



**WONDERS  
OF  
SCIENCE**

Teacher's Resource Book

**Class  
7**



# Wonders of Science-7

## Unit-1 : Nutrition

1.

### Nutrition in Plants

#### Assess Yourself

A. Choose the correct option : (*Multiple Choice Questions*)

- (b) Oxygen, 2. (d) chlorophyll, 3. (b) stomata, 4. (a) Parasite, 5. (c) Pine sap.

B. Fill in the blanks :

- autotrophic, heterotrophic, 2. Oxygen, 3. Glucose, 4. Mistletoe, 5. dead, decaying.

C. State whether the following statements are true or false :

- F, 2. T, 3. F, 4. T, 5. F, 6. T.

D. Match the columns :

Column A	Column B
1. Green plants	(i) Parasite plant
2. Animals	(ii) Saprophyte
3. Fungi	(iii) Heterotroph
4. Dodder	(iv) Autotroph

E. Answer the following questions briefly :

- The green pigment in plants is called chlorophyll.
- Moulds and mushrooms are saprophytes while dodder and fungi are parasites.
- Autotrophs make their own food while heterotrophs do not make their own food.
- Green plants are called producers because they can make their food from water and carbon dioxide in the presence of sunlight.
- Stomata are small openings on the surface of a leaf.

F. Answer the following questions :

- Nutrition is the process of taking in food and breaking it into simple and soluble form which can be easily absorbed by cells.

There are mainly two modes of nutrition in plants :

- (i) Autotrophic Nutrition :** The word 'Auto' means *self* and 'trophe' means *nutrition*. Hence it means self nutrition. Plants make their own food using raw materials like CO<sub>2</sub>, water and solar energy.
- (ii) Heterotrophic Nutrition :** The word 'Hetero' means *others* and 'trophe' means *nutrition*. Thus heterotrophic nutrition means nutrition obtained from others. In this mode, the organism uses food made by autotrophic organism directly or indirectly.

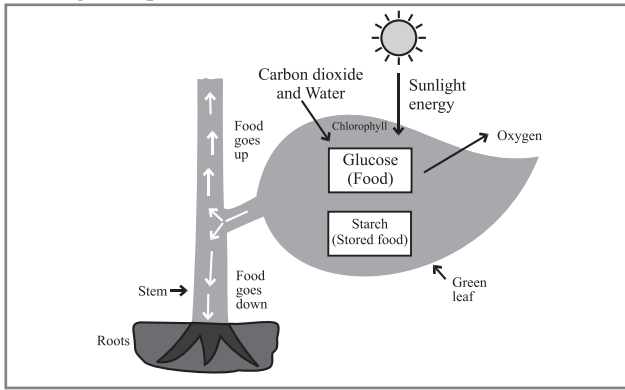
2. Autotrophic Nutrition : See Q.1

Ex. Green plants.

3. Heterotrophic Nutrition See Q.1

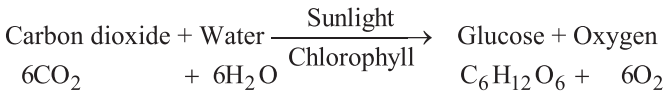
Ex. Fungi and protozoa.

4.

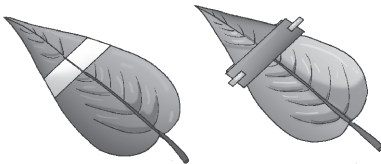


Green plants make their own food  
by photosynthesis.

All green plants make their own food by the process of photosynthesis. In this process, the solar energy is trapped by chlorophyll, a green pigment present in the leaves. This energy is used to combine water from the soil and carbon dioxide from the air. The food made by this combination is called glucose which is used by the plant for growth and repair of its parts. The chemical reaction that takes place during the process of photosynthesis is as follows :



5.



Light is essential for photosynthesis

**To show that light is necessary for photosynthesis**

**Method :** Take a healthy green potted plant. Keep it in the dark for 5-6 hours so that the plant can utilise the food (starch) it has already prepared. This is called destarching.

Select a leaf from the plant and fix a strip of black paper on it with the help of paper clips. Now leave the plant in sunlight for a few hours.

Then pluck the leaf and remove the black paper strip and test it for starch. The portion of the leaf that was wrapped in the strip will not turn blue-black. This is because food was not prepared in this part of the leaf since it did not receive any sunlight. This shows that sunlight is necessary for photosynthesis.

### Activity Time

#### J. Science Puzzle

Here are some jumbled words for you. Arrange them into a correct sequence and fill in the given boxes :

1. 

G	L	U	C	O	S	E
---	---	---	---	---	---	---
2. 

M	O	U	L	D	S
---	---	---	---	---	---
3. 

A	U	T	O	T	R	O	P	H
---	---	---	---	---	---	---	---	---
4. 

S	T	O	M	A	T	A
---	---	---	---	---	---	---

## 2.

## Nutrition in Animals

### Assess Yourself

#### A. Choose the correct option : (Multiple Choice Questions)

1. (b) herbivores, 2. (c) omnivores, 3. (c) mastication, 4. (a) ptyalin, 5. (d) large intestine.

#### B. Fill in the blanks :

1. false foot, 2. Amoeba, 3. cilia, 4. simple substances, 5. salivary glands, pancreas.

#### C. State whether the following statements are true or false :

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

#### D. Match the Columns :

- | Column A           | Column B              |
|--------------------|-----------------------|
| 1. Pancreas        | (i) Bile              |
| 2. Food vacuole    | (ii) Food pipe        |
| 3. Liver           | (iii) Digestive juice |
| 4. Oesophagus      | (iv) Enzymes          |
| 5. Salivary glands | (v) Saliva            |

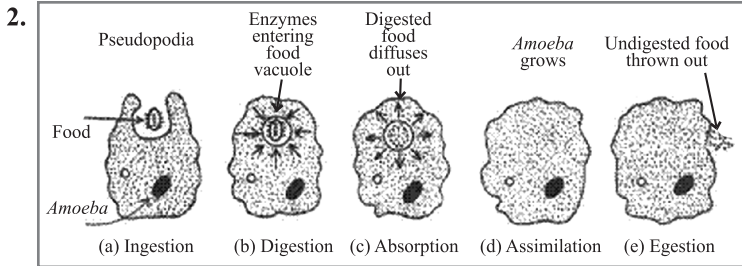
#### E. Answer the following questions briefly :

1. Solid particles are ingested in holozoic mode of nutrition.
2. The word holozoic is derived from two words, 'Holos' meaning 'whole' and 'zoikos' meaning 'animal'.
3. Proteins and minerals are needed for growth and maintenance of our body. Vitamins help in protecting our body from diseases and carbohydrates and fats provide energy.

4. Human beings usually have 20 milk teeth at about 6 months of age and 32 permanent teeth by the age of 32 years.
5. Three glands associated with the digestive system in human beings are the salivary glands, liver and pancreas.

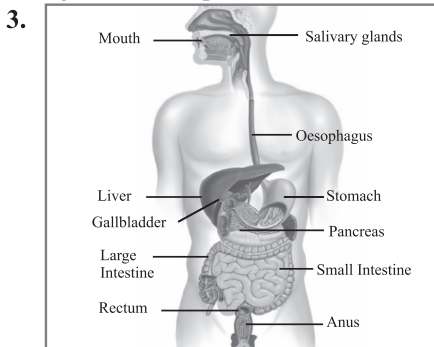
**F. Answer the following questions :**

1. (a) The mode of nutrition in which solid particles of food are taken in is called holozoic mode of nutrition while in parasitic mode of nutrition, an organism called a parasite, lives on the body surface or inside the body of another organism called host.
- (b) Ingestion is the intake of food into the body through the mouth while egestion is the elimination of wastes through the anus.



Different stages in the nutrition (feeding) of *Amoeba*

Unicellular animals like *Amoeba* feed on microscopic plants and animals. All the processes of nutrition are performed by its single cell. The food vacuole releases special digestive chemicals called enzymes, to break down captured food into small and soluble molecules. Thus, digestion takes place inside the food vacuole.



Digestive System

- (i) **Mouth** : The mouth contains salivary glands which produce and secrete a liquid, known as saliva which contains ptyalin. It breaks some of the starch in the food into sugars and also helps in breaking down the food into simpler substances.

- (ii) **Oesophagus** : It is a 25 cm long tube which transports food down to the stomach.
- (iii) **Stomach** : It is a J-shaped organ connected to the end of the oesophagus. As the food enters the stomach, its cells are already releasing gastric juice. At the same time, nerves in the stomach become stimulated and cause more gastric juice to be secreted while the muscle contraction provides a kind of mechanical digestion. Here the second stage of digestion takes place.
- (iv) **The small intestine** : It is a coiled tube like structure. The third stage of digestion takes place here. Most digestion takes place in small intestine.

The food from the stomach seeps into the small intestine, little by little, and may remain there for as long as five hours. The end product of digestion in small intestine are called nutrients. They are now ready to be absorbed by the blood.

- (v) **The large intestine** : After absorption of digested food, the contents of the small intestine, consisting mainly of undigested food material, then pass into large intestine in the form of paste. Here water is absorbed from the undigested food. The undigested food is called faeces.

5. An adult human being normally has 32 teeth, 16 in each jaw. These teeth are of four types—eight incisors, four in each jaw. These have a chisel shape for cutting off pieces of food.

Behind these are four canine teeth, one on each side both on the upper and lower jaw and bottom. These have a fang like shape for tearing food such as meat. Other teeth are premolars and molar used to break up food and chew it. An adult has 8 premolars and 12 molars altogether. The premolars are smaller and located in front of the molars.

### Activity Time

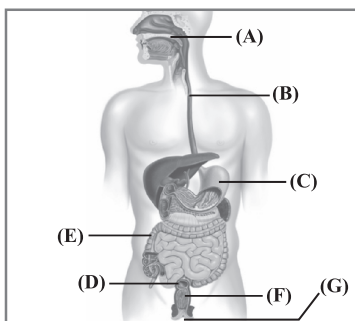
G. Who am I?

1. Amoeba

2. Hydra

3. Paramecium

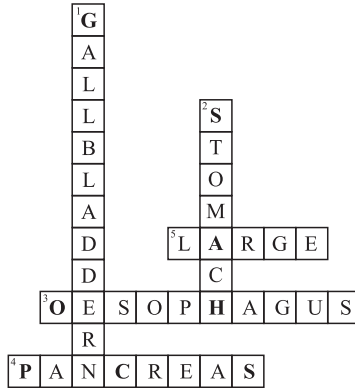
H. In the given figure, identify A, B, C, D, E, F, and G.



- A - Salivary glands
- C - Stomach
- E - Large intestine
- G - Pancreas

- B - Oesophagus
- D - Rectum
- F - Anus

**J. Science Puzzle**



**Unit-2 : Materials**

**3.**

**Fibre to Fabric**

**Assess Yourself**

- A. Choose the correct option : (Multiple Choice Questions)**
- (d) Polar bear, 2. (b) Washing, 3. (a) reprocessed wool, 4. (c) raw silk, 5. (a) water.
- B. Fill in the blanks :**
- animal, 2. untangle and loosen, 3. lambs, 4. strong, long, 5. Shearing.
- C. State whether the following statements are true or false :**
- F, 2. T, 3. T, 4. T, 5. T.
- D. Match the columns :**
- | Column A       | Column B             |
|----------------|----------------------|
| 1. Cocoon      | (i) Kind of sheep    |
| 2. Virgin wool | (ii) Variety of silk |
| 3. Merineo     | (iii) Type of wool   |
| 4. Mulberry    | (iv) Silkworm        |
- E. Answer the following questions briefly :**
- Fleece.
  - A merino sheep yields up to 13.5 kg of wool in one shearing.
  - Present day wool comes from specially bred sheep and the best wool comes from Merino sheep (white sheep).
  - The qualities of best wool are that is warm, light and comfortable.

