Amazing Science Class - 7

Class - 7

1. Nutrition in Plants

P. 10: Quick Review

1. (*a*) Carbon dioxide (*b*) chlorophyll
   (*c*) nutrients (*d*) saprophyte
   (*e*) mistletoe
2. (*a*) True (*b*) True
   (*c*) False (*d*) True

Time to Review

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

B. 1. Plants get carbon dioxide from the air.

2. Oxygen gas is released by green plants during photosynthesis.

3. Mushroom are saprophytes. They get their nutrients from decayed matter.

4. Plants get water from the ground, which is absorbed by the root hairs.

5. Dodder resembles to pink cotton.

6. The special arrangement in which both types of plants mutually gain from each other is called symbiosis.

7. Plants use solar energy to combine carbon dioxide with water.

8. The sun is the ultimate source of energy on the earth.

9. No, mushrooms are not green. This is the reason they are not able to make their own food.

10. Dodder is a parasite.

C. 1. Chlorophyll is a green colouring pigment found in green leaves and stems that absorbs sunlight and uses its energy to synthesise carbohydrates from carbon dioxide and water. This process is known as photosynthesis.

2. Plants absorb a lot of nutrients from the soil. Some of these nutrients are nitrogen, potassium, calcium and phosphorus.

3. The process by which organisms obtaining their food for health and growth is called nutrition.

4. Stomata are tiny pores that are used for gas exchange. They are mostly found on the under-surface of plant leaves. Air enters the plant through these openings. The carbon dioxide is used in photosynthesis. Some of the oxygen produced is used in respiration. Surplus oxygen exits through these same openings.

5. See the equation on page 8 of the textbook.

6. Lichens are formed from a combination of a fungal partner and an algal partner. The fungus supplies water and mineral to the alga, whereas the alga supplies food to fungus.

7. Insectivorous plants trap insects to fulfil their nitrogen requirements.

D. 1. The mode of nutrition in which organisms synthesize their own food from simple substances is called autotrophic nutrition. All green plants and some bacteria are able to synthesize their own food.

The mode of nutrition in which organisms cannot make their own food by themselves, but they get it directly or indirectly from autotrophs is called heterotrophic nutrition. Animals, humans and non-green plants are heterotrophs.

2. Parasites live on or in the bodies of other organisms, called hosts. They draw their nutrients from the hosts.

Saprophytes are non-green plants, which cannot make their own food. They draw nutrients from decayed matter.

3. The main source of energy for life on earth is the sun. Photosynthesis can be defined as the process by which green plants use light energy to synthesize their own food. When sunlight falls on chlorophyll molecules, the energy is absorbed. The chlorophyll molecule then releases energy, which combine carbon dioxide and water to make glucose. The glucose is converted to starch which is sweet in taste. Oxygen gas is released during the process of photosynthesis.

4. See answer of question 3 above.

5. Saprophytes are non-green plants such as mushrooms. They do not make their own food. They get their food from decayed animal and plant bodies. They secrete digestive juices on the decayed matter to break it into

soluble solution. Then they absorb nutrients from the digested matter.

6. The plants that feed on animals are called insectivorous or carnivorous. They include venus flytrap, bladder wort and pitcher plant. They are native to areas where the soil lacks nutrients. These plants get the nutrients normally from the soil and from the animals that they catch.

   Each of the known insectivorous plants uses some sort of trapping mechanism to catch its prey.

7. Plants absorb nutrients from the soil. As a result, the level of these nutrients in the soil keeps on decreasing crop by crop. To maintain the amount of nutrients in the soil, fertilizers and manures are added, which contain requisite nutrients such as nitrogen, potassium, calcium and phosphorus.

HOT Questions

1. Fungus grow on the bread.
2. A dry leaf does not contain chlorophyll. So it does not have starch and hence, does not react with iodine solution to change into blue-black.
3. The coat of wax blocks the openings in the leaf. As a result, the leaf does not make food.

2. Nutrition in Animals

P. 17: Quick Review

1. (*a*) pseudopodia (*b*) multicellular
2. (*a*) True (*b*) False

P. 21: Quick Review

1. (*a*) enzyme (*b*) hydrochloric acid
   (*c*) jejunum (*d*) bile juice
2. (*a*) False (*b*) True
   (*c*) False (*d*) True

P. 21: Quick Review

1. (*a*) rumen (*b*) stomach
2. (*a*) False (*b*) False

Time to Review

A. 1. (*c*), 2. (*a*), 3. (*c*), 4. (*b*), 5. (*c*), 6. (*a*), 7. (*b*)

B. 1. Butterfly takes its food in with the help of proboscis.
   2. Salivary glands secrets saliva.
   3. The liver secrets bile juice.
   4. A human has two sets of teeth in his life.
   5. A premolar is also called bicuspid.
   6. Obomasum is the smallest part of a ruminant's stomach.
   7. Stomach and small intestine are the places where digestion takes place.
   8. The large intestine has three parts namely the caecum, colon and rectum.
   9. The small intestine has three main parts namely the duodenum, jejunum and ileum.
   10. Liquid and salts are absorbed by the large intestine.
   11. Pancreas is located below the liver.
   12. The inner lining of the stomach secrets hydrochloric acid.

C. 1. There are four types of teeth in our jaws. They are incisors, canines, premolars and molars.

   Each jaw has two incisors, two canines, six premolars and six molars.

2. The colour of a healthy tooth is white. It turns yellowish because of plaque, a layer of saliva and bacteria.

3. The cells of the body make use of absorbed substances in the formation of some constituents and in obtaining energy from them. This process is called assimilation.

4. We get energy from the food that we eat. The oxygen that we breathe burns the food inside our body to give energy. The process of breaking down of absorbed food by oxygen to release energy is called respiration.

   Respiration is very important because without respiration we could not get energy.

5. Amoeba is a single-celled animal, which lives in water. It engulf tiny food particles with the help of pseudopodia. It puts out pseudopodia around the food particle and joins up the cavity.

6. Tentacles help the hydra to capture food particles. The tentacles first hold the particle and then contract, and curl towards the mouth.

7. Paramecium is found in water. It has cilia, the movement of which pushes food particles in its mouth.

8. Housefly, butterfly, ant and mosquito are insects. They have proboscis which help them to suck up their food.
9. The human digestive system consists of the mouth, oesophagus, stomach, small intestine and large intestine.

   The oesophagus connects the mouth to the stomach.
10. The mouth contains teeth and tongue. Teeth cut the food into small pieces. The tongue mixes these pieces with saliva, secreted by the salivary glands. The amylase in the saliva changes starch to sugar.
11. The muscles of the stomach relax and contract to mix the food with enzyme and mucus. Hydrochloric acid secreted by the inner lining of the stomach kills any bacteria in the food. The mucus protects the inner lining of the stomach. The digestive juice breaks down proteins into simpler substances.
12. After the food is swallowed, it slides down to stomach through oesophagus by a wave-like movement called peristalsis.

D. 1. **Nutrition in Amoeba:** The Amoeba lives in ponds and moves slowly at the bottom. When a food particle comes closer, the Amoeba puts out its pseudopodia around the food particle. The particle gets trapped in the cavity called food vacuole. The digestive enzyme secreted by the Amoeba help in the digestion of food.

   Nutrition in Hydra: The hydra has tentacles around its mouth to capture food particles. The tentacles first hold the food and then contract and gradually curl towards the mouth. The mouth opens and receives the food. The digested food secreted by the body help to digest the food.

2. The teeth and tongue within the mouth play a key role in digestion of food. The front teeth bite the food into pieces and the back teeth chew it into very small pieces. At the same time, the tongue mixes the food with saliva.
3. Villi are finger-like projections in the inner walls of the small intestine. The absorption of food occurs through villi. Each villus has a network of blood vessels. The digested food absorbed by the villi passes into blood stream in the capillaries.
4. The partly digested food that passes out of the stomach into the small intestine gets mixed with pancreatic juice secreted by the pancreas and the bile juice secreted by the liver. The pancreatic juice changes starch to simple sugar and proteins to simpler compounds called amino acids. The bile breaks up the fats into tiny droplets so that they can be absorbed easily.

   The absorption of food occurs through villi, which have a network of blood vessels. The food absorbed by the villi passes into the blood and then transported to all parts of the body.
5. Chewing the cud is an activity found in ruminants, which have a compound stomach. The stomach has four chambers: rumen, reticulum, omasum and obdomasum. First food enters rumen and from rumen it enters the reticulum. Here the food is formed into soft mass called cud. When the animal rests, the muscles of the reticulum send the cud to the mouth to be chewed well and mixed with the saliva. The animal chews the food thoroughly with a round motion of the jaws. This is called chewing the cud.
6. The soft masses of food called cuds pass through the rumen to the reticulum into the omasum, the third chamber of the stomach. From omasum the food enters the fourth chamber, called obomasum. Here the food mixes with digestive juices and then passes into the intestine for its complete digestion. The digested food is absorbed in the blood.

HOTS Questions

1. Humans are not autotrophs as they use the food prepare by the green leaves. Autotrophs are those organisms which synthesise their own food, which is not correct in case of humans.
2. We need food to fuel our bodies for energy, growth and repair. The digestive system converts the food we eat into its simplest forms, like glucose (sugars), amino acids (that make up protein) or fatty acids (that make up fats). The broken-down food is then absorbed into the blood stream from the small intestine and the nutrients are carried

to each cell in the body.

3. A game needs attention. Eating heavy food makes lazy. So we should avoid eating heavy food before a game.

3. Animal Fibres

P. 30: Quick Review

1. (*a*) hot (*b*) scouring
   (*c*) Gujarat
2. (*a*) True (*b*) True
   (*c*) True (*d*) False

P. 32: Quick Review

1. (*a*) larvae of Bombyx mori
   (*b*) mulberry (*c*) mooga silk
2. (*a*) False (*b*) True
   (*c*) True

Time to Review

A. 1. (*d*), 2. (*d*), 3. (*d*), 4. (*b*), 5. (*b*), 6. (*c*), 7. (*a*)

B. 1. The larvae of Mombyx mori feed on mulberry leaves.
   2. Merino sheep is found in Jammu and Kashmir.
   3. The skin of the sheep has wool.
   4. Silk is obtained from the larvae of a moth, for example, Bombyx mori.
   5. The state of Jammu and Kashmir is the producer of Angora wool.
   6. The shearing of sheep is done in summer season.
   7. Antherea Assamensis feeds on the leaves of som and sualu plants.
   8. Alpaca and Llama are found in South America.
   9. Sorter's disease is very common in people working in wool industry.
   10. This statement is true.

C. 1. Rearing and managing of silkworm on a large scale ia called sericulture.
   2. The fibres that we get from plants and animals are called natural fibres.
   3. We get wool from sheep, goats, rabbits, alpacas and llamas.
   4. Throwing is a series of process to strengthen the raw silk. This includes increasing and twisting the strands together.
   5. The fur contains dust, dirt and grease. The wool is made by removing them from the fur. The wool can be dyed easily.
   6. Silk is used in making fashionable clothing. It is used in making curtains.
   7. Wool is mainly used in making winter clothing such as sweater, gloves, and mufflers. Wool is also used to cover cloth diapers.
   8. Wool insulates against heat and cold. It returns to its original position after being stretched and creased. It resists dirt. These qualities make the wool a good fibre.
   9. When a pupa changes into a moth, it bursts the cocoon and breaks the long silk thread into many short pieces. For this reason, farmers allow only a small percentage of pupas to develop into moths.
   10. Softness decides the quality of wool obtained from different animals.

D. 1. Wool insulates against heat and cold. The air tapped in the wool does not allow body heat to escape, keeping the body cool.

   2. **Laying eggs** : The female silkworm lays eggs in early summer. The farmers store these eggs into cold store and during the spring they put the eggs in incubators for hatching. In about 20 days the eggs hatch into tiny caterpillars. The farmers supply the caterpillars fresh mulberry leaves to eat.

   Spinning of cocoon: The fully grown caterpillars stops eating leaves. They secrete a protein from the salivary glands to form long threads. They wrap themselves with the thread to form ball-like structure called cocoons. Now they changed into pupae.

   Reeling: Pupae are immersed into hot water to kill them. Threads from cocoons are unwound. The process of taking out silk thread from cocoons is called reeling.

   Throwing: The raw silk is strengthened by a series of processes called throwing. During this process four kinds of threads can be produced.

   Boiling off: After throwing, the silk is boiled in hot soap solution to remove sericin.

Dyeing and weaving: Silk fibre is dyed and woven on looms.

3. **Sorting and Grading**: After shearing, the fleece is put into different groups according to the quality. White wool is most desirable. This process is called sorting and grading.

   Scouring: It is the process of washing properly the fleece with detergent to remove dirt, dust and grease.

   Carding: In this process fleece is passed through metal teeth to straighten them. The teeth arrange the fibre into a flat sheet called web. The web is then formed into strand known as silver. The silver is stretched into thinner strand called roving, which is then twisted into yarn.

   Spinning: Three or four strands of wool are spun together to form threads of wool. These threads are rolled into yarn, which is knitted into fabrics.

