (B); 7. (D); 8. (B); 9. (A); 10. (D); 11. (B); 12. (A); 13. (B); 14. (A); 15. (B); 16. (C).