5. The production of silk by silk moths on a large scale is called sericulture.

**F. Answer the following questions :**

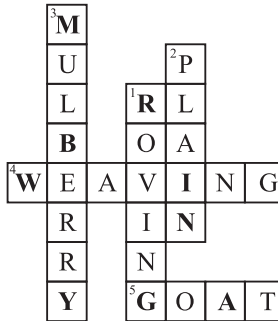
1. Wool is a long and thick kind of hair that can easily be turned into yarn. It is obtained from the fleece of sheep, goat, yak etc. The finest fleece comes from lamb. Most comes from sheep which is found in all temperate parts of the world. Merino sheep produces the finest and largest amount of wool.
2. Wool processing involves the following steps :
  - (i) **Shearing** : It means the removal of fleece from the body of a sheep.
  - (ii) **Washing** : The process of washing the fleece in a stream of water is called scouring. After washing, the wool is squeezed between rollers to remove excess water.
  - (iii) **Grading** : Before the fleece is made into yarn for weaving, it must be graded.
  - (iv) **Dyeing** : Here, the wool is dyed in different colours.
  - (v) **Carding** : The wool is combed in a carding machine into parallel rows of fibres, which are called slivers.  
The carding machine has wire-toothed rollers to separate the wool into loose ropes.
  - (vi) **Roving** : A number of slivers are rolled into a thin rope called roving. It is used to spin yarn.
  - (vii) **Weaving** : Now, the fibres are twisted together to make yarn, which is woven into garments, rugs and blankets.
3. After the silkworm spins a cocoon of silk around itself, the cocoon is left behind and an adult moth emerges.  
The silk fibres are now unwound from the cocoons in a process called reeling. The cocoons are soaked in warm water and then the ends of about six threads are taken and carefully wound together on a reel into a thread. It is called raw silk. This raw silk is washed, died and then twisted into thicker yarns by a process called throwing. It is then boiled in soap water to remove its natural gum. Finally, it is dyed and woven into cloth.
4. Wool is a long and thick kind of hair that can easily be turned into yarn. Clothing made from wool is warm, light and comfortable. It has a resilient curl or crimp, which helps to maintain its shape. It is made of protein.  
On the basis of its origin, manufacturers produce three kinds of wool :
  - (i) Virgin wool is the wool that has never been used before.
  - (ii) Reprocessed wool is the one that has been knitted into unsold products and then respun.



- (iii) Reused wool is the wool that has been made and used or worn, then respun.

### Activity Time

#### J. Science Puzzle



## 4. Heat Flow and Temperature

### Assess Yourself

#### A. Choose the correct option : (Multiple Choice Questions)

1. (a) gain energy, 2. (d)  $100^{\circ}\text{C}$ , 3. (d) 1.00, 4. (a) Clinical, 5. (a) Calorie.

#### B. Fill in the blanks :

1. mass, 2. 1000, 3. sun, 4. Liquids, 5. bimetallic strip.

#### C. State whether the following statements are true or false :

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

#### D. Match the columns :

- | Column A       | Column B                 |
|----------------|--------------------------|
| 1. Heat        | (i) Joule                |
| 2. Temperature | (ii) 4.184 J             |
| 3. Mass        | (iii) Calories           |
| 4. Heat energy | (iv) $0^{\circ}\text{C}$ |
| 5. 1 cal       | (v) Gram                 |

#### E. Answer the following questions briefly :

- Our main source of heat is the sun.
- The temperature at which a substance changes its state from solid to liquid is called its melting point.
- Small gaps are left between the successive length of rails, so that, if they expand in the heat of the sun, they do not buckle but have space to cover the gap.
- Mercury is present in the clinical thermometer.
- Two scales : Clinical thermometer and laboratory thermometer are used to measure temperature.

**F. Answer the following questions :**

1. A measure of heat absorbing ability is called specific heat.  
Different substances have different specific heat. For example, the specific heat of water is 1 while the specific heat of copper is 0.093.
2. Two effects of heat are as follows :
  - (i) Gaining of heat by an object raises its temperature while losing of heat decreases its temperature.
  - (ii) Gaining of heat by an object leads to an expansion in it.
3. (a) Calorie is the amount of heat needed to raise the temperature of one gram of liquid water by one degree celsius.  
(b) 1 kilo Calorie is the amount of heat required to raise the temperature of 1 kg of water by 1° Celsius.
4. We need to measure temperature as there are numerous physical and chemical changes around us which take place due to an increase or decrease in temperature.
5. Formula for measuring the amount of heat :

$$Q = m \times s \times t$$

Mass of 300 mL of water ( $m$ ) = 300 g

Specific heat of water ( $s$ ) = 4.18 J/g°C

Rise in temperature ( $t$ ) = 3°C

Total heat received by water in 15 minutes =  $m \times s \times t$

$$300 \times 4.18 \times 3 = 3762 \text{ J}$$

$$\text{Heat received in one minute} = \frac{3762}{15} = 250.0$$

**5.**

**Transfer of Heat**

**Assess Yourself**

**A. Choose the correct option : (Multiple Choice Questions)**

1. (b) conduction, 2. (a) insulation, 3. (a) iron, 4. (a) convection,
5. (a) heat is absorbed by ice.

**B. Fill in the blanks :**

1. Radiation, 2. Cloudy nights, 3. Aluminium, iron, 4. heat, 5. Black and dull surfaces.

**C. Match the columns :**

**Column A**

1. Land breeze blows during
2. Sea breeze blow during
3. Dark coloured clothes are preferred during
4. Light coloured clothes are preferred during

**Column B**

- (i) Summer
- (ii) Winter
- (iii) Day
- (iv) Night

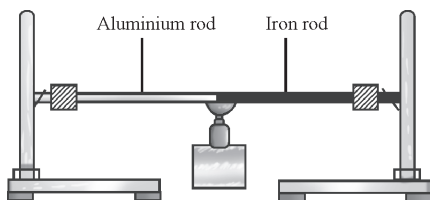
**D. Answer the following questions briefly :**

1. Heat transfer by conduction takes place mainly in solids.
2. Molecules move in currents in convection method of heat transfer.
3. Heat from the sun reaches the earth by radiation.
4. When radiation takes place, heat energy is in the form of infrared rays.
5. On heating, molecules of liquid or gas become loosely packed, creating currents that carry heat.
6. One should wear light coloured clothes in summer because such clothes absorb a small fraction of radiant heat from the sun while reflecting the large portion.

**E. Answer the following questions in detail :**

1. (a) Cloudy nights are warmer than clear nights because the heat radiated by the Earth is again reflected back by the clouds.  
(b) The moon does not have its own light. The radiation from the Sun falls on the moon. Since, the surface of the moon is rough and dull, it is a good absorber of radiant heat and light. Only a fraction of this incident radiation is reflected by the moon. Thus, moonlight is cool on the Earth while sunlight is direct hot radiation from the Sun.
2. Same quantity of heat supplied to different substances does not produce the same increase in temperature because some materials are better conductors of heat and so, increase in temperature in them would be more as compared to other materials.
3. Same as 2.
4. Four applications of radiation of heat are as follows :
  - (i) As earth is closer to the sun, it receives more radiant heat. Thus, heat enables the earth to be pleasantly warm and provides conditions for sustenance of life.
  - (ii) Light coloured clothes are warm in summer because they absorb only a little radiation heat and reflect most of it. On the other hand, dark clothes are worn in summer as they absorb most heat and reflect only a little.
  - (iii) Cloudy nights are warmer than clear nights as the heat radiated by the earth's surface is not allowed to escape by the clouds and is reflected back.
  - (iv) The moon does not have any light of its own and it shines by reflecting the sun's light. As its surface is dull rough, it absorbs most of heat and light. Hence, moonlight is cool while sunlight is hot.

5.

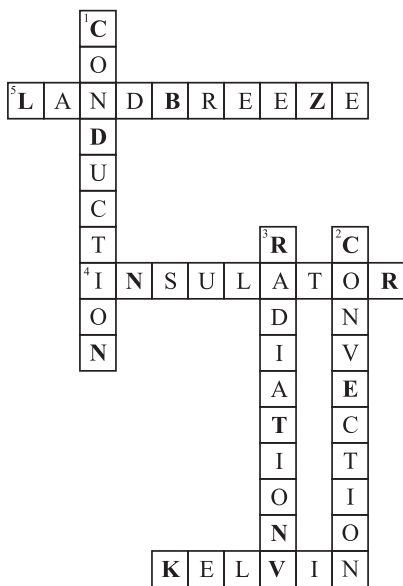


**Conduction of heat varies in different materials**

Take an iron rod and aluminium rod of same size. Fix same small iron nails on both with molten wax. Heat the junction of the rods with a spirit lamp. We see the nails drop earlier from the aluminium rod than from the iron rod. It shows that both aluminium and iron conduct heat but aluminium conducts heat faster than iron.

**Activity Time**

**I. Science Puzzle**



**Unit-3 : Elements, Compounds and Chemical Equations**

**6. Acids, Bases and Salts**

**Assess Yourself**

**A. Choose the correct option : (Multiple Choice Questions)**

1. (a) Soap solution, 2. (b) NaOH, 3. (c) milk, 4. (d) paint, 5. (a) cleaning,
6. (c) positive hydrogen.

**B. Fill in the blanks :**

1. more, 2. soapy, red, blue, 3. salt, water, 4. photography, 5. ions, insoluble, 6. weak, strong, 7. fatty acid, glycerine.

**C. State whether the following statements are true or false :**

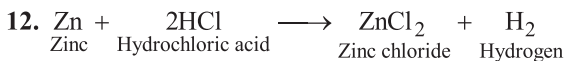
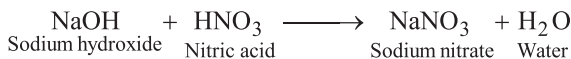
1. F, 2. T, 3. T, 4. T, 5. F, 6. T.

**D. Match the columns :**

Column A	Column B
1. Marble	(i) $\text{Na}_2\text{CO}_3$
2. Blue vitriol	(ii) $\text{Cu}(\text{OH})_2$
3. Soda ash	(iii) $\text{KOH}$
4. Copper hydroxide	(iv) $\text{CaCO}_3$
5. Potassium hydroxide	(v) $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$

**E. Answer the following questions briefly :**

- (a) lemon - citric acid, (b) grapes - citric acid  
(c) tamarind - tartaric acid (d) unripe apple - maleic acid
- Acids commonly used in laboratories and industries are hydrochloric acid ( $\text{HCl}$ ), nitric acid ( $\text{HNO}_3$ ), sulphuric acid ( $\text{H}_2\text{SO}_4$ ) and acetic acid ( $\text{CH}_3\text{COOH}$ ).
- All acids produce positive hydrogen ions when dissolved in water because they contain hydrogen.
- Table sugar contains hydrogen but is not an acid because it does not produce ions when dissolved in water.
- $\text{CaCO}_3 + \text{H}_2\text{SO}_4 \rightarrow \text{CaSO}_4 + \text{H}_2\text{O} + \text{CO}_2$   
Calcium carbonate Sulphuric acid Calcium sulphate Water Carbon dioxide
- The compounds which behave chemically opposite to acids are called bases.
- Bases soluble in water are called alkalis *e.g.*, Sodium hydroxide ( $\text{NaOH}$ ).
- Antacid tablets are made of magnesium hydroxide. It is called antacid as it helps to neutralize the acidity inside the stomach and provides relief from pain and discomfort.
- $2\text{NaOH} + \text{CO}_2 \longrightarrow \text{Na}_2\text{CO}_3 + \text{H}_2\text{O}$   
Sodium hydroxide Carbon dioxide Sodium carbonate Water
- Neutral substances are those substances that do not bring about any change in the colour of common indicators.
- In neutralization reaction, an acid and a base cancel each other's effect to form salt and water.