4. **Mulberry silk** is the most common variety of silk produced by the silkworm Bombyx mori. This silk is produced in the states of Karnataka, Tamil Nadu, Andhra Pradesh and Jammu and Kashmir.

   Mooga silk is produced by the silkworm Antherea Assamenisis, which feed on the leaves of som and suala plants. This silk is known as the pride of Assam.

   Tusser silk is produced by the silkworm Antherea mylitta in the states of Madhya Pradesh and Chhattisgarh.

   Eri silk is produced by another type of silkworm in north India.

HOT Questions

1. Wool insulate against heat and cold. So it is used during winter season.
2. The smooth surface of silk fibre reflects light. This reflected light is seen as lustre.
3. Please avoid this question.
4. Yes, sericulture is an ecofriendly practice as it does not involves chemicals that pollute environment.

4. Structure of Matter

P. 38: Quick Review

1. (*a*) metal (*b*) silver
2. (*a*) False (*b*) False

P. 39: Quick Review

1. (*a*) chemical (*b*) atomicity
2. (*a*) True (*b*) False

Time to Review

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

B. 1. Carbon and sulphur 2. Bromine
   3. One 4. Carbon and calcium
   5. MgO 6. One
   7. Common salt and water
   8. Atom
   9. H_2SO_4 10. SO_4^- and NO_3^-

C. 1. Atom is the smallest particle of an element that has all the properties of that particular element. Atoms are the basic building blocks of matter that make up every objects a desk, the air, even you are made up of atoms!

   2. A molecule is the smallest particle in a chemical element or compound that has the chemical properties of that element or compound. Molecules are made up of atoms that are held together by chemical bonds.

   3. A compound is a substance made of two or more elements chemically combined together in a fixed proportion. The smaller particle of a compound is a molecule which shows all the properties of that compound. Its components can be separated by only chemical means every day, we encounter chemical substances. These chemicals that we use everyday are made up of atoms of a fixed proportion and these atoms are arranged in a certain way.

   4. A chemical formula tells us the number of atoms of each element in a compound. It contains the symbols of the atoms of the elements present in the compound, as well as how many there are for each element in the form of subscripts.

   5. Scientists have adopted certain conventions regarding the chemical symbols for various elements. The symbol is the short form or abbreviated name of the element. Each element has a chemical symbol that is unique to it. An atom of an element is denoted by this

symbol. For example, the symbol for Carbon is C. The symbol for nitrogen is N.

6. The atomicity of an element is the number of atoms present in one molecule of the element. The element that has only one atom are called monoatomic. The elements gold, helium, and neon are mono atomic. Hydrogen and oxygen are diatomic because they have two atoms in their molecules. Phosphorus molecule contains four atoms and so it is called tetra-atomic.
7. A chemical equation is a written representation of the process that occurs in a chemical reaction. A chemical equation is written with the reactants on the left side of an arrow and the products of the chemical reaction on the right side of the arrow.
8. The valency of an element measures its ability to combine with other elements. The valency of hydrogen is taken as 1. The valency of other elements is the number of hydrogen atoms that can combine to form a compound. For example, in water, two atom of hydrogen combine with one atom of oxygen. So the valency of oxygen is two.
9. A radical is a group of atoms that are joined together in some particular spatial structure and that take part in most chemical reactions as a single unit. Important inorganic radicals include ammonium (NH_4), carbonate (CO_3), chlorate (ClO_3) and perchlorate (ClO_4), hydroxide (OH), nitrate (NO_3), phosphate (PO_4), silicate (SiO_3) and sulphate, (SO_4). The use of these radicals simplifies the naming and description of compounds.
10. The balanced equation of the formation of water is as:

$2H_2 + O_2 \longrightarrow 2H_2O$

D. 1. An atom is smallest particle in an element that has the properties of the element. It is not possible to break down the atom further retaining the properties of the element. For example, the atoms of element gold cannot be broken down further and each atom has the properties of gold.

Molecules are formed by the combination of two or more atoms. Unlike atoms, molecules can be subdivided to individual atoms. The atoms are bonded together in a molecule. For example, the water molecule is made up of one oxygen atom and two hydrogen atoms. So a water molecule can be further divided into oxygen and hydrogen atoms. But these atoms cannot be subdivided.

2. Each element has a symbol, one or two letters that represent the element much as your initials represent you. The symbol of an element represents one atom of that element. The symbol of sulphur S represents one atom of sulphur.
3. The chemical formula of carbon dioxide CO_2 shows that it is formed by the chemical composition of one carbon atom and two oxygen atoms.
4. The chemical compounds or elements that take parts in a a chemical reaction are called reactants. The compounds formed by their chemical reaction are called products. Reactants and products are separated by an arrow. The arrowhead shows the direction of the reaction.

$2H_2 + O_2 \longrightarrow 2H_2O$

5. (*a*) $Zn + 2HCl \longrightarrow ZnCl_2 + H_2$
(*b*) $2Na + 2H_2O \longrightarrow 2NaOH + H_2$
(*c*) $P_4 + 5O_2 \longrightarrow 2P_2O_5$

HOTS Questions

1. 2O represents two atoms of oxygen whereas O_2 represents one molecule of oxygen.
2. Avoid this question.

5. Heat and Temperature

P. 48: Quick Review

1. (*a*) temperature (*b*) 134 °C
(*c*) hot, cold
2. (*a*) True (*b*) False

P. 50: Quick Review

1. (*a*) good (*b*) good
(*c*) contact
2. (*a*) False (*b*) False

P. 51: Quick Review

1. (*a*) convection (*b*) convection
(*c*) contact

2. (*a*) True (*b*) True

P. 53: Quick Review

1. (*a*) radiation (*b*) waves
2. (*a*) False (*b*) False

Time to Review

A. 1. (*b*), 2. (*d*), 3. (*a*), 4. (*c*), 5. (*d*), 6. (*d*), 7. (*b*), 8. (*a*), 9. (*c*), 10. (*c*), 11. (*c*), 12. (*b*), 13. (*c*)

B. 1. thermometer 2. 100°C
3. conduction 4. 37°C
5. No 6. mercury
7. temperature 8. mercury
9. good conductor
10. insulators or bad conductors of heat

C. (*a*) conduction (*b*) convection
(*c*) convection (*d*) radiation
(*e*) convection (*f*) radiation
(*g*) radiation

D. 1. Metals such as iron, aluminium, copper, mercury, etc., are good conductors of heat.

2. Handles of utensils are made of bad conductors. Thermocol, which is a bad conductor of heat, is used as insulating material.

3. Handle of a pressure cooker is made of an insulating material, such as ebonite, so that heat could not transfer from the cooker to the hand.

4. The radiation of heat from a hot body depends upon its temperature and its surface area.

5. (*a*) Heat is a form of energy which is transferred from a body at a higher temperature to a body at lower temperature.

(*b*) The hotness or coldness of a body is called its temperature.

(*c*) Conduction is a method of heat transfer from a body at higher temperature to a body at lower temperature in contact.

(*d*) Convection is a method of heat transfer in which heat is transferred by the actual movement of heated particles.

(*e*) Radiation is a method of heat transfer in which heat from a hot body is transferred without any medium.

6. We know that

$C = (F - 32) \times 5/9$
$= (95 - 32) \times 5/9$
$= 63 \times 5/9 = 5 \times 7 = 35\ °C$

7. We know that

$F = (C \times 9/5) + 32$
$= (35 \times 9/5) + 32$
$= 7 \times 9 + 32 = 63 + 32 = 95\ °F$

8. When one end of a cold body, which is good conductor of heat such as iron, is brought in contact with a hot body, the other end of the cold body gets heated. This is because the molecules of the cold body absorb heat from the hot body in contact and vibrate. These molecules in turn cause their neighbouring molecules to vibrate. The process continues till both the bodies acquire the same temperature.

E. 1. A thermometer works on the principle that substances expand on heating and contract on cooling. A thermometer has two important elements– the temperature sensor, in which some physical change occurs in temperature, and some means of converting the physical change into a numerical value. The bulb on a mercury thermometer works as the temperature sensor. The stem of the thermometer has marking to show the numerical value of the temperature.

2. A thermometer consists of a fine capillary tube made of glass. The capillary tube is enclosed in a thick glass tube called stem. The whole length of the stem is graduated in degree Celsius to read the temperature. Two fixed points namely lower fixed point and upper fixed point are marked on the stem. The lower fixed point is the temperature of pure melting ice at normal atmospheric pressure, which is 0°C. The upper fixed point is the temperature of pure boiling water at normal atmospheric pressure, which is 100°C.

3. A clinical thermometer is a thermometer used to measure body temperature. Often the liquid inside it is mercury. It is very accurate because it has a narrow place where the liquid rises very fast. It can measure only a short range of temperature from 35°C to 42°C.

This is because the temperatures of the human body do not vary beyond these limits. There is a constriction in the glass tube, which does not let the mercury drop back into the bulb.

4. Heat is a form of energy which flows from a body at higher temperature to a body at lower temperature. The transfer of heat takes place in three different ways– conduction, convection and radiation.

   Conduction is the transfer of heat between substances that are in direct contact with each other. Conduction occurs when a substance is heated, particles will gain more energy, and vibrate more. These molecules then bump into nearby particles and transfer some of their energy to them. This then continues and passes the energy from the hot end down to the colder end of the substance.

   Convection occurs when warmer areas of a liquid or gas rise to cooler areas in the liquid or gas. Cooler liquid or gas then takes the place of the warmer areas which have risen higher. This results in a continuous circulation pattern. Water boiling in a pan is a good example of these convection currents.

   Radiation is a method of heat transfer that does not rely upon any contact between the heat source and the heated object as is the case with conduction and convection. Heat can be transmitted though empty space. Examples of radiation is the heat from the sun, or heat released from the filament of a light bulb.

5. Woollen clothes form many layers and trap air. Since air is a bad conductor of heat, therefore, it does not allow the flow of heat from the body. As a result we feel warm in woollen clothes.

6. Conduction and convection need a medium for the transfer of heat, but in radiation the transfer of heat takes place without any medium.

7. Being light hot air rises. So ventilators are provided near the ceiling so that hot air may escape through them. It is replaced by fresh air through windows. This way room contains fresh air all the time.

8. As the air becomes hot by the heat of the sun, it expands and rises up. As the hot air rises up, it is replaced by the cooler air. Then the cooler air gets warm and rises up. This movement of hot air cool air is called convection current.

HOTS Questions

1. The phenomenon which causes glass to shatter when we pour boiling water into it is called thermal shock. Typical glass is not able to handle heat very well. The reason is that as the glass heats, it expands. Pouring hot water or tea into a glass is highly likely to break it, because the hot water contacts inside of the glass first, whereas outer side of the glass remains cooler. The glass thus does not expand as a whole, but is pulled in different directions as part of it expands and part does not. This difference produces the breaking.
2. The glass which has a stainless spoon cools first.
3. Actually, it is quite warm in an igloo. As the ice blocks melt in the inside, the bitter cold outside refreezes the water, creating an airtight seal. And as long as the opening is against the wind, cold air does not come inside.

6. Acids, Bases and Salts

P. 61: Quick Review

1. (*a*) Tartaric (*b*) Lactic (*c*) corrosive
2. (*a*) False (*b*) True (*c*) True

P. 62: Quick Review

1. (*a*) bleaching (*b*) sodium
2. (*a*) True (*b*) False

P. 64: Quick Review

1. (*a*) red, blue (*b*) natural indicator
2. (*a*) True (*b*) False

P. 66: Quick Review

1. (*a*) blue vitriol (*b*) potashalum
2. (*a*) True (*b*) False

Time to Review

A. 1. (*b*), 2. (*b*), 3. (*c*), 4. (*a*), 5. (*c*), 6. (*b*), 7. (*a*), 8. (*b*), 9. (*c*), 10. (*d*)

B. 1. acidic 2. acidic
   3. neutral 4. acidic
   5. neutral 6. acidic

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

D. 1. nitric acid.
2. citric acid
3. potassium hydroxide
4. litmus paper
5. lichens.
6. methyl orange
7. acid + base $\longrightarrow$ water + salt
8. magnesium hydroxide
9. litmus
10. aluminium bicarbonate
11. neutralization
12. formic acid

E. 1. We use indicators to know whether a substance is an acid or a base. For example, blue litmus paper turns red in acidic solution and red litmus paper turns blue in a basic solution.

2. Citric acid is a source of vitamin C. Acetic acid is used to preserve food.

   Sulphuric acid is used in industry to manufacture fertilizers, drugs, dyes, etc. Hydrochloric acid is also used in industries to manufacture chemicals which are used to clean washbasins, etc.

3. Sodium hydroxide is used to clean utensils. Magnesium hydroxide is used as antacid.

   Calcium hydroxide is used in the manufacture of bleaching powder. Sodium hydroxide is used in the manufacture of washing soda, soap, detergents, etc.

4. **Properties of acids:** Acids are sour in taste. They turn blue litmus to red.

   Properties of bases: Bases have a bitter taste. They turn red litmus to blue.

5. Salts are formed by the reaction of acids and bases. When an acid reacts with a base, it forms a salt and water. The reaction is called neutralization.