**F. Answer the following questions :**

1. Acids have a sour taste, turn blue litmus red and produce positive hydrogen ions ( $H^+$ ) while a base soluble in water is called an alkali, has a bitter taste and produces negative hydroxide ions ( $OH^-$ ).
2. A base is any substance which neutralizes acid whereas a base soluble in water is an alkali.
3. Properties of acids are :
  - (i) All acids are sour in taste.
  - (ii) All acids solution in water turn blue litmus and methyl orange red.
  - (iii) Acid react with more active metals to form salts and release hydrogen gas.
4. Some compounds react with oxygen to form oxides which do not exhibit acidic or basic characteristics. Such compounds are called neutral oxides.
5.
  - (i) Sulphuric acid is used in storage batteries for cars, buses, etc., and in petroleum refining. It is widely used in the manufacture of detergents, fertilizers, drugs, paints etc.
  - (ii) Hydrochloric acid is used for cleaning metals before soldering, tinning and galvanisation (coating of iron with zinc). It is used for making glucose from starch and for making glue.
  - (iii) Nitric acid is used for the extraction and purification of metals like gold and silver. It is used for etching designs or names on metals like copper, brass or bronze. It is widely used in the manufacture of fertilizers, explosives, dyes, perfumes, medicines, rayon and plastics. Sometimes it is used as a dehydrating agent.
6. Chemists use the pH scale to measure the strength of acid and bases. The pH is a series of numbers from 0 to 14. The middle of the scale 7, is the neutral point which is neither acidic nor a base. Water is a neutral substance. Its pH is 7. A solution with a pH below 7 is an acid and a solution with a pH above 7 is a base.
7. When soap is applied to a turmeric stain, it works as an indicator. As a reaction happens, the sodium hydroxide changes the colour of turmeric stain from yellow to red.

**G. Answer the following questions in detail :**

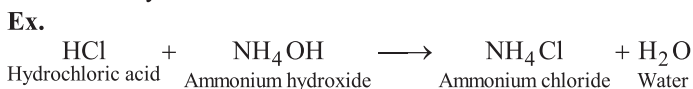
**1. Properties of acids**

- (i) All acids are sour to taste.
  - (ii) Molecules of an acid has one or more replicable hydrogen atoms.
  - (iii) Acids react with more active metals to form salts and release hydrogen gas.
2. Salts are formed by the neutralization of an acid with a base. Hence, the nature of salts formed depend upon the acid and the base used to neutralize it.

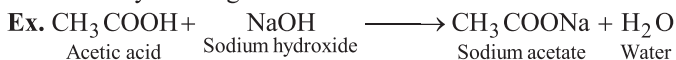
- (i) **Neutral salts** : Neutral salts are formed by the neutralization of strong acid with a strong base.



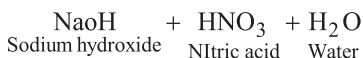
- (ii) **Acidic salts** : These salts are formed when a strong acid is neutralized by a base.



- (iii) **Basic salts** : These salts are formed by the neutralization of a weak acid by a strong base.



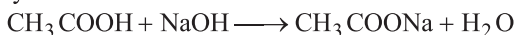
3. There are certain substances which are used to test acids and bases. They are known as acid-base indicators. Some common indicators are red and blue litmus papers, methyl orange, phenolphthalein, universal indicator and pH paper. Phenolphthalein and methyl orange are synthetic indicators.
4. (a) The reaction in which an acid and a base cancel each other's effect to form salt and water is called neutralization reaction.



- (b) Acidic salts are formed when a strong acid is neutralized by a weak base.



- (c) Basic salts are formed by the neutralization of acetic acid with sodium hydroxide



### Activity Time

- J. Complete the following reaction by filling in the boxes. You may refer to the chapter :

1. NaOH, 2. NaNO<sub>3</sub>, 3. H<sub>2</sub>SO<sub>4</sub>, CaSO<sub>4</sub>, 4. 2NaOH, Na<sub>2</sub>CO<sub>3</sub>.

7.

## Chemical Reactions and Separation of Substances

### Access Yourself

- A. Choose the correct option : (Multiple Choice Questions)

1. (b) Two atoms of hydrogen and one atom of oxygen, 2. (a) Natrium, 3. (c) Hg, 4. (b) KMnO<sub>4</sub>, 5. (d) Decomposition reaction, 6. (d) None of these, 7. (b) C + O<sub>2</sub> → CO<sub>2</sub>.

**B. Fill in the blanks :**

1. new, 2. atoms, 3. formulae, 4. reaction, 5. sugar, 6. light.

**C. State whether the following statements are true or false :**

1. T, 2. T, 3. T, 4. T, 5. T, 6. T.

**D. Match the following :**

**Column A**

1. Formation of curd from milk
2. Melting of glaciers
3. Chemical reactions
4. Neutralization
5. Decaying of layers of metal

**Column B**

- (i) Rusting
- (ii) Reactants and Products
- (iii) Acid + base  $\rightarrow$  salt + water
- (iv) Chemical change
- (v) Physical change

**E. Answer the following questions briefly :**

1. Matter is made up of tiny particles called atoms which are invisible to the naked eyes.

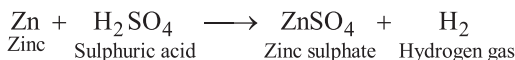
Matter has three states : solid, liquid and gas.

2. A pure substance contains only one kind of molecule.
3. Elements are represented using short notations. These notations are called symbols. This is the shorthand way of representing elements.
4. A freshly cut piece of brinjal turns black after sometime due to chemical reaction with air.
5. Nitrogen – N  
Iron – Fe  
Calcium – Ca  
Oxygen – O<sub>2</sub>  
Sodium – Na
6. Two atoms of hydrogen are present in sulphuric acid.

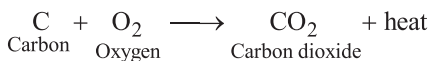
**F. Answer the following questions :**

1. The process in which the chemical properties of the original substances disappear as new chemical substances with different chemical properties are formed, is called a chemical reaction.

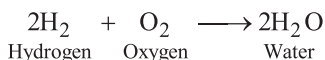
**(i) Evolution of gas**



**(ii) Release of energy**



**(iii) Change of state**





2. A pure substance made up of only one kind of atom is called an element. Elements are pure substances and can not be broken by any chemical process. For example, if we melt a piece of iron by adding heat energy then iron has changed its state from solid to liquid but it is still iron. No new or simpler substance is formed.

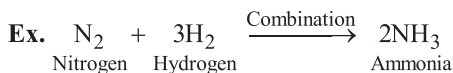
3. (a) Chemical formula is a set of chemical symbols showing the elements present in compound and their relative proportions. Most chemical formula represent compounds.

**Ex.** Ammonia is a compound of nitrogen and hydrogen. A molecule of ammonia has the formula  $\text{NH}_3$  *i.e.*, 1 nitrogen atom and 3 hydrogen atoms.

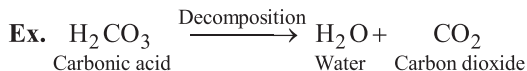
(b) Chemical equation is written with the reacting substances on the left hand side and the product formed on the right hand side with an arrow in between as shown below :



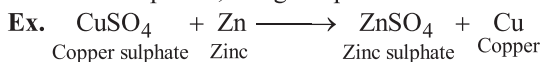
4. (a) **Combination reaction** : When two or more simple substances combine to form a new complex substance, it is combination reaction.



(b) **Decomposition reaction** : When one complex substance breaks down or decomposes into two or more simple substances, a decomposition reaction occurs.



(c) **Displacement reaction** : When an element replaces another element in a compound, a single replacement reaction occurs.



5. The salinity of water means the amount of salt dissolved. Yes, the salinity can be removed by distillation or by reverse-osmosis.

6. In many solids, the particles are arranged in a regular, repeating pattern. Such a regular arrangement of particles is called a crystal.

When hot saturated solution of a substance is cooled, crystals of pure substance are separated and impurities are left behind in the solution. This process is called crystallization. It is used for getting a pure sample of a soluble solid substances from the solution.

#### G. Balance the following equations :

- $\text{Al} + 3\text{Cl} \rightarrow \text{AlCl}_3$
- $2\text{Ca} + \text{O}_2 \rightarrow 2\text{CaO}$
- $2\text{Na} + \text{CO}_3 \rightarrow \text{Na}_2\text{CO}_3$

### Activity Time

- J. Find out the names of four elements in this grid :**  
BORON, NITROGEN, CARBON, NEON.

S	O	D	C	I	U	M	F
G	N	O	A	P	Z	R	T
N	I	T	R	O	G	E	N
S	T	U	B	O	R	O	N
M	Z	O	O	X	N	R	T
Y	V	P	N	E	O	N	W

## Unit-4 : The World of Living

### 8. Weather, Climate Changes and Adaptations

#### Assess Yourself

- A. Choose the correct options : (Multiple Choice Questions)**
1. (b) Altitude, 2. (a) frog, 3. (b) weather, 4. (c) high, 5. (c) Camel, 6. (b) Snail.
- B. Fill in the blanks :**
1. similar, 2. temperature, precipitation, 3. equator, 4. Ptarmigan, 5. fur, 6. away.
- C. State whether the following statements are true or false :**
1. T, 2. F, 3. T, 4. F, 5. F, 6. F.
- D. Match the columns :**
- | Column A                | Column B                |
|-------------------------|-------------------------|
| 1. Rainfall             | (i) Kilometres per hour |
| 2. Wind speed           | (ii) Degree celsius     |
| 3. Relative humidity    | (iii) Millibars         |
| 4. Temperature          | (iv) Percent            |
| 5. Atmospheric pressure | (v) Centimetres         |
- E. Answer the following questions briefly :**
1. Weather is an atmospheric activity over a short period like a cold winter snap or a hot spell.
  2. At night, the part of the earth away from the sun, does not receive the sun's radiant energy.
  3. Hibernation is the period of unconsciousness or deep sleep by which many animals pass the winter, when the food is scarce.

4. The thick fur and the fatty layer under the skin help the polar bear withstand the bitter cold.
5. Soil becomes dry in summer because the heat of the sun evaporates its moisture content.

**F. Answer the following questions in detail :**

1. The basic difference between weather and climate is that while weather is an atmospheric activity over a short period of time, the climate of a region is its general pattern of weather over a long period of time.
2. Climate of a place is affected by wind and humidity. The wind may be hot, cool or carry humidity, leading to rain. Similarly, the amount of humidity at a place dictates whether the place will have rain or not.
3. Polar bear lives on Arctic ice-floes, where its yellowish-white fur gives it good camouflage, a way of hiding from their enemies. The thick fur and the fatty layer under the skin help the polar bear withstand the bitter cold.
4. Animals living in hot and dry climatic conditions adapt in the following ways :
  - (i) Creatures, such as lizards and rodents often escape the heat by living in underground burrows.
  - (ii) Desert animals lose almost no water in their waste. Only in this way they can survive in a world where rain hardly ever falls.

**Activity Time**

**J. Who am I?**

- |          |               |
|----------|---------------|
| 1. Camel | 2. Ptarmigan  |
| 3. Snail | 4. Polar bear |

**9.**

**Soil**

**Assess Yourself**

**A. Choose the correct option : (Multiple Choice Questions)**

1. (a) Soil, 2. (a) Rat, 3. (b) Gujarat, 4. (c) Tamil Nadu, 5. (c) humus,
6. (b) non-biodegradable, 7. (d) Clayey soil, 8. (c) Terrace farming,
9. (b) Recycling.

**B. Fill in the blanks :**

1. weathering, 2. humus, 3. dark-coloured, 4. dark, bright, 5. erosion,
6. nitrogen.

**C. State whether the following statements are true or false :**

1. T, 2. T, 3. F, 4. F, 5. F, 6. T, 7. T.

**D. Match the columns :**

<b>Column A</b>	<b>Column B</b>
1. Alluvial soil	(i) Deccan trap region
2. Black soil	(ii) Chhota Nagpur
3. Sandy soil	(iii) Northern plains
4. Laterite soil	(iv) Punjab, Haryana and West Rajasthan

**E. Answer the following questions briefly :**

1. Living organism and organic matter are two main ingredients of soil.
2. To improve sandy soil, we should add atleast 2 inches of organic matter each year.
3. Topsoil is the uppermost layer of soil. It is made up of humus which is mixed with mineral particles.
4. The carrying away of soil from one place to another by water and wind is called soil erosion.
5. Alluvial soil, black soil, red soil, laterite soil, sandy soil and mountain soil are found in India.

**F. Answer the following questions :**

1. The process by which rocks are broken down by environment : water, wind, snow, frost and sun, is called weathering.
2. Overuse of fertilizers and pesticides has changed the structure and properties of the soil leading to soil erosion.
3. Decayed plants and animal remains are called humus.
4. Two ways of solving the problem of soil pollution is to use fertilizers and pesticides; and sanitary landfill to dispose of waste.
5. Terrace farming is the method to make a series of level plots in step line fashion on the slope. It helps to conserve soil.
6. The black colour of any soil indicates that it is rich in humus.

**G. Answer the following questions in detail :**

1. The soil is formed by a number of physical, chemical and biological processes, some of which are as follows :
  - (i) Continuous weathering breaks down the rocks into minute particles. Later, the dead bodies of plants and animals got decayed, mixed with rock particles and formed soil.
  - (ii) Rainwater and chemical substances contained broke down the rock particles further, which rolled down the hillside or were swept away by rivers and glaciers to form soil.
  - (iii) When the vegetation like lichen and mosses, grew and died on rock particles, their remains added organic matter to the soil skeleton. This added humus to it.

All these process together gave rise to soil as we know it.
2. Soil is an important part of the earth. The major types of soil found in India are as follows :

- (i) **Alluvial soil** : It is actually the silt brought down by the rivers from the mountainous and hilly regions. These soils are very rich and fertile and hence ideal for cultivation. This soil is found in abundance in northern plains. Wheat and sugarcane are the two main crops.
  - (ii) **Black soil** : Black soil or regur is clayey, deeper, fine grained and black. It is rich in chemical properties, hence very fertile. Because of its colour and suitability for growing cotton, it is also known as 'Black cotton soil'.
  - (iii) **Sandy soil** : Sandy soil is found in arid regions of Punjab, Haryana and West Rajasthan. It is porous in nature and not suitable for cultivation because it lacks humus content.
3. A soil profile is a vertical cross section of the soil. Most soils have only three major horizons : the surface horizon (A), the subsoil (B) and the base (C).

Some soils have an organic horizon (O) on the surface but this horizon may also be buried. Horizon R is the hard bedrock.

**O-horizon** : This is the top organic layer of soil, made up mostly of leaf litter. This organic matter decomposes to form humus which gives the soil its dark colour. It is rich in nutrients and good for growth of plants.

**A-horizon** : This layer is called topsoil. It is found below the O-horizon and above the B-horizon. It is soft porous and can hold water.

**B-horizon** : This layer of soil is also called the subsoil. It contains clay and has a rich deposit of minerals. It has been observed that roots of plants reach upto this layer only.

**C-horizon** : This layer of soil is beneath the B-horizon and above the R-horizon. It consists of slightly broken up particles of the parent rock called bedrock. Plants do not penetrate into this layer and very little organic matter is found here.

**R-horizon** : This layer is beneath all the other layers.

4. The causes of soil erosion are as follows :

- (i) **Rainfall and flooding** : Rainfall and storm produce four major types of soil erosion like rill erosion, gully erosion, sheet erosion and splash erosion, caused by the impacts of raindrops on the soil surface that break down and disperse the soil particles which are then washed away by the storm water runoff.
- (ii) **Deforestation** : This type of erosion results from people removing vegetation from the land in an uncontrolled manner.
- (iii) **Faulty Agricultural practices** : Erosion is at its worst in developing countries because farmers lack the knowledge and means for wise agricultural practices. Much of the vegetation is removed not by people but by their livestock, such as cattle.

5. Soil can be conserved by following methods :
- (i) **Contour farming** : A better method of ploughing is called contour farming which is to plough horizontally across the face of the slope.
  - (ii) **Terrace farming** : It means to make a series of level plots in step-like fashion on the slope. It is called terracing.
  - (iii) **Forestry** : Forestry is the practice of caring for forests so that they continue to produce useful trees.
  - (iv) **Strip cropping** : In strip cropping the farmer plants low strips of cover crops that hold down the soil between strips of crops.
6. Forests are thoughtlessly cut to make room for farms or for timber and firewood. People in many developing countries depend on wood for heat and cooking. Today, many areas of the remote high mountains have been stripped bare of forests. As a result, during the seasonal heavy rains and monsoon, torrents of water race down the mountainsides carrying off the fertile topsoil.  
This is effect of deforestation.
7. Soil pollution is the contamination of the atmosphere the soil, the rivers and the sea by chemicals, rubbish or other substances. Pollution of soil occurs in the following ways :
- (i) Overuse of pesticides and fertilizers has changed the structure and properties of the soil.
  - (ii) Seepage of discharge from factories and other harmful effluents into ground water poisons the plants and animals.
  - (iii) Drops of nitric acid and sulphuric acid fall to the earth in the form of acid rain and pollute the soil, air and water.
  - (iv) Non-biodegradable wastes are also responsible for soil pollution. These wastes includes, polythene, plastic and other man-made materials disposed off by humans as rubbish.

### Activity Time

#### J. Science Puzzle

**Unscramble the letters to answer the following hints :**

1. WEATHERING, 2. LOAMY, 3. HUMUS, 4. REGUR

## Unit-5 : Respiration, Transportation and Reproduction

### 10. Respiration in Plants and Animals

---

#### Assess Yourself

#### A. Choose the correct option : (*Multiple Choice Questions*)

1. (a) yeast, 2. (a) leaves, 3. (c) gills, 4. (d) vocal cords, 5. (b) lenticles,  
6. (a) alveoli, 7. (c) anaerobic.

**B. Fill in the blanks :**

1. Ethyl alcohol, carbon dioxide, 2. Anaerobic respiration, 3. upper,
4. cell membrane, 5. gills, 6. Operculum.

**C. State whether the following statements are true or false :**

1. F, 2. T, 3. F, 4. T, 5. T, 6. T.

**D. Complete the given analogies :**

1. Lenticle, 2. spiracles, 3. Ethyl alcohol, carbon dioxide,
4. Multicellular.

**E. Answer the following questions briefly :**

1. The respiration which takes place in the presence of oxygen is called aerobic respiration while anaerobic respiration takes place in the absence of oxygen.
2. Living things need oxygen to obtain energy from the food they eat.
3. Carbon dioxide gas.
4. When we exhale, air rushes out of our lungs, and our chest muscles relax.
5. Fishes possess gills for respiration in water while whale has lungs and has to come to surface to breathe.
6. Lenticles are present in potato's tubers.

**F. Answer the following questions in detail :**

1. (a) The main function of alveoli is to help in respiration.  
(b) Guard cells are the bean shaped structures, around each stoma. They help in the opening and closing of the stomata.  
(c) Fish possess gills for exchange of gases.  
(d) Nostrils are used to inhale and exhale.  
(e) Spiracles are tiny holes on the body of grasshopper which help them to breathe.  
(f) Lenticles help in exchange of gases.
2. The process of getting oxygen into the body and using it for releasing energy (ATP) by burning the food, and removing carbon dioxide and water vapour from the body is known as respiration. It is essential for life because it provides energy for carrying out all the life processes which are necessary to keep the organism alive.
3. Respiration is of two types :
  - (i) Aerobic respiration
  - (ii) Anaerobic respirationThe respiration which uses oxygen is called aerobic respiration. In such respiration, the food in the form of glucose is completely

broken down into CO<sub>2</sub> and water by oxidation while anaerobic respiration takes place in absence of oxygen.

4. Microscopic organisms such as yeast and bacteria too need energy to survive. This they obtain by anaerobic respiration when they break down glucose in the absence of oxygen to give ethyl alcohol, carbon dioxide and energy. This process is called fermentation.

5. (a) Differences between breathing and respiration are :

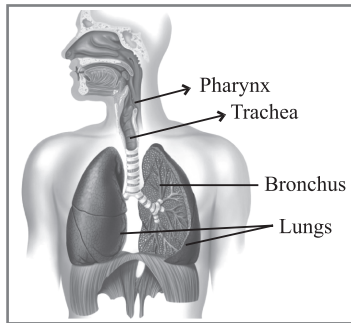
S.No.	Breathing	Respiration
(i)	It is a physical process which involves the exchange of gases.	It is a biological process which involves breakdown of food.
(ii)	During this process, no energy is released.	Energy is released during this process.
(iii)	It takes place inside the cell.	It takes place inside the cell.

(b) Differences between aerobic and anaerobic respiration.

S.No.	Aerobic Respiration	Anaerobic Respiration
(i)	It takes place in the presence of oxygen.	It takes place in the absence of oxygen.
(ii)	Glucose is completely broken down.	Glucose is partially broken down.
(iii)	Carbon dioxide and water are the end products.	Ethyl alcohol and lactic acid are the end products.

6. Respiratory organs of the humans are as follows :

- (i) **The nose and throat** : We take in air through the nostrils or the opening of the nose. If the air is cold as it may be in winter, it is quickly heated by warm blood that passes through blood vessels near the inner lining of the nose. At the same time, mucous in the nose moistens the area. Finally large and tiny hair in nose help to clean the air in our nose. Now the clean air moves into our throat and from there, through windpipe, goes deeper into the respiratory system.

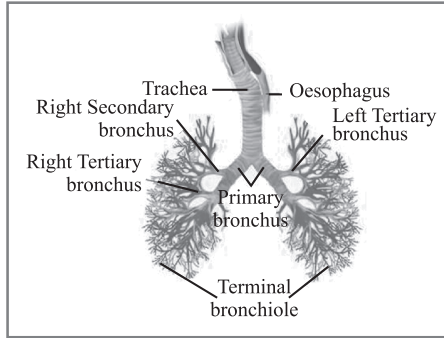


Human respiratory system

- (ii) **Trachea and bronchi** : Air passes down the throat into the trachea. The trachea branches into two tubes called bronchus.