6. NaCl, called common salt, is used in food. Sodium carbonate is used in laundry for washing clothes.

7. The substances that are neither acidic nor basic in nature are called neutral substances. They have a pH of 7, for example pure water is a neutral substance.

F. 1. Bases reacts with acids to neutralise their effects. So they are called antacids.

2. A base is any substance which reacts with acids according to the general equation to give salt and water. This definition includes alkalis. But also means that all metal oxides are bases even those which do not dissolve in water to form alkalis. Alkalis are bases which dissolve in water to form solutions with a pH above 7. This is not restricted to metal oxides but also includes compounds like Ammonia.

3. Strong acids are corrosive; they can burn skin. So we should handle them carefully.

4. The neutralization reactions are exothermic reactions, meaning they give heat as a result the temperature of the mixture rises.

5. To save life in water from the effects of acidic or basic nature of the waste.

G. 1. Acids are sour in nature. Bases are opposite to acids in nature. So bases are called antacids. They are bitter in taste. Acids turn blue litmus red. Bases turn red litmus blue.

2. A substance which is used to know whether a substance is acidic or basic in nature is called an indicator. It changes the aqueous acidic or basic solution. For example, litmus is an indicator in red and blue colours. Acids turn blue litmus red and base turns red litmus to blue.

   Methyl orange is another indicator which gives pink colour in acid and yellow in basic medium.

3. Some gases, like sulphur dioxide and nitrogen dioxide, present in the air are acidic in nature. These gases react with water to form sulphuric acid and nitric acid. These acids come down with rain as acid rain. Acid rain damages buildings and monuments. Acid rain causes damage to plants and animals, and also increases the acidity of the soil.

4. **Sulphuric acid**: It is used in the manufacture of fertilizers, drugs, dyes, detergents, paints and explosives. It is used in textile, paper and leather industries. The batteries of cars, buses, trucks contain sulphuric acid.

   Sodium chloride: It is used as common salt

in food, and preservative in pickles. It is used in curing meat and fish. It is used in the manufacture of chlorine, hydrochloric acid, washing soda, and sodium hydroxide.

Sodium hydroxide: It is used in the manufacture of washing soaps, detergents, rayons, medicines and paper. It is also used in textile industry and refining edible oils.

Calcium hydroxide: It is used in the manufacture of bleaching powder. It is also used as a dressing material for acid burns.

HOTS Questions

1. The patient is suffering from acidity.
2. Methyl orange is pink in acidic solution and yellow in a basic solution and neutral in a salt solution.

7. Physical and Chemical Changes

Time to Review

A. 1. (*c*), 2. (*b*), 3. (*b*), 4. (*b*), 5. (*c*), 6. (*d*), 7. (*a*), 8. (*b*), 9. (*c*)

B. 1. reversible
2. physical
3. chemical
4. air
5. prevents

C. 1. Temporary
2. Chemical change
3. Applying paint or grease
4. Chemical change
5. Heat
6. Iron oxide

D. 1. Chemical change
2. Chemical change
3. Physical change
4. Physical change
5. Chemical change
6. Chemical change
7. Physical change
8. Chemical change
9. Physical change
10. Chemical change
11. Chemical change
12. Physical change

E. 1. Rusting can be prevented by applying paint or grease. It can also be prevented by galvanisation.

2. Metals are extracted from ores by chemical changes. Medicines are produced by chemical changes. Plastics, soaps and detergents are manufactured by chemical changes. Respiration and digestion of food are chemical changes.

3. Rusting is the common term for corrosion of iron and its alloys, such as steel. A reddish-brown layer is deposited on rusted iron objects.

4. An alloy is a material composed of two or more metals or a metal and a non-metal.

5. Rusting of iron requires air and moisture.

F. 1. Humidity or moisture is more in coastal areas. So rusting occurs faster in coastal areas than plain areas.

2. Painting prevents the reaction of iron with water and air, so it prevents rusting.

3. Evaporated water can be changed into water again by condensation. So it is a physical change.

4. Firework is a chemical reaction in which heat and light are produced. The heat can burn skin.

G. 1. A chemical change occurs when a substance combines with another to form a new substances. Some chemical changes produce heat and are exothermic reactions and others may require heat and are endothermic.

Properties of chemical changes

- A chemical change is not reversible.
- It is permanent in nature.
- It gives rise to new substances with different properties.
- A chemical change absorbs or gives out heat.

2. It is a chemical change. The reaction between baking soda and lemon juice is an acid-base reaction, because it involves an acid (citric acid in the lemon juice) reacting with a base (baking soda). The gas evolved is carbon dioxide.

3. Melting of ice is a physical change because ice on melting changes into water. If this water is placed at a temperature below 0°C, it will again changes to ice.

4. Take a clean beaker and put the powdered impure sample of copper sulphate in it. Add distilled water and stir the contents gently with the help of a glass rod. In order to make the solution more clear add two or three drops of concentrated sulphuric acid in it. Heat the solution in the beaker on a wire gauze. Stir it

continuously and add more impure copper sulphate until no more of it dissolves. Filter the solution and collect the filtrate in a china dish. Place the china dish over wire gauze kept over a tripod stand and heat it gently. As the solution gets heated, stir it with a glass rod. This helps in uniform evaporation and prevents the formation of a solid crust. When the volume of the solution is reduced to one-half, take out a drop of the concentrated solution on one end of the glass rod and cool it by blowing air. Formation of thin crust indicates that crystallization point is reached. Turn off the burner, cover the dish with a watch glass, and keep it undisturbed. As the solution cools down, crystals separate out. Slow cooling ensures better crystallization.

5. There are several differences between a physical and chemical change in matter or substances. A physical change in a substance doesn't change what the substance is. In a chemical change where there is a chemical reaction, a new substance is formed and energy is either given off or absorbed.

   Melting of wax is a physical change whereas burning of wax is a chemical change

HOTS Questions

1. Apple contains malic acid. When we cut it, the malic acid come in contact with air, a chemical reaction takes place which changes the cut surface of the apple brown.
2. In deserts, the air contains less moisture. So occurring of rusting does not take place rapidly.
3. Glowing of a bulb is not a chemical reaction.

8. Adaptations of Animals to Climate

P. 84: Quick Review

1. (*a*) highest (*b*) air
   (*c*) desert (*d*) hygrometer
   (*e*) rain
2. (*a*) False (*b*) False
   (*c*) False (*d*) False

Time to Review

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

B. 1. humidity 2. adaptation
   3. Siberia 4. camouflage
   5. hot 6. cold
   7. arboreal

C. 1.–(*e*), 2.–(*d*), 3.–(*a*), 4.–(*b*), 5.–(*a*)

D. 1. Weather is the state of the atmosphere at a particular place and time as regards heat, cloudiness, dryness, sunshine, wind, rain, etc.

   Climate is the weather prevailing in an area in general or over a long period.

   2. The main elements of weather are temperature, humidity, and wind.

   3. The mass movement of animals in search of more favourable climate is called migration or seasonal movement of animals from one region to another.

   4. Polar bear and penguins live in polar region.

   5. Many animals have evolved to exhibit some form of camouflage, which is an adaptation that allows animals to blend in with certain aspects of their environment. This is called camouflage. It increases an organism's chance of survival by hiding it from predators.

E. 1. Black colour absorbs more heat than white colour. So the penguins have black feather on the beak to absorb more heat from the sun.

   2. Tropical rainforests support a great variety of animals because of the constant warmth, and regular supply of water and a wide variety of food.

   3. The long beak allows the toucan to reach fruits on branches that are too small to support the bird's weight.

   4. Lemurs and lorises have big eyes, which help them to see in the dark. They also have sensitive hearing to run away from their predators.

   5. Long ears help elephants to hear very soft sounds. They also help the elephants to keep cool in the hot and humid climate of the rain forests.

F. 1. The elements of weather are as follows :

   Temperature: During the day the temperature increases because of the sun. During night, the temperature decreases as there is no sun that heats the earth.

Humidity: The amount of water vapour in the air is called humidity. More the humidity, more is the chance of rain.

Winds: The blowing air is called wind. During winter, wind blows from the northern mountains to the northern plains. So the temperature in the plains falls down. During summer, winds blow from deserts to the northern plains. So the temperature in plains increases.

2. The common factors that affect the climate of a place are as:
   - Distance from the equator
   - Height above the sea level
   - Distance from the sea and mountains
   - Direction of prevailing winds from the seaside that brings rain to coastal areas and dry weather to inland areas
   - Warm ocean currents and cool ocean currents
3. Polar bears have two thick layers of fur that retain body heat and protect from extreme cold. The layer of fat under the skin makes the body insulated. The wide and large paw helps to walk easily on the ice. The strong sense of smell helps the polar bear to catch pray buried under the snow.
4. See page 83 of textbook.
5. The long-tailed monkey live in the forests of the Western Ghats. It has a long tail to swing on branches and eats fruits.

   The elephant has big ears that help it to keep cool.

HOTS Questions

1. Migratory birds travel long distances to search for favourable place. And return to the original place when the conditions are favourable. So they are called good navigators.
2. After sunset the whole surrounding looks same covered with snow. So the penguins lost their way to home.
3. Frogs, snakes and fish are cold-blooded animals. They take on the temperature of their surroundings. They are hot when their environment is hot and cold when their environment is cold. They hibernate during winters to avoid cold climate.
4. It becomes very cold in Siberia during the months of December and January. So the birds come to India to warm places.

Model Test Paper I

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

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

C. 1. oxygen 2. clinical
   3. chemical equation 4. acetic
   5. soil

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

E. 1. Nutrition is the process of taking in nutrients from the food an organism eat.

   There are two main types of nutrition: autotrophic and heterotrophic.

   Autotrophic nutrition: It is the mode of nutrition in which the organisms manufacture their own food by photosynthesis using inorganic raw materials like carbon dioxide and water in the presence of light and chlorophyll. It is also called **holophytic nutrition**. The organisms are called autotrophs or producers. For example, all green plants.

   Heterotrophic Nutrition: It is the mode of nutrition in which organisms cannot manufacture their own food and depend on others for their food. It is also called **holozoic nutrition** since the organisms feed on solid food. The organisms are called heterotrophs or consumers. For example, all animals and the non-green plants.

   Heterotrophs who feed on plants directly are called herbivores, for example, deer, cow, goat and rabbit.

   Heterotrophs who eat the flesh of other animals by killing them are called carnivores, for example, lion, tiger and snakes.

   Heterotrophs who feed on both plants and animals are called omnivores, for example, man, bear and crow.

   Heterotrophs that obtain food by decomposing dead plant and animal matter

are called saprophytes or decomposers and this mode of heterotrophic nutrition is called **saprophytic nutrition**, for example, most fungi, bacteria,protozoans and certain plants.

Heterotrophs that feed on the flesh of dead animals are called **scavengers**, for example, vultures and hyenas.

The organisms that draw food from other living organisms called hosts by living on or inside their bodies are called parasites and this mode of nutrition is called **parasitic nutrition**, for example, malarial parasite, several fungi and bacteria.

2. **Ingestion** is the consumption of a substance by an organism. In animals, it normally is accomplished by taking in the substance through the mouth into the gastrointestinal tract, such as through eating or drinking.

   Egestion is the discharge or expulsion of undigested food material from a cell in case of unicellular organisms, and from the digestive tract via the anus in case of multicellular organisms.

3. Because the iron is more reactive than copper, it displaces copper from the aqueous sulphate forming aqueous iron sulphate, which is reddish brown.

4. Magnesium hydroxide is a base. It reacts with the acid in the stomach and neutralizes it. So it acts as an antacid.

5. Mercury is an opaque metal. It remains liquid over a wide range of temperature. Its boiling point is high and freezing point is low. Coefficient of expansion of mercury is high; Little heating produces more expansion.

9. Soil

P. 92: Quick Review

1. (*a*) weathering (*b*) small pieces of rocks
2. (*a*) False (*b*) True

P. 92: Quick Review

1. (*a*) top soil (*b*) horizon C
2. (*a*) True (*b*) False

P. 94: Quick Review

1. (*a*) sandy (*b*) loamy (*c*) clayey
2. (*a*) False (*b*) True (*c*) False

P. 96: Quick Review

1. (*a*) conservation (*b*) terrace, contour
2. (*a*) True (*b*) True

Time to Review

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

B. 1. clay, silt and sand
2. clayey soil
3. humus
4. earthworm
5. top soil, subsoil and parent rock
6. mineral particles, humus, living organisms, air and water
7. water and wind
8. 0.002 mm - 0.005 mm
9. (*a*) sandy-loam soil (*b*) loamy soil

C. 1. The topmost layer of the earth's crust is called soil.

2. The soil that has developed three layers (top soil, subsoil and parent rock) is called mature soil.

3. Topsoil contains enough amount of humus which is required by plants for their growth. The humus makes it darker than other layers.

4. The decomposed organic matter in soil is called humus.

5. Humus is needed for the growth of plants.

6. Hirizon C contains rocks and is very hard.

7. Soil is composed of mineral particles, humus, living organisms, air and water. Humus is completely decomposed mater of plants and animals.

D. 1. The breaking down of rocks into smaller pieces by the natural forces such as wind, water, sun's heat, plants and animals is called weathering. There are two types of weathering.