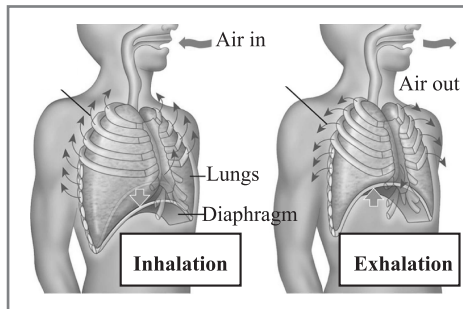


Each bronchus further branches into smaller and smaller tubes. The thinnest branches lead to grape-like cluster of tiny balloons called alveoli. Each thin walled alveolus is surrounded by a network of capillaries.



The bronchi

7. When we are about to take a breath, the muscles attached to our ribs contract and pull upward and outward. At the bottom of our chest another muscle, called the diaphragm, also contracts and pulls down the bottom of our chest. Both the actions make the chest expand. As a matter of fact, the pressure in our lungs instantly becomes lower than the pressure of the air around us. This difference in pressure forces the air to rush into lungs. Our chest must expand before we breathe in or inhale. The reverse happens when we breathe out or exhale our chest muscles relax.



Mechanism of breathing in humans

### Activity Time

- J. Rearrange the jumbled words to make meaningful words related to respiration :

1. GILLS, 2. STOMATA, 3. TRACHEA, 4. LARYNX, 5. SPIRACLES.

- K. Given below is a word-grid in which different words related to respiration in organisms are hidden. These words may be written in any direction : Upwards, downwards or along the diagonals. Find words related to respiratory system. Clue words are given below :

S	V	M	P	L	U	N	G	S
C	Z	G	O	W	X	N	T	L
R	M	A	T	I	D	O	T	C
I	X	R	X	Y	M	S	R	A
B	R	H	I	A	N	T	A	Y
S	T	P	T	B	Z	R	C	E
M	I	A	M	T	S	I	H	A
S	P	I	R	A	C	L	E	S
N	E	D	K	J	N	S	A	T

## 11. Transportation and Excretion in Living Organisms

### Assess Yourself

**A. Choose the correct answers : (Multiple Choice Questions)**

- (a) Two, 2. (b) xylem, 3. (c) Four, 4. (b) Red blood cells, 5. (d) sphygmomanometer, 6. (a) arteries, 7. (c) Platelets, 8. (a) Urine.

**B. Fill in the blanks :**

- phloem, 2. malpighian tubule, 3. translocation, 4. arteries, capillaries, veins, 5. four, 6. carbon dioxide, sweat, urine, 7. excretion.

**C. State whether the following statements are true or false :**

- T, 2. F, 3. T, 4. T, 5. T, 6. T.

**D. Match the columns :**

**Column A**

**Column B**

- |              |   |                                 |
|--------------|---|---------------------------------|
| 1. Stomata   | → | (i) Absorption of water         |
| 2. Xylem     | → | (ii) Transpiration              |
| 3. Root hair | → | (iii) Transport of food         |
| 4. Phloem    | → | (iv) Synthesis of carbohydrates |

**E. Answer the following questions in about 10 words :**

- If there were no excretion, waste products would eventually poison the organism.
- In *Amoeba*, *paramecium*, sponge and *hydra*, wastes are removed through body surface by diffusion.
- Rubber, raphides and gum.

4. The kidneys, ureter, urinary bladder and urethra are four excretory organs in humans.
5. Urethra.
6. Microscopic parts found on the outer section of kidney are called Nephrons.
7. Ureter

**F. Answer the following questions briefly :**

1. Water in plants moves through the constant process of diffusion and evaporation.
2. The food is transported in plants by the process of translocation.
3. The blood is red in colour due to haemoglobin.
4. In human blood plasma, red blood cells, white blood cells and platelets are found.

**G. Answer the following questions in detail :**

1. Plants absorb much more water through their roots than what is required by them for various activities. The excess water is given off by the plants in vapours form through their leaves. The stomata in the leaves regulate this water loss, known as transpiration.  
Thus it is a process by which a plant gives off water vapour through its leaves.

2. The circulatory system mainly consists of the blood vessels, heart and blood. The functions of these are as follows :

Blood vessels are of 3 types :

- (i) **Arteries** : As the left ventricle pumps the blood, it passes through the largest blood vessel in the body. The aorta : This vessel carries blood away from the heart. It branches into other smaller arteries which form a network leading to all parts of the body.
- (ii) **Capillaries** : The artery network carries blood all over the body but their walls are too thick for oxygen and food to pass through so the blood pass from the thick arteries into very thin blood vessels called capillaries.
- (iii) **Veins** : After blood has given up its oxygen and is dark red again, it leaves the capillaries and enters blood vessels called veins. These carry blood back from the body to the heart. They have tiny one way valves to prevents blood from flowing backward.

**Heart** : The heart receives deoxygenated blood in the right auricle and then pumps it through the right ventricle to the lungs for oxygenation through the pulmonary artery.

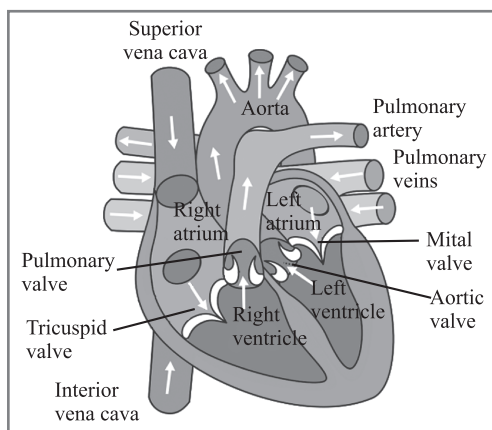
3. The kidneys are located under the lowest ribs near the spine. Each kidney is divided into an inner section and an outer section. The outer section contains millions of nephrons.

The amount of various salts in the body's water, particularly in water blood tissue, is very important. It is necessary that salts in the body's

water be kept at exactly the right concentration. It is the work of two kidneys.

Out of the filtered material much of the water and digested food are reabsorbed into the blood stream. Left over liquid is called urine.

4. Excretion in plants takes place in the following ways :
- (i) Excretion of gaseous waste in plants takes place through the stomata in leaves and lenticels in stems.
  - (ii) Some waste products of photosynthesis collect in the leaves and bark of the tree. The plant gets rid of them by shedding leaves and peeling of bark.
  - (iii) Some wastes are stored as solid entity.
  - (iv) Some plants excrete waste as secretions such as, gum, resin, etc.
  - (v) Aquatic plants excrete metabolic wastes through diffusion whereas terrestrial plants excrete into the soil.
5. The heart receives oxygenated blood in the right auricle and then pumps it through the right ventricle to the lungs for oxygenated through the pulmonary artery.



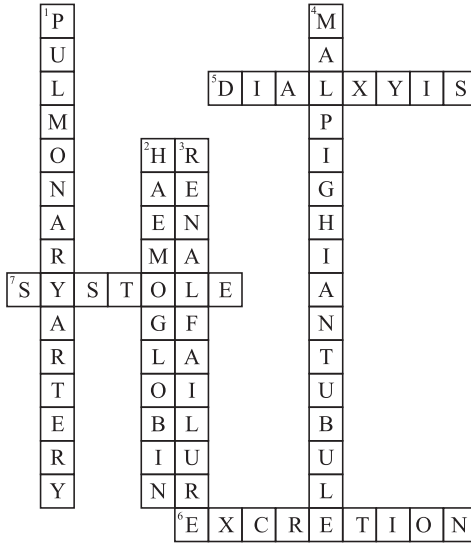
Structure of heart

The oxygenated blood is brought back into the left auricle through the pulmonary veins and from there it is pumped to all parts of the body by the dorsal aorta and its branches. The pulmonary artery is the entry artery which transports oxygenated blood and pulmonary vein transports oxygenated blood.

## Activity Time

### K. Science Puzzle

With the help of given clues, solve the crossword puzzle :



12.

## Reproduction

### Assess Yourself

**A. Choose the correct option : (Multiple Choice Questions)**

1. (a) stamen, 2. (c) frog, 3. (b) One, 4. (d) water, 5. (b) yeast,  
6. (d) radicle, 7. (d) zygote, 8. (c) dispersal.

**B. Fill in the blanks :**

1. new, 2. two, 3. zygote, 4. Stamens, 5. Budding.

**C. State whether the following statements are true or false :**

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

**D. Match the columns :**

- | Column A                           | Column B               |
|------------------------------------|------------------------|
| 1. Budding                         | (i) Germination        |
| 2. Binary fission                  | (ii) Orchid            |
| 3. Early growth stage of an embryo | (iii) Coconut          |
| 4. Dispersal by wind               | (iv) <i>Paramecium</i> |
| 5. Dispersal by water              | (v) Yeast              |

**E. Answer the following questions briefly :**

1. Reproduction is necessary for the continuation of species on the earth and also to replace the dead members.

2. Moulds grow on bread when it comes in contact with the dust carrying fungi. They are tiny microorganisms.
3. In sexual reproduction, fusion of male and female gametes are involved which are produced by males and females.
4. Vegetative reproduction involves formation of new plants from vegetative cell, buds or organs of the plant.
5. Three parts of the the pistil are stigma, style and ovary.
6. Stamen is the male organ and pistil is the female organ of the flower.

**F. Answer the following questions :**

1. Four methods of asexual reproduction are :
  - (i) Binary fission
  - (ii) Budding
  - (iii) Spore formation
  - (iv) Vegetative reproduction
2. Under proper conditions of moisture, oxygen and right temperature, the seed go through a process called germination.  
When germination begins, the part of the embryo below the cotyledon or hypocotyl becomes plant's stem. Upper part is called epicotyl which becomes leaves while radicle becomes roots.
3. (a) The fertilization which occurs outside the female body is called external fertilization.  
(b) The fertilization occurs outside the female body is called internal fertilization.

**G. Answer the following questions in detail :**

1. The reproductive organs in a flower are petals, sepals, carpels and stamen.

The stamen is the male part of the flower. In most flowers, each stamen has two parts : filament and anther.

The anther produces the pollen which contains the sperm. The pistil is the female part of the flower. The parts of the pistil are stigma, style and ovary. At the base of the flower is the hollow ovary which contains egg cells. A slender tube called the style connects the ovary to a sticky structure at the top of pistil called the stigma.

In flowers, reproduction occurs in two stages : first, the pollen must be transferred to the stigma. This stage is called pollination. In self-pollination, pollen is transferred to the stigma of the same flower and in cross pollination, pollen is transferred from the flower of one plant to the stigma of another plant.

An agent is a person or a thing that plays an active role of produces a specified effect.

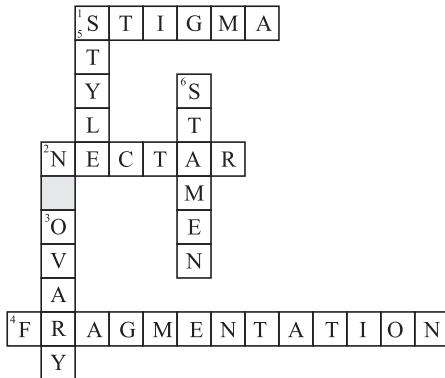
2. An agent is a person or a thing that plays an active role or produces a specified effect. Pollinating agents are animals, as insects, birds, bats,

water, wind and even plants themselves when self-pollination occurs within a flower.

- (i) **By wind** : Some plants have evolved seeds that use wind power to transport them from one place to another. They are usually lighter and smaller than other seeds.
  - (ii) **By animals** : Animals like bats also carry pollen grains with them when they move from one place to another.
  - (iii) Water pollination takes place in aquatic plants. Here pollen grains are carried away with the help of water currents.
  - (iv) Insect too are agents of pollination. When the insect visits the flower and suck its nectar, the pollen grains get stuck to their body and are carried away to the stigma.
- Different ways of seed dispersal are as follows :
3. (i) **Dispersal by wind** : Some plants have evolved seeds that use wind power to transport them from one place to another. They are lighter and smaller than other seeds.
  - (ii) **Dispersal of winged fruits** : Different kinds of seeds are housed in winged or plumed fruits that remain airborne long enough to carry the seed away from its parent.
  - (iii) **Explosion** : Some plants have pods which explode when ripe and shoot out the seeds.
  - (iv) **Dispersal by animals** : Animals carry the seeds to suitable locations. Many fleshy fruits are attractive to animals which carry them away before eating. In doing this, they carry away the seeds as well.
  - (v) **Dispersal by water** : Plants which grow beside or in water often use it to disperse their seeds.
4. Do it yourself.

### Activity Time

#### K. Science Puzzle



## Unit-6 : Moving Things, People and Ideas

13.

### Time and Motion

#### Assess Yourself

**A. Choose the correct option : (Multiple Choice Questions)**

1. (a) distance  $\div$  time, 2. (a) km/h, 3. (d) kilometer, 4. (b) speed,  
5. (c) 20 m/s.

**B. Fill in the blanks :**

1. sundial, 2. hertz, 3. motion, 4. time.

**C. State whether the following statements are true or false :**

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

**D. Match the columns :**

- | Column A     | Column B             |
|--------------|----------------------|
| 1. Time      | (i) 366 days         |
| 2. Leap year | (ii) 365 days        |
| 3. Year      | (iii) Distance/speed |

**E. Answer the following questions briefly :**

- Some devices used for measuring time in older days were the sundial, hour glass, water clock and burning candle clocks.
- SI unit of time is second.
- We are in motion.
- The unit of speed is m/sec or km/h.

**F. Answer the following questions :**

- When we throw a ball upward its speed decreases gradually because the gravity of the earth pulls everything back to itself.
- The difference between uniform and non-uniform motion are :

Uniform motion	Non-uniform motion
When a body moving along a straight line covers equal distances in equal intervals of time, it is said to be in uniform motion. <b>Ex.</b> A cyclist moving along a straight line with a constant speed.	When a body moves unequal distances in equal intervals of time, or it changes its direction of motion or the speed, then the body is said to be in non-uniform motion. <b>Ex.</b> A stone falling from a height.

- Motion is simply a change in position It is of two types : Uniform and Non-uniform motion.  
See Q. 2
- Distance between two poles = 100 m  
Time Salma takes to cover the distance = 50 s



$$\text{speed} = \frac{\text{distance}}{\text{time}} \left( s = \frac{D}{t} \right) = \frac{100}{50} = 2 \text{ m/s}$$

5. Speed of the train = 120 km/hr

Time taken = 1 minute

$$\therefore \text{distance (D)} = s \times t = 120 \times \frac{1}{60} = 2 \text{ km.}$$

### Activity Time

#### G. Numerical Problems

1.  $s = \frac{D}{t} = \frac{120}{60} = 2 \text{ m/s}$

2.  $s = \frac{D}{t} = \frac{1}{10} = 0.1 \text{ m/s}$

#### J. Science puzzle

Here are some jumbled words for you. Arrange them into meaningful words :

1. S T O P W A T C H

2. S U N D I A L

3. P E N D U L U M

4. P E R I O D I C

5. M O T I O N

6. S P E E D

7. U N I F O R M

## Unit-7 : How Things Work

### 14. Electric Current and Its Effects

#### Assess Yourself

#### A. Choose the correct option : (Multiple Choice Questions)

1. (a) ampere, 2. (b) Copper, 3. (c) to the negative terminal of the battery, 4. (d) Both (a) and (b) 5. (a) attract each other.






#### B. Fill in the blanks :

1. attraction, 2. electric current, 3. positive, 4. switch, 5. solar cells, dynamos.

#### C. State whether the following statements are true or false :

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

**D. Identify the following symbols :**

1.  Cell
2.  Open key
3.  Closed key
4.  Direct current
5.  Electric lamp

**E. Answer the following questions briefly :**

1. Ohm.
2. Coulomb.
3. Ampere.
4. Earthing means connecting the metallic bodies of electrical appliances to the earth.
5. A dynamo is a device which converts mechanical energy into electrical energy.

**F. Answer the following questions :**

1. The flow of electrons through a wire is called electric current. Ammeter and galvanometer are used to measure it.
2. A steady current flowing in one direction only is called a direct current or simply D.C.

The electric current which moves back and forth, reversing its direction regularly, is called alternating current or A.C. We use A.C. current at our homes.

3. Materials which allow electric current to pass through them are called conductors.

Materials which do not allow electric current to pass through them are called insulators.

Opposition to the flow of electricity is called resistance.

4. Effects of electric current are as follows :
  - (i) Heating effect
  - (ii) Chemical effect
  - (iii) Magnetic effects

**G. Answer the following questions in detail :**

1. Atoms are made of even smaller particles called subatomic particles called protons, neutrons and electrons. Both protons and electrons have a basic property called electric charge.

Protons have a positive (+) charge, electrons have a negative (-) charge. Neutrons are neutral as they have no electric charge.

The force of attraction exists between two opposite charged particles, so negatively charged electrons are attracted to positively charged protons.

The force of repulsion exists between particles of the same charge. So negatively charged electrons repel one another just as positively charged electrons do.

2. Current simply means the number of electrons that pass a given point in a unit of time or the electron's rate of flow. Higher the electric current in a wire, more electrons are passing through it.

The SI unit in which current is expressed is ampere. The ampere is a unit of measurement of the rate of electrons flow or current in an electrical conductor.

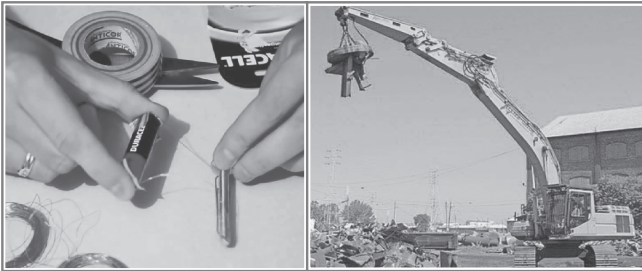
Instruments such as ammeter and galvanometer are used to measure current.

3. If you connect one wire from a terminal on a dry cell to a small flashlight bulb, nothing will happen. Now connect another wire from the bulb to the other terminal on the dry cell. The light is switched on immediately. You have simply provided a **path** for the flow of electrons. You have made an electric **circuit**.

If you remove one of the wires, the light is switched off again. An electric circuit provides a complete closed path or "circle" for electrons to flow. By removing one of the wires when the light is switched off, you have broken the circuit.

A simpler way of opening and closing an electric circuit is with a switch. If you connect a switch to your circuit, you can flip the switch ON and OFF. When the switch is on, there is a closed path of circuit for the flow of electrons. When it is OFF, the path is broken. Now the electrons do not flow any more. This is a very important rule to remember. Electricity cannot flow through an open circuit. It flows only through a closed circuit.

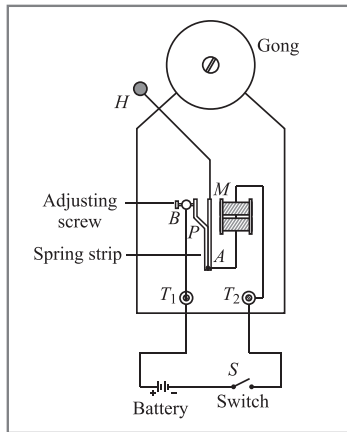
4. Magnetism is closely related to electricity because both involve motion of electrons. An electric current flowing through a wire gives rise to a magnetic field surrounding the wire. Thus magnetism can be produced from electricity.



By coiling a current carrying wire around a soft iron core, a simple electromagnet can be made (left). Large electromagnet is used to lift heavy loads require more loops of wire and larger currents (right).

5. An electric bell is a mechanical bell that functions by means of an electromagnet. It is based on magnetic effect of current.

**Working :** Electric current flows through the coil when switch is turned ‘ON’, the core of magnet gets magnetised, so soft iron armature A is attracted towards magnet and the hammer strikes the gong and the bell rings.

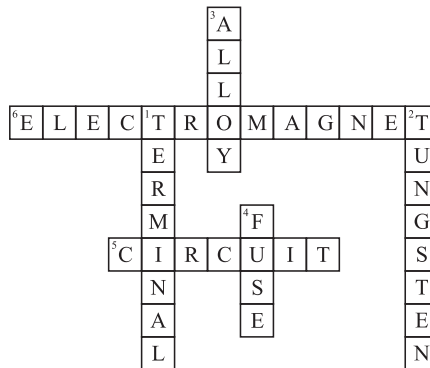


Electric bell

When the armature is attracted towards the electromagnet, the screw loses its contact with strip and so current flowing in winding of electromagnet stops. Consequently, the electromagnet loses its magnetism and the armature retains its normal position due to spring effect and touches the screw again. The current in circuit begins to flow again. As a result, the electromagnet gains its magnetism and attracts the armature and the hammer strikes the gong again. The process repeats itself and we hear a ringing sound as the hammer keeps hitting the bell until the switch is turned off.

### Activity Time

I. Using clues solve the puzzle :



## Unit-8 : Natural Phenomena

### 15. Winds, Storms and Cyclones

#### Assess Yourself

**A. Choose the correct option : (Multiple Choice Questions)**

- (b) anemometer, 2. (a) at night, 3. (c) southeast, 4. (c) Puri, 5. (d) None of these.

**B. Fill in the blanks :**

- less, 2. High, 3. eye, 4. land, 5. clockwise.

**C. State whether the following statements are true or false :**

- F, 2. F, 3. T, 4. T.

**D. Match the following :**

- | Column A               | Column B                        |
|------------------------|---------------------------------|
| 1. Hurricane           | (i) Eye of a cyclone            |
| 2. Typhoon             | (ii) Name of a cyclone in Japan |
| 3. Centre of a cyclone | (iii) Other name of a cyclone   |
| 4. Tornado             | (iv) A dark funnel shaped cloud |

**E. Answer the following questions briefly :**

- Windvane.
- Local winds and global winds.
- Wind vane is usually is put at a high place, especially on the top of a building.
- Anemometer.
- A storm is a violent atmospheric disturbance. There are three types of storms : thunderstorm, tornado and cyclone.
- (a) Hurricane is a large tropical storm that develops in the oceans of the world.  
(b) Tornado is a violently rotating column of air extending between and in contact with a cloud and the surface of the earth.

**F. Answer the following questions in detail :**

- Local winds are small scale winds that result from differences in temperature and pressure in localised areas. During day time, the air over a land area is often warmer than the air over a nearby lake or sea. The air is warmer because the land heats up faster than the water. As the air over the land rises, the cooler air over the sea moves in land to take its place. This flow of air from sea to the land is called sea breeze. During the night, flow of air from the land to the sea is called a land breeze.
- The direction of the wind is the direction from which it flows.  
A weathervane or windvane is an instrument used for showing the direction of wind.