Chemical weathering which results from chemical reactions between minerals in rocks and external agents like air or water. Oxygen oxidizes minerals to alteration products whereas water can convert minerals to clays or dissolve minerals completely.

Physical weathering is when rocks are broken apart by mechanical processes such as rock fracturing, freezing and thawing, or breakage during transport by rivers or glaciers.

2. The soil profile is a key to understanding the processes that have taken in soil development. It is defined as a vertical section of the soil from the ground surface downwards to where the soil meets the underlying rock.

   Virtually all soil profiles are composed of many layers, termed as horizons. Most soils have three or more horizons. These layers largely represent different degrees of decomposition of organic matter, called humus. The horizon A contains the highest degree of humus. The horizon B, below the horizon A, has lesser quantity of humus than the horizon A.

   Below the horizon B is the horizon C. This horizon is often consistent with the parent material and may have been little altered from the material in which the soil originally formed.

3. Weathering is a term which describes the general process by which rocks are broken down at the earth's surface into such things as sediments, clays, soils and substances that are dissolved in water. The process of weathering typically begins when the earth's crust is uplifted by tectonic forces. After the physical breakup and chemical decay of exposed rocks by weathering, the loosened rock fragments and alterations products are carried away through the process of erosion.

   Rainfall and temperature can affect the rate in which rocks weather. High temperatures and greater rainfall increase the rate of chemical weathering. Rocks in tropical regions exposed to abundant rainfall and hot temperatures weather much faster than similar rocks residing in cold, dry regions.

4. There are basically three types of soil: clayey, sandy and loamy.

   Clayey soil: Particles of this soil are very small and compact. The soil absorbs and holds water and creates a drainage problem. This adversely affects healthy root and plant growth.

   Sandy soil: Particles of this type of soil are large. The water and nutrients quickly drain away from the plant root zone. Sandy soil is the opposite of clay soil. Its water-holding capacity is very low.

   Loamy soil: This soil consists of sand, clay and silt. It contains enough humus. Like clay the soil holds water and have good aeration around the roots.

5. Soil can become polluted in a number of ways. The main causes of soil pollution are poor management of the land in farming, mining and quarrying, disposal of household and factory waste.

   Farming: The main problem is the increased use of chemical fertilisers, pesticides and insecticides. If applied in the wrong strengths, these can remain in the soil, and will also leach off the fields and into local water supplies.

   Mining: The mining waste is generally left on site in the form of spoil heaps. These spoil heaps may contain a wide variety of toxic, or poisonous substances which then leach into the soil due to rainfall.

   Disposal of waste: We produce vast quantities of household waste every year. Much of our waste is either incinerated causing problems of air pollution or buried in landfill sites, where leaching of waste builds up problems for the future.

   Heavy industry often produces quantities of unwanted chemicals, which, if allowed to come in contact with the soil, can cause extensive pollution.

6. Soil erosion refers to the wearing away of a topsoil by the natural forces of water and wind. It is also caused by deforestation and overgrazing.

   Soil erosion by water: The greater the intensity and duration of a rainfall, the higher the erosion rate. Lighter materials such as very fine sand, silt, clay and organic matter are easily removed by the runoff water. Surface water runoff occurs whenever there is excess water on a slope that cannot be absorbed into the soil or is trapped on the surface.

Soil erosion by wind: This occurs in susceptible areas of mainly sandy and organic soils. Under the right conditions it can cause major losses of soil and property. Soil particles move depending on their size and wind strength.

7. The best way to prevent soil is to increase area under forests. Indiscriminate felling of trees should be stopped and efforts should be made to plant trees in new areas.

   Overgrazing of forests and grass lands by animals, especially by goats and sheep, should be properly checked. Separate grazing grounds should be earmarked and fodder crops should be grown in larger quantities.

   Much of the soil erosion by river floods can be avoided by constructing dams across the rivers. This checks the speed of water and saves soil from erosion.

   We can save lot of our valuable soil by bringing about certain changes in our agricultural practices such as crop rotation, strip cropping, contour ploughing, terracing, contour bunding, etc.

HOTS Questions

1. Clay is good for making toys as it has fine particles and less aeration to hold the particle tightly.
2. Formation of soil is continue in nature. But it take thousands of years to form a few milimetres layers of soil. Hence, soil can be considered as non-renewable resource.
3. Soil formation takes a long time whereas soil erosion occurs quickly. So we are very aware of soil erosion.

10. Respiration

P. 103: Quick Review

1. (*a*) breathing (*b*) physical (*c*) aerobic
2. (*a*) False (*b*) True

P. 105: Quick Review

1. (*a*) Amoeba (*b*) skin
2. (*a*) False (*b*) True

P. 107: Quick Review

1. (*a*) bronchi (*b*) inhalation (*c*) larynx
2. (*a*) True (*b*) True

P. 108: Quick Review

1. (*a*) anaerobically (*b*) enormous
2. (*a*) True (*b*) False

Time to Review

A. 1. (*a*), 2. (*c*), 3. (*c*), 4. (*a*), 5. (*c*), 6. (*c*), 7. (*b*), 8. (*c*), 9. (*b*), 10. (*b*), 11. (*a*)

B. 1. gills 2. breathing
3. spiracles 4. lungs
5. lactic acid 6. yeast
7. stomata 8. tracheae
9. cellular respiration
10. aerobic and anaerobic
11. external and internal
12. yeast and some bacteria
13. alveoli

C. 1. $C_6H_{12}O_6 + 6O_2 \longrightarrow 6CO_2 + 6H_2O + \text{Energy}$

2. Respiration is a process by which a living organism takes in oxygen to release energy and then remove the waste products like carbon dioxide and water.

3. We breathe to get oxygen to our cells so that they can use oxygen to get energy. Cells do this by completely breaking down glucose (sugar) into carbon dioxide and water.

4. The lungs are the main organs of the human respiratory system.

5. Amoeba — cell surface, Fish — gills, Insects — tracheae, Earthworm — skin

6. Glucose and oxygen are used in respiration.

   Plants respire through stomata, tiny holes in leaves.

7. Air inhaled through the nose is warmed and moistened, so it does not irritate the sensitive airways.

D. 1. Fish use a specialized organ called gills in order to breathe the oxygen dissolved in water. The mouth and throat of a fish force water over the gills. Gills have a lot of blood vessels. The water has a higher concentration of oxygen than the blood. Therefore, the dissolved oxygen from the water moves through the thin walls of the blood vessels and enters the blood. Once the blood is fully

oxygenized, it is pumped back into the body and used by the fish for energy and for all metabolic processes in the body.

2. Aerobic means with air. This type of respiration needs oxygen for it to occur, so it is called aerobic respiration.

   The chemical equation is:

   $C_6H_{12}O_6 + 6O_2 \longrightarrow 6CO_2 + 6H_2O + \text{Energy}$

   In the above equation, we see that glucose is broken down by oxygen to release energy with carbon dioxide and water being produced as by-products of the reaction.

   Aerobic respiration occurs in plants as well as animals. Oxygen enters plant cells through the stomata. Plants produce their food via photosynthesis and release energy from it through the process of respiration.

3. When a person takes in a breath of air, the air travels through the nose or mouth, into the larynx, then into the trachea, which is the main passageway into the lungs. The trachea divides into a right and left main bronchus. Each major bronchus then subdivides into smaller airway passages referred to as bronchi. As the airway passages make their way out to the lung tissue, the passages become smaller and are referred to as bronchioles. Eventually the bronchioles terminate into small collections of air sacs known as alveoli, which is where the actual exchange of CO_2 and oxygen occur.

4. Cilia and mucus along the inside wall of the nasal cavity traps and removes dust and pathogens from the air as it flows through the nasal cavity. The cilia move the mucus down the nasal cavity to the pharynx, where it can be swallowed.

5. Green plants make glucose (sugar) by combining water and carbon dioxide. This needs energy, which comes from the sunlight. The energy is trapped by chlorophyll. The glucose which is made contains some energy. When a plant needs energy, it releases it from the glucose in the same way as animals do by respiration.

6. (a) External respiration is basically the transfer of gas between respiratory organs such as lungs and the outer environment. Internal respiration is the transfer of gas between the blood and cells.

   External respiration also known as breathing refers to a process of inhaling oxygen from the air into the lungs and expelling carbon dioxide from the lungs to the air. Exchange of gases both in and out of the blood occurs simultaneously. External respiration is a physical process during which oxygen is taken up by capillaries of lung alveoli and carbon dioxide is released from blood.

   In internal respiration, oxygen is used in chemical reaction within the cells. In this process energy from food substances are released and carbon dioxide and water are produced as waste products.

   (b) **Respiration**
   - It takes place in living cells only.
   - It is carried out with the help of various enzymes.
   - It is a slow process.
   - It occurs at the body temperature of the organism.

   Combustion
   - It does not take place in the living cell.
   - Enzymes are not involved in this process.
   - Sudden release of energy generates high temperature.
   - Energy released in combustion is dissipated as heat and to some extent as light.

8. See table 10.1 on page 102 of the textbook.

HOTS Questions

1. Yes. During the day, in presence of sunlight, the plants use up the carbon dioxide and release oxygen as a by-product. But during night they are unable to use the carbon dioxide and this leads to increase in the proportion of carbon dioxide in the air. During night the trees breathe in oxygen and release carbon dioxide. If one sleeps under the trees, the amount of increased carbon dioxide in the air around will certainly affect the health. So it is advised not to sleep under trees during night.

2. A yawn is a reflex consisting of the simultaneous

inhalation of air and the stretching of the eardrums, followed by an exhalation of breath.

Yawning most often occurs immediately before and after sleep, during tedious activities. It is commonly associated with tiredness, stress, sleepiness, or even boredom and hunger, though studies show it may be linked to the cooling of the brain.

3. Like all other living creatures, fish too need oxygen to breathe. Fish get their supply of oxygen from water. They take water into their mouths, which passes through their gills. A fish's gills work only in water. This is why most fish die when they are out of water for long.

   When water passes through the fish's gills, it absorbs oxygen from the water and replaces it with carbon dioxide from the fish's bloodstream. The water flows out under the gill's cover and this process is repeated.

4. When we breathe in the absence or scarcity of oxygen, our body produces lactic acid because of partial breakdown of glucose in the cells. Lactic acid causes cramps which can be removed after a massage or hot water bath.

5. The oil burning in a lamp produces carbon dioxide and carbon monoxide which is a poisonous gas. If the room is closed, the percentage of these gases increases and the person sleeping will feel suffocation. Even death may occur.

6. Whale and dolphin are mammals. They breathe through lungs but not gills. So they have to come up to breathe air.

11. Transportation of Materials in Plants and Animals

P. 114: Quick Review

1. (*a*) xylem (*b*) vascular bundle
2. (*a*) False (*b*) True

P. 116: Quick Review

1. (*a*) transpiration (*b*) osmosis
   (*c*) lower, higher
2. (*a*) False (*b*) True

P. 119: Quick Review

1. (*a*) plasma (*b*) stethoscope
   (*c*) haemoglobin (*d*) capillaries
   (*e*) white blood (*f*) four
2. (*a*) False (*b*) False
   (*c*) True (*d*) True
   (*e*) False (*f*) True

Time to Review

A. 1. (*a*), 2. (*c*), 3. (*b*), 4. (*a*), 5. (*b*), 6. (*c*), 7. (*b*), 8. (*c*), 9. (*b*), 10. (*b*), 11. (*c*), 12. (*b*), 13. (*b*)

B. 1. stomata 2. ventricles
   3. ureter 4. urine

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

D. 1. White blood cells 2. Urinary bladder
   3. Valve 4. Ureters
   5. Pulmonary 6. Sweat
   7. Nephridium 8. Stethoscope
   9. Xylem vessels 10. 72-80

E. 1. The blood supplies food and oxygen to all parts of the body. It protects the body from infection and removes waste from the cells.

   2. The blood is made up of four components–plasma, red blood cells, white blood cells and platelets.

   3. The human heart has four chambers. Two of these chambers are called atria. The other two are called ventricles. The two atria form the curved top of the heart. The ventricles meet at the bottom of the heart to form a pointed base which points toward the left side of your chest. The left side of the heart has one atrium and one ventricle. The right side of the heart has the others. A wall, called the septum, separates the right and left sides of the heart. A valve connects each atrium to the ventricle below it. The mitral valve connects the left atrium with the left ventricle. The tricuspid valve connects the right atrium with the right ventricle.

      The top of the heart connects to a few large blood vessels. The largest of these is the aorta, or main artery, which carries nutrient-rich blood away from the heart. Another important vessel is the pulmonary artery which connects the heart with the lungs.

   4. The excretory system is very important to our body and only has a few parts. In a similar way to removing solid waste from our body, we must also get rid of fluids.

      Urine is the result of the excretory system

balancing the amount of water and salts in your body. We said the system is small. The kidneys are the main organs involved in the excretory system. Related body parts include the ureters, bladder, and urethra.

The kidneys act as a filter. Eventually all of the blood in our body passes through the kidneys and they are able to do their filtering. The kidneys pull harmful molecules out of our bloodstream and leave the ones that are good for us.