3. The scale used for measuring wind speed called Beaufort scale. On it, the force of wind is shown by numbers from 0 to 12.



Force : 8-9	Strength : Gale	Force : 10-11	Strength : Storm	Force : 12	Strength : Hurricane
Speed : 75-110	km/h	Speed : 111-150	km/h	Speed : Above 150	km/h
Effect : Slates fall off		Effect : Widespread		Effect : Disaster.	

The Beaufort scale from 0 to 12 indicates the strength of the wind. It is based on the effect of wind or such things as trees and houses.

The number 0 shows that the wind is calm and the which smoke rises straight up. At 1, smoke drifts slowly. By the time it is 4, we have a moderate wind blows at which small branches of the trees are moving. At force 7, whole trees are shaking and it becomes difficult to walk against the wind. Force 12 something few of us will ever see.

4. Thunderstorms develop from cumulonimbus clouds. These clouds form when there is a rapid upward rush of warm air from very hot areas on the ground and a rapid downward movement of cool air around the warm air. The result is an explosive build up of dense storm clouds that reach altitudes of 10 to 15 kilometres.

We can estimate the distance of a thunderstorm by counting the seconds between the flash and the thunder—every three seconds represents a kilometre.

5. Lightning is caused by the build up of a negative electric charge at the bottom of the thundercloud. As the charge builds-up a point is reached at which the air can no longer block the passage of electricity. Then, there is an enormous flash of electric energy between the cloud and the ground or from cloud to cloud, called lightning. As the electric energy passes through a section of air, it heats the section, causing a violent outward movement of air. The movement is so sharp and sudden that it produces a booming sound, called thunder.

Sometimes ice crystals falling through a thunderstorm are caught and tossed back up by an updraft of warm air. In the process, water droplets freeze into crystals, making them bigger. Eventually they become so big and heavy that they fall to the ground. This form of precipitation is called hail and crystals are called hailstones.

6. Tornado is a violently rotating column of air extending between and in contact with a cloud and the surface of the earth. Severe thunderstorm can produce tornadoes. A tornado can travel at the speed of about 300 km/hr and this can cause buildings to collapse and roofs to blow off.

7. The high wind blowing over the roof creates a low pressure. This difference of pressure causes an upward thrust and the roofs lifted up. Once the roof lifted up, it is blown up with the wind along its direction.

### Activity Time

I. Here are some jumbled words for you. Arrange them into meaningful words :

1. T H U N D E R
2. G L O B A L      W I N D
3. H A I L S T O N E S
4. T Y P H O O N S
5. T O R N A D O E S
6. C Y C L O N E

## 16.

## Light

### Assess Yourself

A. Choose the correct option : (*Multiple Choice Questions*)

1. (a) concave mirror, 2. (d) virtual, 3. (b) convex, 4. (a) plane,
5. (c) 15 cm, 6. (b) Three, 7. (c) 3,00,000 km/s, 8. (a) incident ray,
9. (b) incident ray and the normal, 10. (c) at infinity.

B. Fill in the blanks :

1. Beam, 2. the angle of reflection, 3. half, 4. spectrum, 5. Periscope.

C. State whether the following statements are true or false :

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

D. Match the columns :

- | Column A            | Column B  |
|---------------------|---|
| 1. A concave lens   | (i) The image is always inverted and magnified.             |
| 2. A concave lens   | (ii) The image is erect and smaller in size than the object |
| 3. A plane mirror   | (iii) can form image of objects spread over a large area    |
| 4. A concave mirror | (iv) The image is erect and of the same size as the object  |
| 5. A convex mirror  | (v) Used by dentists to see enlarged image of teeth         |

**E. Answer the following questions briefly :**

1. Pin-hole camera is based on the rectilinear propagation of light. Due to this propagation of light an inverted image is formed of the object.
2. Concave mirrors, are used in solar cooker while convex mirrors are used in stores/shops to provide security guards with wide view of the shopping area.
3. A periscopes is used in submarines.
4. The band of seven colours is called spectrum.
5. The phenomenon of splitting of white light into seven colours is called dispersion of light.

**F. Answer the following questions in detail :**

1. When we see our image in a plane mirror, we find it of the same size. The image is also erect. It means that our 'top' does not become 'bottom' in the mirror. But we find that our left side appears as right and our right side appears as left in the mirror. This phenomenon is called lateral inversion. The image formed by a plane mirror has the following characteristics :
  - (i) The image is virtual.
  - (ii) It is of the same size as the object.
  - (iii) It is erect but laterally inverted.
2. Differences between a convex and concave lenses are :

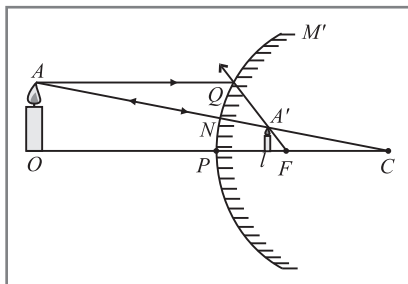
S.No.	Convex lens	Concave lens
(i)	It is thicker at the centre than at the edges.	It is thicker at the edges and thinner in the centre.
(ii)	A convex lens can form different types of images when used in different instruments. The image formed by the lense is larger than the object.	All images produced by concave lense are right side up and smaller than the object.

3. The different images formed by a convex lens are :
  - (i) upside down and smaller as in a camera;
  - (ii) upside down but larger as in a microscope.
  - (iii) night side up and enlarged as in a binocular.
4. The splitting up of white light into its constituent seven colours when passed through a prism is called dispersion of light.

To show that white light is made up of the seven colours of the rainbow, cut a disc from cardboard and divide it into seven equal sections. Colour each section. Make a small hole in the middle of the disc and push a sharp pencil or stick through it and spin the disc quickly. It shows that white light is composed of seven colours.

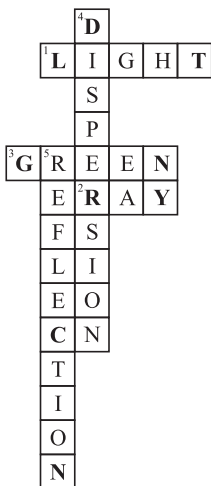


5. The phenomenon of splitting of white light into seven colours is called dispersion. Example : Rainbow
- G. A'I represent the image of AO.



### Activity Time

#### J. Science Puzzle



### Unit-9 : Natural Resources

17.

Water

#### Assess Yourself

- A. Choose the correct option : (*Multiple Choice Questions*)
- (a) H<sub>2</sub>O, 2. (d) None of these, 3. (a) Fossil fuels, 4. (c) water table,
  - (b) chlorine, 6. (c) 97%, 7. (b) condensation, 8. (b) Rainwater.
- B. Fill in the blanks :
- 3, 2. water cycle, 3. rivers, pipe system, 4. Decomposers.

**C. State whether the following statements are true or false :**

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

**D. Match the columns :**

**Column A**

1. If cooled below  $0^{\circ}\text{C}$ , water freezes to form
2. Fresh water comes from
3. When heated above  $100^{\circ}\text{C}$  water boils to form a colourless vapour called
4. Top level to which water rises
5. Thick ice sheets covering polar regions

**Column B**

- (i) Steam
- (ii) Solid
- (iii) Water cycle
- (iv) Continental glacier
- (v) Watertable

**E. Answer the following questions briefly :**

1. 3% of water is available to us for use.
2. Everyday, the heat of sun causes water on the earth's surface to change into gas, called evaporation.
3. The very thick ice sheets that cover most of the polar regions are called continental glaciers.
4. In the reservoir, dirt in the water settles on the bottom and many of the bacteria die. From the reservoir, the water passes to a filtration plant where beds of sand and gravel remove more dirt and bacteria. Finally at the chlorination plant, chlorine gas kills the remaining bacteria.
5. Sea water is not used for drinking because it contains minerals and salt that are unfit for human use.

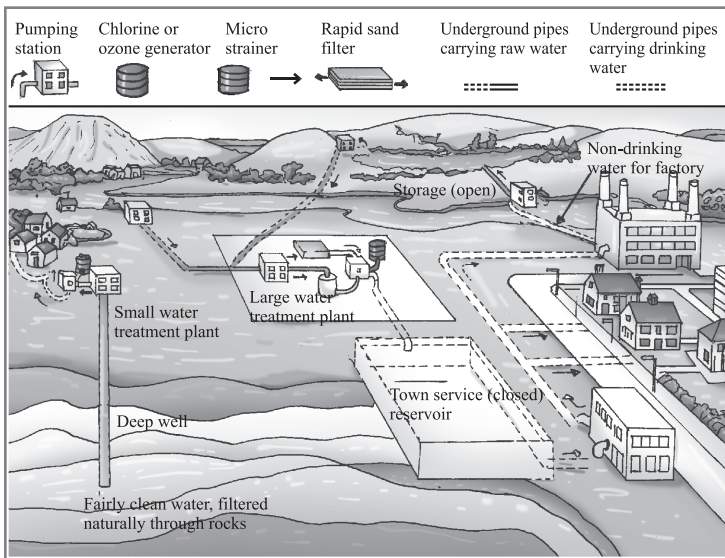
**F. Answer the following questions in detail :**

1. To a scientist, water is the elixir of life which is to be used judiciously and with care.
2. About 70% of the surface of the earth is covered with water. The distribution of water on the earth's surface is extremely uneven. Only 3% of water on the surface is fresh, the remaining 97% is in oceans. Most of this fresh water is locked up in ice caps and great sheets of ice that cover a large part of Antarctica. Remaining fresh water is under the ground and in lakes, ponds, streams and rivers. Fresh water is drinking water which is essential for all plants and animals that live on land.
3. Water is found in the nature in the following forms :  
(i) Running water, (ii) Standing water, (iii) Frozen water.

**Standing water :** Unlike rivers and streams, the water in lakes and ponds usually stays at one place. Both are important sources of water. For example, Dal lake.

The pine-forested shores of a lake can hold enormous amounts of water from rains and melting snow. During drought, the lake holds a huge of water in reserve.

4. As river water is dirty and may contain bacteria which cause diseases, it must be treated in various ways before it is fit to drink. First, water is pumped from the river into artificial storage lake or reservoir. In the reservoir dirt in the water settles on the bottom and many of the bacteria die. From the reservoir, the water passes to a filtration plant where beds of sand and gravel remove more dirt and bacteria. The water finally go through a chlorination plant, where chlorine gas kills any remaining bacteria. Now water is fit for drinking and is pumped into water mains.



Water supply system

5. The effects of water shortage are as follows :
1. Drought conditions in many parts of the world leading to loss of life;
  2. Loss of agricultural crops due to insufficient irrigation;
  3. Depletion of water-table;
  4. Interrupted and insufficient supply of drinking water.
6. Conservation of water
1. Close the tap while brushing teeth.
  2. Check for leaking taps and water-pipes.
  3. Free flowing wells should be covered to prevent their contamination.
  4. Dishwashers and washing machines should be operated on full loads.
  5. Regular toilets can be replaced by low flush toilets.

**Assess Yourself****A. Choose the correct option : (Multiple Choice Questions)**

1. (d) All of these, 2. (a) cutting down of trees, 3. (a) food,
4. (b) By afforestation, 5. (d) Carbon dioxide, 6. (c) Overgrazing.