5. (*a*) **Arteries :**
   - Arteries carry oxygenated blood, away from the heart except pulmonary artery
   - These are mostly deeply situated in the body
   - These are thick-walled.
   - These do not have valves.
   - Blood in arteries moves with pressure

   Veins :
   - Veins carry deoxygenated blood, towards the heart except pulmonary veins.
   - These are superficial and deep in location
   - These are thin-walled
   - These posses wide lumen
   - Valves are present in veins.
   - Blood in veins moves under very low pressure

   (*b*) **Xylem**
   - Xylem is usually found deep in the plant.
   - It conducts water and minerals.
   - Its conducting cells are dead.
   - It provides mechanical support to the plant.

   Phloem
   - It is usually found towards the outside of the plant.
   - It conducts prepared food to parts of plant.
   - Its conducting cells (sieve tubes)are living.
   - It does not provide mechanical support.

6. In case of kidney failure, hands or feet may swell. The person feels tired and weak because his body needs clean blood to function properly. This may result in death. If the kidneys stop working completely, the person needs to undergo dialysis or kidney transplantation. Dialysis is a process of removing toxic substances from the blood with the help of a machine.

7. The transport system of plants consists of vascular tissues: xylem and phloem. These vascular tissues extend uninterrupted from the roots to the stem and leaves.

   Xylem
   It is made up of long narrow cells, which are joined end to end. The xylem transports water and dissolved mineral salts from the roots up the stem and to the leaves. It provides mechanical support for the plant.

   Phloem
   The phloem consists of mainly sieve tubes and companion cells. The sieve tubes have thin-walled living cells, which are joined end to end, and their end walls are perforated. The phloem transports manufactured food in the leaves to other parts of the plant. The process by which manufactured food is transported throughout the plant is known as translocation.

   Transport of Water
   The transport of water into the root hairs occurs through the process of osmosis. As water reaches the xylem vessel, water accumulates in the xylem vessels, and is pushed up the stem, creating what is called **root pressure**.

   Transpiration
   Transpiration is the loss of water in the form of vapour from stomata of the leaves of a plant. When water vapour evaporates from the leaves, this creates a decrease in water concentration in the leaves, thus water is pulled up from the stems. Evaporation of water from the leaves also causes a cooling effect on the plant as the plant is exposed to direct sunlight. This prevents the leaves from getting burnt or scorched.

8. The muscles of the heart contract and relax

automatically. The phase of contraction of muscles is called systole. The phase of relaxation of the heart muscles is called diastole. The two phases of the heart muscles can be heard as lub and dub. The regular throbbing of the arteries, caused by the successive contractions of the heart, especially as may be felt at an artery, as at the wrist is called pulse. A normal heart beats about 72-80 times in one minute.

9. Excretion is the removal of waste products which are produced the chemical reactions that occur inside all living organisms. The chemical reactions that takes place in our body are called metabolism.

   The normal waste that our body produces is urea. It is released in urine and sweat. Carbon dioxide is also something that is excreted when we exhale.

   Excretion is important for living organisms because a build up of the waste products from metabolism is very dangerous for the body because it can, in excess, be poisonous.

   Be careful though, faeces is not excretion. It is egestion, which is the removal of undigested food from the body and it does not occur in all living organisms because obviously plants cannot produce faeces.

10. Carbon dioxide, sweat, urine and faeces are the main metabolic wastes produced by our body.

11. See answer to question 7 above.

12. See answer to question 7 above.

13. See answer to question 7 above.

14. See activity 2 on page 125 of the textbook.

15. The three factors that affect absorption of water are as follows :

   Concentration of soil solution : The cell sap of root hair is more concentrated than that of the surrounding soil water. The water, therefore, enters the root hair. If the concentration of the soil solution is higher, the water absorption is inhibited. Absorption of water is poor in alkaline soils and marshes.

   Soil air : Absorption of water is retarded in poorly aerated soils because in such soils deficiency of oxygen and consequently the accumulation of carbon dioxide will retard the metabolic activities of roots like respiration. Water logged soils are poorly aerated and hence, are physiologically dry. They are not good for absorption of water.

   Soil temperature : Increase in soil temperature up to about 30°C favours water absorption. At higher temperature water absorption is decreased. At low temperature also water absorption decreased so much so that at about 0°C, it is almost decreased. This is probably because at low temperature.

16. Transpiration affects the absorption of water and mineral salts by roots. To some extent, transpiration controls the temperature of plants. Roots tend to absorb more water than required by the plant. The excess water is removed by transpiration. Transpiration establishes a continuous water stream from the roots to the topmost parts of plants, thus, increasing the rapid transportation of water.

F. 1. Veins have valves within them to prevent back flow of the blood. These are one-way valves. The blood is allowed to go towards the heart, but it cannot fall back the other way. These types of valves are especially important in getting blood back from places like your legs, all the way back to the heart.

2. Veins tend to become more prominent as we get older. In children there is usually a thick layer of tissue under the skin and it is often difficult to see any veins at all. This layer tends to be thicker in females than in males, and in both sexes it decreases with age.

   In addition our skin becomes thinner as we get older which also makes the veins more visible. If you are fit and well it is very unlikely that your prominent veins are anything to worry about.

3. The distinctive sound of the heartbeat lub and dub comes from the closure of two pairs of heart valves. The valves are like doors. They open to allow blood to move in one direction and close to keep blood from backing up. The first sound results from closure of the mitral

and tricuspid valves, which separate the upper and lower chambers of the heart. The second sound occurs as a result of closure of the pulmonic and aortic valves. Blood travels across these valves on its way to the lungs and heart.

4. Actually, the human body sweats all the time, even when we are sleeping. But when we exercise or perform some strenuous work we sweat more as the body gets heated up faster. As a result, we sweat more during summers and less during winters.

5. The ventricles of the heart have thicker muscular walls than the atria. This is because blood is pumped out of the heart at greater pressure from these chambers compared to the atria. The left ventricle also has a thicker muscular wall than the right ventricle.

6. Water rises against gravity, without the help of any mechanical pump. Stomata open up during the day to let carbon dioxide in and let water escape. Water vapour leaves the air spaces of the plant through the stomata. Water has strong adhesive and cohesive properties– as the water leaves, it is replaced by water clinging to the inside of the cell walls. This creates a tension or pulling on the water in the xylem and gently pulls the water toward the direction of water loss. The cohesion of water is strong enough to transmit this pulling force all the way down to the roots

7. Internally, the human heart is divided into four chambers. The upper two chambers of heart are called auricles. The lower two chambers of heart are called ventricles. The auricles are further classified as left auricle and right auricle. In the same way, ventricles are also classified as left ventricle and right ventricle.

   Auricles open into ventricles of their sides. The openings between atria and ventricles are guarded by valves. The valve present between left auricle and left ventricle contains two flaps and is called bicuspid valve. The valve present between right auricle and right ventricles contains three flaps and is known as tricuspid valve. The function of these valves is to prevent the back flow of blood from ventricles into auricles when the ventricles contract.

G. 1. Blood is classified as a connective tissue and consists of plasma, red blood cells, white blood cells and platelets.

   The blood plasma is a mixture of proteins, enzymes, nutrients, wastes, hormones and gases. It accounts more than half of the blood. It is a straw-coloured fluid.

   Plasma : The plasma is a straw-coloured fluid in which blood cells are suspended. It is made up of approximately 90% water as well as electrolytes such as sodium and potassium and proteins.

   Red blood cells : The main function of red blood cells is to carry oxygen. They contain a protein called haemoglobin. This combines with oxygen to form oxyhaemoglobin. Each red blood cell has a lifespan of approximately 120 days before it gets broken down by the spleen. New red blood cells are made in the bone marrow of most bones.

   White blood cells : There are many types of white blood cells, although the function of all of them is to fight with disease and infection. They typically have a lifespan of a few days. They are made in the bone marrow like red blood cells.

   Platelets : These are disc shaped cell fragments which are involved in clotting the blood to prevent the excess loss of body fluids.

2. Plants absorb water through the entire surface of roots. The area of young roots where most absorption takes place is the root hair zone. The root hairs are delicate structures which get continuously replaced by new ones. The root hairs provide a large surface area. They are extensions of the epidermal cells. They have sticky walls by which they adhere tightly to soil particles. As the root hairs are extremely thin and large in number, they provide enormous surface area for absorption. They take in water from the intervening spaces mainly by osmosis.

3. The circulatory system is responsible for

transporting materials throughout the entire body. It transports nutrients, water, and oxygen to our body cells and carries away wastes such as carbon dioxide that body cells produce.

The circulatory system is divided into three major parts: the heart, the blood and the blood vessels.

The Heart : The heart is an muscular organ bout the size of your fist. The heart is located in the centre of your chest slightly to the left. Its job is to pump the blood and keep the blood moving throughout the body.

The Blood : The blood is a tissue that is constantly flowing through the body. It is pumped by the heart. It travels through thousands of miles of blood vessels right within the body. It carries nutrients, water, oxygen and waste products to and from the body cells.

The blood is composed of plasma, red blood cells, white blood cells and platelets.

The Blood Vessels : There are three types of blood vessels: arteries, capillaries and veins

The **arteries** carry blood away from the heart, much of which is oxygen rich.

The **capillaries** are tiny blood vessels as thin or thinner than the hairs on your head. They connect arteries to veins. Nutrients, oxygen and wastes pass in and out of the blood through the capillary walls.

The **veins** bring deoxygenated blood back toward the heart.

4. A large number of biochemical reactions occur in the cells of our body. They produce a variety of waste products. These waste products are toxic and need to be removed from the body. The process of removing waste from the body is called excretion. The organs that are involved in excretion are called excretory organs. Kidneys and skin are the main excretory organs in humans.

   The skin helps to remove excess of water and salt from the body in the form of sweat.

   The kidneys remove waste in the form of urine. The kidneys are bean-shaped organs located on either side of the backbone at about the level of the stomach and liver. Blood enters the kidneys through renal arteries and leaves through renal veins. Tubes called ureters carry waste products from the kidneys to the urinary bladder for storage or for release. The product of the kidneys is urine, a watery solution of waste products, salts, organic compounds, and two important nitrogen compounds: uric acid and urea. Both of these nitrogen products can be poisonous to the body and must be removed in the urine. The urine flows through the ureters toward the urinary bladder. When the bladder is full, the urine flows through the urethra to the exterior.

5. Plants are less complex in structure than animals, and have their own means of excretion. They remove some wastes through diffusion. During the day, excess oxygen gas produced by photosynthesis, which is released through the stomata. Carbon dioxide produced by respiration is normally used up during photosynthesis. At night, however, as photosynthesis slows, carbon dioxide is not used up as fast as it is produced, and it is released as a waste product.

   Plants also eliminate waste by the accumulation of waste in the vacuoles of the aging leave cells. These leaves will eventually die and fall off, removing waste in the process.

   Have you ever noticed sticky, milky or oily substances being oozed from the bark of trees? These are excretory products and may be resins, gums, latex and or other excretory products.

HOTS Questions

1. The fact of water escape is a consequence of the anatomical construction of the leaf. The anatomical structure of the leaf is necessary for photosynthesis and respiration. When there is an escape route water also escapes. Transpiration does not remove excess of water. The plants in fact are forced to absorb more water because most of it will be lost by way of transpiration. That is why transpiration is often called a necessary evil.
2. The rate of absorption of water by the root hair is

decreased by the decrease in temperature of the soil below 20°C.

3. This is because the body temperature maintained by the flow of the blood in the body.
4. Platelets help in blood clotting. When your skin is injured or broken, platelets clump together and form clots to stop the bleeding. When you do not have enough platelets in your blood, your body cannot form clots. A low platelet count may also be called thrombocytopenia.
5. The white blood cells help to fight infection and thus protect us from diseases, so they are called soldiers of our body.
6. The right heart collects deoxygenated blood from two large veins, the superior and inferior venae cavae. The blood collects in the right atrium and is pumped through the tricuspid valve into the right ventricle, where it is pumped into the pulmonary artery through the pulmonary valve.

12. Reproduction in Plants

P. 132: Quick Review

1. (*a*) stem (*b*) artificial
   (*c*) asexual
2. (*a*) False (*b*) False
   (*c*) True

P. 142: Quick Review

1. (*a*) androecium (*b*) sepals
   (*c*) biotic
2. (*a*) True (*b*) True
   (*c*) False

P. 137: Quick Review

1. (*a*) radicle (*b*) ovary
   (*c*) monocot
2. (*a*) False (*b*) False

Time to Review

A. 1. (*a*), 2. (*a*), 3. (*b*), 4. (*d*), 5. (*a*), 6. (*c*), 7. (*c*), 8. (*c*), 9. (*b*), 10. (*a*), 11. (*b*), 12. (*a*), 13. (*b*)

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

C. 1. fragmentation 2. bisexual
   3. algae 4. bud
   5. one 6. hibiscus
   7. asexual reproduction 8. zygote
   9. tuber 10. asexual
   11. (*a*) budding (*b*) fragmentation
   (*c*) spore formation (*d*) stem cutting
   12. self-pollination and cross-pollination

D. 1. (*a*) The process of producing new individuals by an organisms to continue its species is called reproduction. Organisms reproduce in two ways– asexually or sexually.

   (*b*) Pollination is the process by which pollen is transferred from the anther to the stigma of the plant, thereby enabling fertilization and reproduction. It is unique to the flowering plants.

   (*c*) The fusion of male and female gametes to form a zygote is called fertilization. The zygote develops into embryo.

2. Yeasts have asexual and sexual reproductive cycles. However, the most common method for reproduction is asexual by budding or fission. The nucleus of the parent cell splits and a daughter cell is built out of the parent cell and is separated.
3. (*a*) In budding a new plant arises as an outgrowth called bud from the parent's body. The bud after developing completely detaches from the parent's body to live an independent live.

   (*b*) Grafting is a techniques used to join parts from two or more plants so that they appear to grow as a single plant. In grafting, the upper part (scion) of one plant grows on the root system (stock) of another plant.

   (*c*) Layering is a means of plant propagation in which a portion of an aerial stem grows roots while still attached to the parent plant and then detaches as an independent plant. Layering has evolved as a common means of vegetative propagation of numerous species in natural environment.
4. Vegetative propagation is a form of asexual reproduction of a plant. Only one plant is involved and the offspring is the result of one parent. The new plant is genetically identical to the parent. New plants grow from parts of the parent plant.
5. The process of seed development begins with

fertilization and involves the fusion of the male and female gamete into a zygote. After fertilization, the sepals and petals dry and fall off. The zygote formed after fertilization develops into embryo. The embryo is protected by a hard seed coat, called testa. The embryo inside the testa is seed.

6. Vegetative propagation is a cheaper, easier and more rapid method of propagation in plants than growing plants from their seeds. The character of a plant is preserved by vegetative reproduction. Another advantage is that in propagation by this methods, the plants skip the risky seedling stage in which a number of plants die under adverse conditions.
7. They have spines or hooks to get attached to fur coats of animals and get transported over long distances. Therefore, these outgrowths help in dispersal of the seeds.

E. 1. Yeast form a long chain so that daughter cell do not fall off from the parent cell.
2. Insect pollinated flowers are brightly coloured and sweet scented so that the plant can attract the insect towards itself.
3. Seeds and fruits dispersed by water are large and spongy to help them float easily on water, for example coconut.
4. It is because pollination is very uncertain. A lot of pollens go waste if wind is not favourable, which is the case usually pollens reach the right spot not very easily.

F. 1. In asexual reproduction, a single organism is able to reproduce on its own. In plants, common methods of asexual reproduction are budding, fission, fragmentation and spore formation.

In budding, a new plant arises as an outgrowth called bud from the parent's body. The bud after developing completely detaches itself from the parent's body to live an independent life.

Fission is a process of asexual reproduction in which an individual divides into two (binary fission) or more (multiple fission) new individuals. It is common in Amoeba.

It is the most common mode of reproduction in bacteria, fungi, mosses and ferns. A spore is a tiny, spherical structure with a thick wall. It develops into a structure called sporangium by the repeated division of nucleus. Every time the nucleus divides and a new spore is formed. Spores are asexual reproductive bodies. When spores are released, they float in air as they are very light and can cover long distances.

It is the process in which an organism splits into two or more fragments after becoming mature. Each of the fragment soon develops into a new plant, for example, algae such as spirogyra reproduce by fragmentation.

Hence, vegetative reproduction refers to the development of a new plant from the vegetative plant part such as stem, root or leaf. The reproductive organ of the plants called flower is not involved in vegetative reproduction.

The roots of some plants such as sweet potato and dahlia possess buds. These roots when planted, grow into a new plant.

A potato (tuber) is a modified stem with buds called on its surface. When a cut part of a potato with an eye is planted, it grows into a new plant.

These are some underground modified stems with thick scales such as onion and tulip. They are called bulb. When planted in soil, they grow into new plant.

2. See answer to question 6 of short answers.
3. Pollination is the process by which pollen is transferred from the anther to the stigma of the plant, thereby enabling fertilization and reproduction.

There are two types of pollination called self-pollination and cross-pollination.

Self-pollination is the more basic type of pollination because it only involves one flower. This type of pollination occurs when pollen grains from the anther fall directly onto the stigma of the same flower.

Cross-pollination is a more complex type of pollination that involves the transfer of pollen from the anther of one flower to the stigma of a different flower.

4. Dispersal means scattering of seeds and fruits by wind, water and animals.

   Dispersal by animals: Some plants have structures that get tangled in animal fur or feathers, and are then carried to new sites. Other plants produce their seeds inside fleshy fruits that then get eaten by an animal. The fruit is digested by the animal, but the seeds pass through the digestive tract, and are dropped in other locations.

   Dispersal by wind: The kind of seeds which are often wind dispersed are smaller seeds that have wings or other hair-like or feather-like structures. Plants that produce wind blown seeds, like the dandelion often produce lots of seeds to ensure that some of the seeds are blown to areas where the seeds can germinate.

   Dispersal by water: Many aquatic plants and plants that live near water have seeds that can float, and are carried by water. Plants living along streams and rivers have seeds that float downstream, and therefore become germinate at new sites.

5. A flower is basically made up of four concentric rings of structures called whorls: calyx, corolla, androecium and gynoecium. The outer whorl is called calyx and made of modified leaves called sepals, which provide protection to the flower before it opens and are usually green.

   Inside the sepals is the second whorl called corolla, which is made of petals, which are often brightly coloured.

   Within the corolla are one or more stamens containing pollen, which are the male reproductive structures, that form the third whorl. Each stamen is made up of paired anthers on a filament or stalk. The anthers are the orange/yellow structures often seen in the centre of a flower. Anthers possess pollen grains which produce male gametes.

   In the very centre of the flower are the female reproductive organs, collectively called gynoecium. This whorl consists of an ovary, which contains one or more ovules, a style and the stigma. The ovary is at the base of the flower. From the ovary, extends a tubular structure called the style and on the top of the style is a surface receptive to pollen called the stigma.

   For diagram see fig. 12.12 on page 133.

6. See answer to question 4 above.

7. Vegetative reproduction in plants– natural and artificial:

   Natural methods of asexual reproduction include strategies that plants have developed to self-propagate. Many plants, such as ginger, onion, gladioli, and dahlia, continue to grow from buds that are present on the surface of the stem. In some plants, such as the sweet potato, adventitious roots or runners (stolons) can give rise to new plants . In *Bryophyllum*, the leaves have small buds on their margins. When these are detached from the plant, they grow into independent plants; they may also start growing into independent plants if the leaf touches the soil. Some plants can be propagated through cuttings alone.

   In artificial reproduction, roots can give rise to new plants, or plants can propagate using budding or cutting.

   In **grafting**, part of a plant is attached to the root system of another plant. The two unite to form a new plant containing the roots of one and the stem and leaf structure of the other.

   Cutting is the process in which the stem of a plant is placed in moist soil or water to generate a new root system.

   In **layering**, part of the plant's stem is bent down and covered with soil. This stem can generate a new root system and, therefore, an entirely new plant.

8. (*a*) Differences between sexual and asexual reproduction

   Asexual Reproduction:
   - It involves only one parent
   - It involves no fusion of male and female gametes.
   - Offsprings are genetically identical to parent.
   - It results in rapid production of large number of offsprings.

Sexual Reproduction:

- It involves two parents– a male and a female.
- It involves the fusion of male and female gametes.
- Offsprings are genetically different from parents.
- It is a slow process and produce less number of offsprings.

(*b*) **Difference between unisexual and bisexual flowers**

Unisexual flower: These flower may either contain male reproductive organs (stamen) or female reproductive organs(carpel). Cross pollination takes place in such flowers.

Bisexual flower: These flowers contain both stamen and carpels. There are chances of cross pollination and self pollination in such flowers.

(*c*) Difference between complete and incomplete flowers

Incomplete flower : A flower without one or more of the four whorls (sepals, petals, stamens and carpels) is called an incomplete flower.

Complete flower : A flower having all the four whorls is called a complete flower.

(*d*) Difference between budding and fragmentation

Budding : It is a form of asexual reproduction when a new plant is produced from breaking off the parent plant is called budding. It normally only breaks into few buds.

Fragmentation : It is a form of asexual reproduction wherein a parent plant breaks into fragments. This can have quite a few fragments overall.

HOTS Questions

1. Sugarcane plant is grown by stem cutting.
2. See answer to question 8 (*a*) above.

13. Time and Motion

Time to Review

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

B. 1. m/s 2. bob
3. electronic 4. speedometer
5. straight

C. 1. False 2. False
3. False 4. False
5. False 6. True

D. 1. speed 2. second
3. time period 4. irregular speed

E. 1. The time taken by the pendulum to complete one oscillation is called its time period, which can be changed by changing the length of the thread of the bob.

2. The distance covered in unit time is called speed. The SI unit of speed is m/s.

3. Distance = Speed × Time

4. 36 km = 36 × 1000 = 36000 m
1 hour = 1 × 60 × 60 s = 3600 s
36 km / 1h = 36000 m / 3600 s = 10 m/s.

5. When a body covers unequal distances in equal time of interval, its speed is said to be non-uniform.

F. 1. The resting position of the bob of a pendulum is called its mean position. The pendulum starts from one side goes to other then back to the start. This is one oscillation and the time taken is called the period.

2. **Uniform motion**: When an object covers equal distance in equal intervals of time, it is said to be in uniform motion. When an object is in uniform motion, its speed remains constant throughout

Non-uniform motion: When an object covers unequal distance in equal intervals of time or vice-versa then it is said to be in non-uniform motion. The speed of the object varies in the case of non-uniform motion.

3. Speed of the train = 80 km/h
Distance covered in 6 hours = 80 × 6 = 480 km.
The distance between the cities is 480 km.

4. Distance covered = 1600 m
Time taken = 4 minutes = 4 × 60 s = 240 s.
Speed = Distance covered/time taken
= 1600/240 = 6.66 m/s

5. Number of oscillations = 10, time taken = 20 s
Time period = $\frac{20}{10}$ = 2 s

6. Distance covered = 300 km, Time taken = 6 hours
   Average speed = 300 km/6 h = 50 km/h.
7. Speed = 5 m/s
   Total distance to cover = 40 m.
   Time taken = $\frac{40\text{ m}}{5\text{ m/s}}$ = 8 s.
8. Do it yourself.

HOTS Questions

1. Test the pendulum with a shortened string length. The period should be shorter than before.
2. Time taken = 50 minutes = 50 × 60 = 3000 s.
   Speed = 60 km/h = 60 × 1000 m/ 60 × 60 s.
   = $\frac{50}{3}$ m/s
   Now do yourself.

14. Electric Current and Circuits

P. 153: Quick Review

1. (*a*) negative (*b*) battery
2. (*a*) True (*b*) True

P. 155: Quick Review

1. (*a*) electric circuit (*b*) more
2. (*a*) True (*b*) False

P. 158: Quick Review

1. (*a*) short circuit (*b*) increasing
2. (*a*) False (*b*) True

Time to Review

A. 1. (*a*), 2. (*b*), 3. (*a*), 4. (*a*), 5. (*c*), 6. (*b*), 7. (*a*), 8. (*c*), 9. (*b*)

B. 1. battery 2. ammeter
3. CD player
4. primary cells and secondary cells
5. iron and copper
6. heating effect
7. electromagnet, armature, hammer and gong, spring and screw
8. low melting point
9. plastic and wood
10. Miniature circuit breaker

C. 1. An electric circuit is a path in which electrons from a current source flow. Electric current flows in a closed path called an electric circuit. The point where those electrons enter an electrical circuit is called the source of electrons.
2. We conveniently represent an electric circuit by symbols for various components.
3. The heating effect of current is used in geyser, iron, heater and ovens.
4. Fuse is a piece of wire of a material with a very low melting point. When a high current flows through the circuit due to overloading or a short circuit, the wires gets heated and melts. As a result, the circuit is broken and current stops flowing.
5. A solenoid is a coil of insulated wire wound on a rod-shaped form made of solid iron. Devices of this kind can be used as electromagnets, as inductors in electronic circuits, and as miniature wireless receiving antennas.
6. See answer to question 1 above.
7. Any circuit which is not complete is considered an open circuit. A circuit is considered to be closed when electricity flows from an energy source to the desired endpoint of the circuit.
8. Opposition offered by the material of a conductor in the flow of electric current is called resistance.

   The resistance of a wire depends upon its length and area of cross section. The resistance increases with the increase of length of the conducting wire and decreases with decrease in length. Resistance of a conductor increases with the decrease in cross-sectional area of the wire and vice-versa.
9. Electromagnets are widely used as components of other electrical devices, such as motors, generators, relays, loudspeakers, hard disks, MRI machines, scientific instruments, and magnetic separation equipment.
10. When a high current flows through the circuit due to overloading or a short circuit, the wire gets heated and melts.

D. 1. An electromagnet is a magnet that runs on electricity. Unlike a permanent magnet, the strength of an electromagnet can easily be changed by changing the amount of electric

current that flows through it. The poles of an electromagnet can even be reversed by reversing the flow of electricity.

An electromagnet works because an electric current produces a magnetic field. The magnetic field produced by an electric current forms circles around the electric current.

Electromagnets are common in everyday appliances. They are found in doorbells, hard drives, speakers, trains, anti-shoplifting systems, MRI machines, microphones, home security systems, motors, and many other everyday objects.

2. There are two types of circuit we can make, called series and parallel. The components in a circuit are joined by wires.

   Series circuit: If there are no branches in an electric circuit, then it is a series circuit. In a series circuit, if a component is disconnected, the circuit is broken and all the components stop working. If you put more lamps into a series circuit, the lamps will be dimmer than before.

   Parallel circuit: If there are branches in an electric circuit, it is a parallel circuit. In a parallel circuit, different components are connected on different branches of the wire. In a parallel circuit, if a component is disconnected from one parallel wire, the components on different branches keep working. And, unlike a series circuit, the lamps stay bright if you add more lamps in parallel.

3. The fuse breaks the circuit if a fault in an appliance causes too much current to flow. This protects the wiring and the appliance if something goes wrong. The fuse contains a piece of wire that melts easily. If the current going through the fuse is too great, the wire heats up until it melts and breaks the circuit.

4. When current flows through a metallic wire, it offers some obstruction to the flow of the current. This obstruction is called electric resistance. The electrical resistance occurs due to the frequent collisions of the free electrons with the atoms of the conductors.

   The resistance of a wire in particular is greatly affected by its length and diameter. Increasing the length of a wire increases its resistance because the electrons will experience more collisions as they flow from one end to the other. On the other hand, the resistance of a wire decreases as its diameter gets larger because the electrons have more cross-sectional area to move through, which decreases the chance of collisions.

5. Important parts of an electric bell are electromagnet, armature, spring, hammer and gong.

   The electric circuit is completed through a battery and push switch button connected to the terminals. When the push button is pressed the electric circuit is completed and the armature is attracted towards the electromagnet as a result, the small spring gets detached from the screw due to which the electric circuit is broken and the electromagnet is demagnetized. Hence, the attraction disappears and the armature is brought back by the spring to its original position. Contact of the spring with the screw is now remade, which completes the electric circuit. The action is repeated over and over again consequently. The armature vibrates and hammer attached to it strikes the gong and the bell rings and sound is produced.

6. Heating effect of electricity is one of the widely used effects in the world. When electric current is passed through a conductor, it generates heat due to the resistance it offers to the current flow. The work done in overcoming the resistance is generated as heat.

   Applications of the heating effect of electric current include appliances like electric immersion water heater, electric iron, etc. All of these have a heating element in it. Heating elements are generally made of specific alloys like, nichrome.

7. A current carrying conductor creates a magnetic field around it, which can be comprehended by using magnetic lines of force or magnetic field lines. The nature of the magnetic field lines around a straight current carrying conductor is concentric circles with

centre at the axis of the conductor.

The direction of the magnetic field lines of force around a conductor is given by the Maxwell's right hand rule or the right handed cork screw rule. According to this rule, if we hold the conductor in the palm of the right hand so that the thumb points in the direction of the flow of the current, the direction in which the fingers curl gives the direction of magnetic lines of force.

HOTS Questions

1. No, we cannot use copper in place of tungsten as it has low melting point.
2. Because they have high melting point.

15. Winds, Storms and Cyclones

Time to Review

A. 1. (*d*), (*d*), 2. (*d*), 3. (*b*), 4. (*a*), 5. (*a*), 6. (*b*), 7. (*c*), 8. (*c*)

B. 1. strong 2. heat
3. typhoon

C. 1. False 2 False
3. False 4. True
5. True 6. False

D. 1. breeze 2 Andhra Pradesh
3. rises 4. monsoon
5. eye

E. 1. Winds within high pressure areas flow outward from the higher pressure areas near their centres towards the lower pressure areas further from their centres.

2. Air contains water vapour. As it cools, water vapour condenses into water droplets to form clouds, and releases heat.

3. Thunderstorms usually develops in hot, humid tropical areas, like India

4. One should avoid driving during a cyclone. He should store drinking water and enough food. He must keep all household goods at safe places.

5. A tornado is a violent rotating column of air extending from a thunderstorm to the ground. They can destroy large buildings, uproot trees and hurl vehicles hundreds of yards.

6. Thunder is sound caused by lightning. The sudden increase in pressure and temperature from lightning produces rapid expansion of the air surrounding and within a bolt of lightning. This expansion of air creates a wave, which produces the sound of thunder.

7. (*a*) A typhoon is a violent tropical cyclone, which is a low pressure system occurring in tropical oceans. The winds above the ground circulate around the centre anti-clockwise for a typhoon occurring in the northern hemisphere and clockwise for that occurring in the southern hemisphere.

   (*b*) A cyclone is an area of closed, circular motion rotating in the same direction as the earth. This is usually characterized by inward spiraling winds that rotate counterclockwise in the Northern Hemisphere and clockwise in the Southern Hemisphere of the Earth.

F. 1. Smoke consists of particles of ash carried on the hot air from burning. Since hot air is less dense than cold air, it rises as it is displaced by the heavier cold air.

2. Indian agriculture fully depends upon the rain for irrigation. The rain is a help to farmers sometimes by growing crops that need lots of rainfall.

3. Cyclones that form over the east coast of India are either those that develop in position over southeast Bay of Bengal. The frequency of cyclones over Northwest Pacific is quite high, hence the east coast of India gets higher number accordingly.

4. India's climate is very tropical. We do not have air clashes of the hot air from the equator and cold air from the poles. So, the occurrence of a tornado is very rare in India. Actually tornadoes are relatively common in India, especially in the region near Bangladesh.

5. Air exerts pressure. The wind blowing with high speed may damage many things. If holes are made in hanging banners and hoarding, the air can pass through these holes to reduce the pressure of the wind. This prevents them from getting damaged.

G. 1. The earth's surface is not even everywhere. So it is heated unevenly by the sun. When the sun rays fall on the earth's surface, some of it become warmer than the other. This causes temperature difference. The warmer air being lighter rises up and the air from the cooler areas rushes in to take the place of warm air. As a result, a current of air is set up, called wind.

2. During summer, the land near the equator warms up faster than away from the equator. The temperature of the land near the equator is higher than that of oceans and seas. The air over the land gets heated and rises up, causing the winds to blow from oceans to the land. These winds are called monsoon, which bring rain to most part of India.

3. Cyclone refers to the spinning storm that rotates around a low-pressure centre. The low-pressure centre is referred to as the eye of the storm.

   Warm air being light rises, and as it rises, it cools. The cool air cannot hold as much moisture as warm air, so the water gets squeezed out of the condensing air and a cloud begins to form. If the warm air rises very quickly, this creates an updraft.

   Likewise, if the water in the cloud builds up enough, it may fall back to the ground as rain and draw cool air down with it as a downdraft. When they work together, that warm updraft and cool downdraft create a storm cell. As this process continues, the cloud grows and we eventually get a large thunderstorm cloud.

4. Lightning is an electric current. When the land is hot, it heats the air above it. This warm air rises. As the air rises, water vapour cools and forms a cloud. When air continues to rise, the cloud gets bigger and bigger. In the tops of the clouds, temperature is below freezing and the water vapour turns into ice.

   Now, the cloud becomes a thundercloud. Lots of small bits of ice bump into each other as they move around. All these collisions cause a build up of electrical charge.

   Eventually, the whole cloud fills up with electrical charges. Lighter, positively charged particles form at the top of the cloud. Heavier, negatively charged particles sink to the bottom of the cloud. When the positive and negative charges grow large enough, a giant spark-lightning occurs between the two charges within the cloud.

   Lightening causes heavy damage to animals and people caught in a thunderstorm. It can cause fire and destroy buildings. It can destroy electronic equipment such as television, computer, etc.

5. Thunderstorm is a storm with lightning and thunder. It is produced by a cloud, usually producing gusty winds, heavy rain and sometimes hail.

   On a hot summer day, the surface of the earth is heated by the sun. The earth's surface heats the air just above it. The action of warm air rising and cold air sinking plays a key role in the formation of severe thunderstorms. The warm surface air rises because it is less dense than the surrounding air. As the air rises, water vapour cools and forms a cloud. When air continues to rise, the cloud gets bigger and bigger. In the tops of the clouds, temperature is below freezing and the water vapour turns into ice.

   Now, the cloud becomes a thundercloud. Lots of small bits of ice bump into each other as they move around. All these collisions cause a build up of electrical charge.

   We should take the following precautions during a thunderstorm.
   - ❖ We should not take shelter under a tall tree or tower.
   - ❖ We should not take shelter under an umbrella with a metallic end.
   - ❖ We should not sit near a window.
   - ❖ A car or bus is a safe place to take shelter.

6. A cyclone always develops in an ocean, when a vast surface of water heats up. The warm waters in turn heat the air above it. This causes a low pressure on a vast area of the ocean. Due to the low pressure, the moist air from the ocean surface begins to rise up rapidly. This creates a strong upward wind that rotates spirally. As the moist air reaches

a certain height, it cools and condenses into water droplets to form clouds. When vapour condenses, it releases heat. This heat warms the air in the upper regions and makes the air rise further, adding speed to the rotating air column. If this process continues, it forms a large rotating wind storm called a cyclone.

7. Lightning is a bright flash of electricity produced by a thunderstorm. Within a thundercloud, many small bits of ice bump into each other as they move around in the air. All of those collisions create an electric charge. After a while, the whole cloud fills up with electrical charges. The positive charges form at the top of the cloud and the negative charges form at the bottom of the cloud. Since opposites attract, that causes a positive charge to build up on the ground beneath the cloud.

8. Here are some precautionary measures:
   - Check that the walls and roofs of your home are secure.
   - Trim treetops and branches well clear of your home.
   - Clear your property of loose material that could blow about and possibly cause injury or damage during extreme winds.
   - In case of a storm warning, know your nearest safe high ground and the safest access route to it.
   - Prepare an emergency kit to take with you and keep a list of emergency numbers on display.
   - Listen continuously to your local radio or TV for further warnings.
   - When the cyclone strikes, disconnect electrical appliances.
   - Stay indoors in the strongest part of the building.

HOTS Questions

1. Do yourself.
2. See answer to question 5 of Give Reasons.
3. Tropical cyclones are powered by the moisture that evaporates from warm ocean water. When they move over land they are cut of from that fuel source. There is moisture in the air, but not enough to maintain their strength.

16. Light

P. 173: Quick Review

1. (*a*) convex (*b*) virtual and upright
   (*c*) spherical
2. (*a*) False (*b*) False
   (*c*) True

P. 175: Quick Review

1. (*a*) convex
   (*b*) real, inverted of the same size
2. (*a*) False (*b*) True

P. 175: Quick Review

1. (*a*) seven (*b*) violet
2. (*a*) False (*b*) False

Time to Review

A. 1. (*a*), 2. (*c*), 3. (*c*), 4. (*a*), 5. (*d*), 6. (*b*), 7. (*b*), 8. (*a*)

B. 1. plane mirror 2. real
   3. concave mirror 4. prism
   5. irregular reflection 6. lens
   7. optical centre 8. dispersion of light
   9. violet, indigo, blue, green, yellow, orange and red
   10. Carbon dioxide is a gaseous waste.

C. 1. Light always travel in a **straight** line.
   2. **White** light splits into seven colours after passing through a prism.
   3. The curved shining surface of a screen acts as a **concave** mirror.
   4. Magnifying glass is a **convex** lens.
   5. If we raise our right leg in front of a plane mirror, it will appear as the **left** leg.
   6. Concave lenses are used in spectacles to help people see **distant** things clearly.

D. 1. Light is a form of energy that produces sensation of sight.
   2. A lens is a transparent reflecting medium having a spherical surface as the reflecting surface.
   3. (*a*) A virtual image is the location from where light appears to have converged. A virtual image is formed by a concave lens or by placing an object inside the focal length of a convex lens. A virtual image cannot be obtained on a screen and is always erect.

(*b*) A real image is that where light actually converges. It occurs when an object is placed outside the focal length of a converging lens or outside the focal length of a converging mirror. A real image is obtained on a screen and is always inverted.

4. (*a*) A concave is used by a dentist.
   (*b*) A convex mirror is used as a rear view mirror in vehicles.
5. A spherical mirror is a portion of a spherical surface, capable of reflecting light.

E. 1. Dispersion is the property by which light is splits out according to its colours as it passes through a prism. For example, white light, consists of a collection of component colours. These colours are often observed as light passes through a triangular prism. Upon passage through the prism, the white light is separated into its component colours—red, orange, yellow, green, blue, indigo and violet. The separation of visible light into its different colours is known as **dispersion**.

2. See table 16.2 of the textbook on page 174.
3. When we hold a convex lens close to an object, an erect and enlarge image of the object is formed which is virtual.

   When we hold a concave lens close to an object, an erect and diminish image of the object is formed which is virtual.

   See activity 10 on page 181 of the textbook.
4. The Newton's colour disc is a disc with segments in rainbow colours. When the disc is rotated, the colours fade to white. In this way Newton demonstrated that white light is a combination of the seven different colours found in a rainbow. A Newton disc can be created by painting a disc with the seven different colours. A combination of red, green and blue in the circular disc will yield the same result. This is due to the phenomenon called persistence of vision. It can easily be board piece. It was an important discovery as it proves that light is not colourless,but has colour in it which together converge to give a faded white colour which we consider colourless. This property is based on the principles of dispersion of light.
5. (*a*) **Divergent beam**: When the rays of light starting from a point travel in different directions, the collection of such rays is termed a divergent beam of light.

   Convergent beam: When the rays of light coming from different directions meet at a point, the collection of such rays is termed a convergent beam of light.

   (*b*) **Convex mirror**: A mirror with a spherical surface and reflecting from the exterior the curvature is called a convex mirror. It diverges the incident rays after reflection.

   Concave mirror: A mirror with a spherical surface and reflecting from the interior of the curvature is called a concave mirror. A concave mirror converges the incident rays after reflection.

HOTS Questions

1. The moon reflects the light of the sun that falls on its surface and so is visible to us.
2. H, O, U, X

17. Water

P. 186: Quick Review

1. (*a*) water table (*b*) 96%
2. (*a*) True (*b*) True
   (*c*) False

P. 189: Quick Review

1. (*a*) water table (*b*) varies
2. (*a*) True (*b*) False

P. 190: Quick Review

1. (*a*) liquid (*b*) raw sewage
2. (*a*) True (*b*) False

Time to Review

A. 1. (*b*), 2. (*a*), 3. (*c*), 4. (*c*), 5. (*c*), 6. (*d*), 7. (*a*), 8. (*d*), 9. (*c*), 10. (*c*)

B. 1. water cycle
   2. Ice, water and water vapour
   3. water table
   4. March 22
   5. infiltration
   6. groundwater
   7. rain

8. increasing population and deforestation

C. 1. Sea water is saline, so it cannot be used.

2. You must have seen potted plants wilting and ultimately drying up if they did not get water even for a few days. Plants need water to get nutrients from the soil to prepare their food.

3. Sewage is the liquid waste which mainly comes from houses and industries. It contains urine, detergents, oil and many other chemicals.

4. Water is used for drinking, irrigation and in industries.

5. Water harvesting is the collection of runoff for productive purposes. Instead of runoff being left to cause erosion, it is harvested and utilized.

D. 1. Water Conservation Methods

- Turn off tap while you are brushing your teeth and open it when you need to rinse your mouth.
- Take shallow baths and plug the drain before you run water. Keep showers short with pressure at low force. Re-use bath water to water your lawn or shrubs or for heavy cleaning jobs like floors or cars.
- Get rain tanks and collect the rainwater in them. That water can be used for gardening and washing cars.
- Sprinklers can be used in farms to save huge amounts of water.
- Use better canal systems since they contribute towards water conservation.

2. Water covers 70% of our the earth's surface, and it is easy to think that it will always be plentiful. However, freshwater—the stuff we drink, bathe in, irrigate our farm fields with—is incredibly rare. Only 3% of the world's water is fresh water, and two-thirds of that is tucked away in frozen glaciers or otherwise unavailable for our use.

Many of the water systems that keep ecosystems thriving and feed a growing human population have become stressed. Rivers, lakes and aquifers are drying up or becoming too polluted to use. More than half the world's wetlands have disappeared. Agriculture consumes more water than any other source and wastes much of that through inefficiencies. Climate change is altering patterns of weather and water around the world, causing shortages and droughts in some areas and floods in others.

3. Sewage is a mixture of domestic and industrial wastes. It is more than 99% water, but the remainder contains some suspended solids and harmful bacteria that must be removed before the water is released into the water sources.

Treatment of Swage

The large solids that are carried in sewage are removed by screens consisting of metal bars which are placed across the influent channels.

Now organic solid matter is separated from the wastewater. This is done by putting the wastewater into large settlement tanks for the solids to sink to the bottom of the tank. The settled solids are called sludge. At the bottom of these circular tanks, large scrappers continuously scrape the floor of the tank and push the sludge towards the centre where it is pumped away for further treatment.

The water, at this stage is put into large rectangular tanks. These are called aeration lanes. Air is pumped into the water to encourage bacteria to breakdown the tiny bits of sludge that escaped the sludge scrapping process.

Next the almost treated wastewater is passed through a settlement tank. Here, more sludge is formed at the bottom of the tank from the settling of the bacterial action. Again, the sludge is scrapped and collected for treatment. The water at this stage is almost free from harmless substances and chemicals. This water is then released into the river.

4. The continuous movement of water between the land, ocean, rivers and creeks and atmosphere is called water cycle.

As water moves through the cycle, it changes from liquid water vapour and back to liquid. Liquid can also freeze and become solid. This natural process removes some of the impurities.

When the sun heats water in rivers, lakes or oceans, it provides enough energy to change water into water vapour, which rises in the air. As water vapour rises, it becomes cooler and changes back into tiny liquid water droplets. These merge together to form clouds. When so much water has condensed that the air cannot support its weight, water falls from the clouds back to the earth. Depending on the air temperature, water can take a liquid form (rain), or a solid form (snow, sleet or hail).

Infiltration occurs when water falls back to the earth, where some of it soaks into the ground. It is then collected underground in layers of rock, sand or gravel called aquifers. This water is known as groundwater. Groundwater eventually seeps to the bottom of rivers, providing a steady flow of water even after the rain has stopped. Water in the ground can also be absorbed by plant roots. This water travels up through the plant to its leaves, where some of it is used in the process of photosynthesis. When water evaporates from plants, mainly through their leaves. This gets water vapour back into the air.

Some of the rain water flows on the surface. This water is called surface water, and collects in creeks which flow into larger rivers.

5. Rainwater harvesting is a technique used for collecting, storing, and using rainwater for landscape irrigation and other uses. The rainwater is collected from various hard surfaces such as roof tops. This ancient practice is currently growing in popularity throughout our communities due to interest in reducing the consumption of potable water and the inherent qualities of rainwater.

HOTS Questions

1. About 70 percent of earth's surface is covered with water, due to which it looks blue from the space. So the earth is called blue planet.
2. The freshwater supply available for consumption is only about 3% of the total world supply of water. This means that if all of the world's water is thrust into a cup, drinkable water would only be about half a teaspoon! More than one billion people do not have access to safe drinking water.

   One of the biggest users of freshwater is the agricultural industry. Another big water user is the energy providers.
3. Rain is the main source of water. It fills rivers, lakes and ponds. Rain also rechanges the ground water. If does not rain for a long period of time, it will lead to drough. As a result, vegetations and animals will die.

18. Forests

P. 194: Quick Review

1. (*a*) infiltration (*b*) water vapour
2. (*a*) True (*b*) True

P. 195: Quick Review

1. (*a*) tannin (*b*) khair
   (*c*) resin
2. (*a*) True (*b*) False

P. 197: Quick Review

1. (*a*) plants (*b*) carbon dioxide
2. (*a*) True (*b*) False

Time to Review

A. 1. (*c*), 2. (*a*), 3. (*b*), 4. (*a*), 5. (*a*), 6. (*b*), 7. (*d*), 8. (*a*)

B. 1. crown 2. canopy
   3. shrubs 4. transpiration
   5. producers
   6. Conservation of resource
   7. wild animals
   8. humus 9. deforestation

C. 1. Humidity is the amount of water vapour in the air. Water vapour is the gaseous state of water and is invisible.

   2. Lac is a resinous substance secreted as a protective covering by the lac insect. It is used to make varnish, sealing wax, dyes, etc.

   3. Latex is a milky fluid found in many plants, which exudes when the plant is cut and coagulates on exposure to the air. The latex of the rubber tree is the chief source of natural rubber.

   4. A forest is an area comprised of a variety of living things and non-living things. Trees are the biggest part of a forest. The trees help in creating a special environment which, in

turn, affects the kinds of animals and plants that can exist in the forest.

5. The slow movement of water through the pores in soil or permeable rock is called percolation.

D. 1. A forest has thousands of trees. Trees provide beauty, shade, oxygen, clean air and water, fruit, nuts, medicines, rubber, lac, kattha, tannins, resins, and wood products such as paper, furniture and housing.

Trees are used to make lumber and plywood, there are leftover chips, bark and sawdust. The chips and sawdust are made into wood pulp for paper and other products.

Wood pulp and by-products are used for many different things, ranging from cleaning compounds, deodorants and hair spray, to artificial vanilla flavouring, medicines and cosmetics.

2. See above answer of question 1.

3. Among plants, trees are by far the most effective evapo-transpirers. Trees form half of the water cycle. A tree breathes out many gallons of water per day through large surface area of its leaves.

It is almost impossible to overstate ability of trees to humidify air and thereby maintain the rain cycle far from oceans. While some rainfall evaporates directly from the ground and from small plants.

4. Relatively straight, solid logs are converted into high value, solid timber products, used in construction, furniture, flooring and fittings. These logs can be sawn, sliced or peeled.

Sawing converts the logs into boards that are dried and milled into rectangular sections, strip flooring, architraves, or trims.

These pieces can also be glued together to make glue laminated products such as bench tops and beams.

Slicing parts of the logs produces decorative veneer. This is used in furniture, kitchen cupboards and wall panels.

Peeling a log produces veneer that may be glued together to make plywood used in building homes and offices, toys, and furniture.

5. Plant and animals must coexist to survive. They depend upon each other because each provides something the other needs. Trees provide shade, a place to live, food for nourishment and oxygen to breathe.

Animals spread the seeds of plants and help with pollination.

Animals give out carbon dioxide during the process of respiration, which is needed by plants to prepare their food by the process of photosynthesis.

Animal excreta and decaying animal matter supplies nutrients to the soil which are required by plants for their growth. The decomposers in the soil convert dead animal bodies to humus that work as manure.

6. Planting trees helps restore damaged lands and provide firewood, timber, food for people and for animals, and medicine. Planting trees can make land that is poor and barren become rich and fertile again. Tree planting has many benefits, but it is not right for all areas or all communities.

7. Forests serve as a crucial water collection, filtration and delivery system. They collect rain and snowfall, delivering it throughout the year to trickling rock seeps, streambeds, meadows and creeks. These all feed into larger rivers that supply our reservoirs, agricultural canals and water tables before wending to the sea.

8. If forests disappear, it will have following consequences :

Soil erosion : The roots of a tree make gaps in the soil so that air and water can reach the roots of the plants. When trees removed, the soil is pushed down and the gaps fill in. The conditions become unfriendly for new growth.

Drought : Forests help to produce rainfall. If the forests disappear, there will be less rain resulting in dryer conditions that eventually lead to drought.

Climate change : Forests help to remove large amounts of carbon dioxide from the air. They absorb the gas during photosynthesis. When forests are cut down, less carbon dioxide

is being absorbed leaving it trapped in the atmosphere. This can lead to climate change.

Species extinction : Another harmful result of deforestation is the extinction of animal and plant species. They disappear because their environment and life cycles have been disturbed and they are unable to adapt to the changes.

HOTS Questions

1. Wind will carry top soil to other places making the treeless areas barren.
2. If you have a close look at the things of your daily use, you would find most of them have been taken from forests. They all are forest products. So the statement in itself is correct.

Model Test Paper II

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

B. 1. red
2. pollination
3. speed
4. real
5. water cycle

C. 1. False
2. False
3. False
4. False
5. False

D. 1.–(*d*), 2.–(*c*), 3.–(*b*), 4.–(*a*), 5.–(*e*)
For teacher : Please correct the option (*b*) of column–II. It should be m/s or km/h.

E. 1. Fertilization is the process of fusion of the female gamete and the male gamete produced in the pollen tube by the pollen grain.

The male gametes of the flower are transferred on to the female reproductive organs through pollinators. The final product of this process is the formation of embryo in a seed.

2. Kidneys, lungs and skin are the main excretory organs in humans. The kidneys remove waste in the form of urine. The kidneys along with the ureters, urinary bladder and urethra form the excretory system. Urea is the main excretory product produced. Lungs help in removing carbon dioxide which is produced when food is burned in the body. The skin helps in removing the excess water and salts from the body in the form of sweat.
3. A fuse is a part of an electric circuit which prevents too much current from flowing. The fuse is always connected to the live wire of the circuit. When the current in the circuit exceeds, the fuse wire gets heated up and as its melting point is low, gets melted, thereby breaking the circuit. The appliance is thus saved from getting damaged and our house from short circuit.
4. Various factors responsible for scarcity of water are as follows :

Increasing population : The rapid growth of population has led to increased demand for more houses, roads, offices, buildings thereby reducing open areas. It decreases the seepage into the ground. Also, a lot of water is required for construction work. This has resulted in depletion of water table.

Increasing industries : There has been great increase in the number of industries, and a large quantity of water is required in these industries for production processes. Most of the water used by these industries is groundwater. This also depletes water table.

Deforestation : Increase in population has led to rapid expansion of urban areas. For that the forest cover is being removed. Due to deforestation, land is devoid of trees and it cannot retain water and runs down to the sea freely. Thus water does not seep through the soil to recharge groundwater.

5. Forests play an essential role in purifying the air we breathe. Of course, trees do not have lungs the way human beings do. But they breathe, or respire.

Plants use carbon dioxide to make their own food by the process of photosynthesis. During this process they give out oxygen. In this way plants help to purify air.