**B. Fill in the blanks :**

1. A forest, 2. cool, 3. 20, 4. waste, dirty, 5. digestion.

**C. State whether the following statements are true or false :**

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

**D. Answer the following questions briefly :**

1. (a) A series of organisms linked by the process of eating and being eaten is called a food chain.

Plant → Butterfly → Frog → Snake → Eagle

- (b) In a forest, a plant is not eaten by just one herbivore. It is eaten by different animals and they in turn, are eaten by other carnivores. Thus, many food chains get interlinked to form a web known as food web.

2. Deforestation.

3. Carbon dioxide gas is consumed and oxygen gas is released by plants during photosynthesis.

4. Sewage is the waste matter and dirty water which is produced by modern towns and cities in large quantity.

**E. Answer the following questions :**

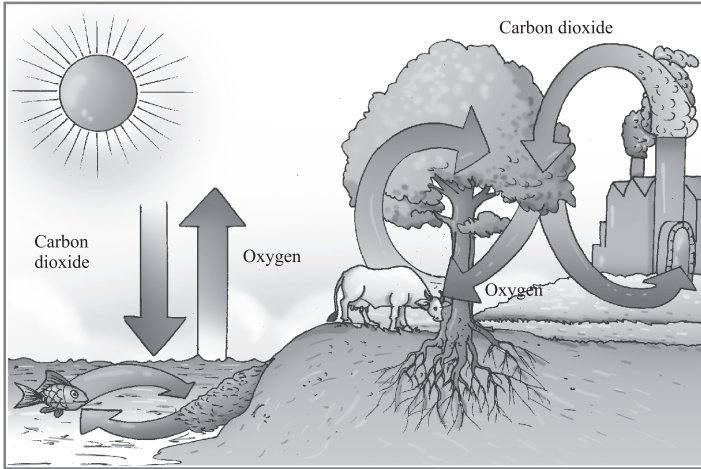
1. Forests protect our planet in the following ways :

- (i) They purify air.
- (ii) They recycle water into the atmosphere which falls as rain to replenish the ground water.
- (iii) They maintain the fertility of the soil.
- (iv) They provide us wood, bamboo, rubber, honey, medicinal plants, fruits, etc.
- (v) They regulate the climate by maintaining the level of rainfall.

2. Plants depend on animals are follows :

- (i) **Carbon dioxide** : Plants need carbon dioxide to carry out photosynthesis and make their food.
- (ii) **Reproduction** : In flowers, the pollen must be transferred to stigma, for reproduction. In cross pollination activities of insects are helpful to a great extent.
- (iii) **Dispersal of seeds** : Many fleshy fruits are attractive to animals which carry them away before eating. In doing so they carry away the seeds.

- (iv) **Nutrients** : Animal excreta and dead body of animals, especially microorganisms and tiny insects, add nutrients to the soil for plants.
3. Plants are the air purifier of the planet earth. They produce oxygen which we and all animals need to survive. The atmosphere which has 20 percent oxygen, supplies us and other air-breathing animals with this vital gas.



Oxygen/carbon dioxide cycle

4. Disadvantages of deforestation are as follows :
- (i) **Soil erosion** : Trees in forest grip soil with their roots. If trees are gone, soil will be washed away.
  - (ii) **Water pollution** : In the absence of plants, soil will run into the water bodies, making water muddy and polluted.
  - (iii) **Drought** : Forests help to cause rain by transpiration. In the absence of forests, the water cycle will be disturbed. This condition will eventually lead to drought.
  - (iv) **Landslides** : Without trees, land will be very unstable and may easily come down the slopes in the form of landslide.
  - (v) **Global warming** : Carbon dioxide levels increase when we cut down forests. This may cause global warming.
5. In early seventies, there was no proper system of sewage disposal. Today extensive networks of pipes called sewers carry the sewage to sewage farms. There, it first goes through screens or sieves which removes solids. Then it flows into settling tanks. Particles suspended in water are separated out as liquid sludge. Remaining water is then sprayed on porous filter beds through revolving sprinklers. The sludge is usually treated in digestion tanks where it ferments and releases methane gas.

**F. Answer the following questions in details :**

1. Forests are called the lungs of the earth because just as lungs in a human body purify the air taken in, forests purify the earth's atmosphere.
2. Afforestation means planting more and more trees. These trees while providing shade, increase green cover and lead to more rain. Thus, afforestation will help in reducing global warming.

**Activity Time**

**Half-Yearly Model Test Paper**

**A. Choose the correct option : (Multiple Choice Questions)**

1. (c) carbon dioxide, 2. (c) mastication, 3. (d) 100°C, 4. (c) milk, 5. (b) two atoms of hydrogen and one atom of oxygen, 6. (b) weather.

**B. Fill in the blanks :**

1. animal, 2. sun, 3. cloudy nights, 4. replaceable, 5. Ptarmigan, 6. dark-coloured.

**C. State whether the following statements are true or false :**

1. F, 2. T, 3. F, 4. T, 5. T, 6. T.

**D. Match the columns :**

- | Column A       | Column B       |
|----------------|----------------|
| 1. Heat        | (i) Joule      |
| 2. Temperature | (ii) 4,184 J   |
| 3. Mars        | (iii) Calories |
| 4. Heat energy | (iv) °C        |
| 5. 1 cal       | (v) Gram       |

**E. Answer the following questions briefly :**

1. The green pigment in plants is chlorophyll.
2. A merino sheep yields 13.5 kg of wool at one shearing.
3. Mercury is present in a clinical thermometer.
4. (a) citric acid, (b) citric acid, (c) tartaric acid, (d) maleic acid.
5. At night, the part of the earth away from the sun does not receive's sun's radiant energy.
6. Two main ingredients of soil are broken down rocks and humus.

**F. Answer the following questions in detail :**

1. Unicellular animals like *Amoeba* feed on microscopic plants and animals. All the processes of nutrition are performed by its single cell.  
**Digestion :** The food vacuole releases special digestive chemicals called enzymes, to break down captured food into small and soluble molecules. Thus, digestion takes place inside the food vacuole.
2. Wool is a long and thick kind of hair that can easily be turned into yarn. It is obtained from the fleece of sheep, goat, yak etc. The finest

fleece comes from lamb. Most comes from sheep which is found in all temperate parts of the world. Merino sheep produce the finest and largest amount of wool.

3. (a) Calorie is the amount of heat needed to raise the temperature of one gram of liquid water by one degree celsius.  
 (b) 1 Kilo Calorie is the amount of heat required to raise the temperature of 1 kg of water by 1° Celsius.

4. Same quantity of heat supplied to different substances does not produce the same increase in temperature because some materials are better conductors of heat and so, increase in temperature in them would be more as compared to other materials.

**5. Difference : The differences between an acid and an alkali are :**

S.No	Acid	Alkali
(i)	All acids are sour to taste.	Bases are bitter in taste.
(ii)	All acid solutions in water turn blue litmus and methyl orange red.	Bases turn red litmus blue and phenolphthalein bright pink.
(iii)	Molecule of an acid has one or more replaceable hydrogen atoms.	When bases dissolve in water they provide negative hydroxide ion OH <sup>-</sup> .

6. Climate of a place is affected by wind and humidity wind may be hot, cool or carry humidity, leading to rain. Similarly, the amount of humidity at a place dictates whether the place will have rain or not.

## Annual Model Test Paper

**A. Choose the correct option : (Multiple Choice Questions)**

1. (a) yeast, 2. (c) Four, 3. (c) Frog, 4. (d) kilometer, 5. (a) ampere, 6. (c) southeast.

**B. Fill in the blanks :**

1. new, 2. motion, 3. attraction, 4. High, 5. Beam, 6. 3.

**C. State whether the following statements are true or false :**

1. T, 2. F, 3. F, 4. F, 5. F, 6. F.

**D. Match the columns :**

Column A	Column B
1. Budding	(i) Germination
2. Binary fission	(ii) Coconut
3. Early growth stage of an embryo	(iii) Fluff
4. Dispersal by wind	(iv) Paramecium
5. Dispersion by water	(v) Yeast

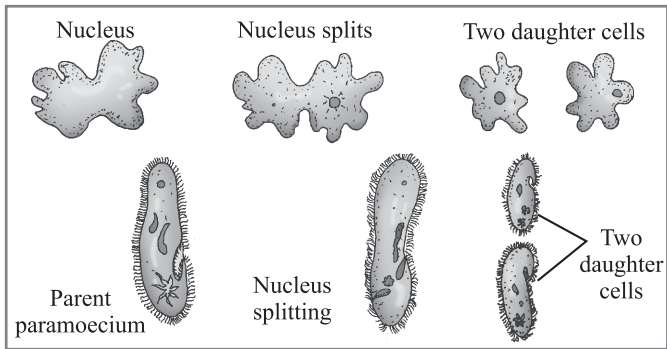
**E. Answer the following questions in brief :**

1. Some devices for measuring time in older days were sundial, hour glass, water clock and burning candle-clock.

2. Ampere.
3. The wind-vane is put at a high place specially on the top of a building.
4. Pin-hole camera is based on the rectilinear propagation of light. Due to this, an inverted image of object is formed.
5. Everyday the heat of the sun causes water on the earth's surface to change into gas, called evaporation.
6. Carbon dioxide gases are consumed and oxygen gases are released by plants.

**F. Answer the following questions in detail :**

1. (a) The main function of alveoli is to help in respiration.  
 (b) Guard cells are the bean shaped structures, around each stoma. They help in the opening and closing of the stomata.  
 (c) Fish possess gills for exchange of gases.  
 (d) Nostrils are used to inhale and exhale.  
 (e) Spiracles are tiny holes on the body of grasshopper which help them to breathe.  
 (f) Lenticles help in exchange of gases.
2. In *Amoeba*, *Paramecium*, Sponge and *Hydra*, wastes are removed through body surface by diffusion.
3. Asexual reproduction is carried out in the following way :  
 (i) **Binary fission** : In binary fission a single celled organism divides into two identical equal-daughter organisms. First nucleus elongates and divided then the cytoplasm and cell membrane follow. Each newly formed cell grows into a new organism.

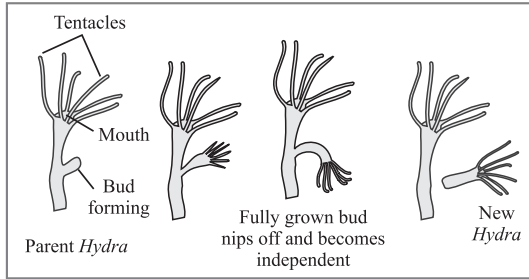


**Binary fission in *Amoeba* and *Paramecium***

- (ii) **Budding** : It also occurs in unicellular plants. In this method, a small bud develops on the side of the organism. The bud grows, develops and gets detached from the parent organism and leads an independent life. Reproduction takes place in *Hydra*, yeast and sponges by this method. In yeasts, sponges or corals, sometimes

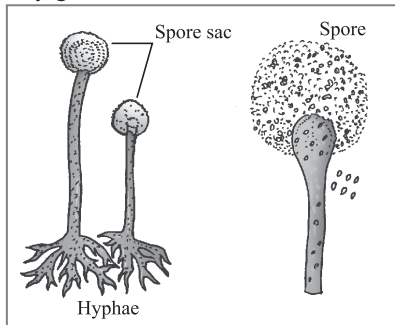


the grown up bud separates from the parent. Sometimes, it never separates and a chain or colony of interconnected organisms is formed.



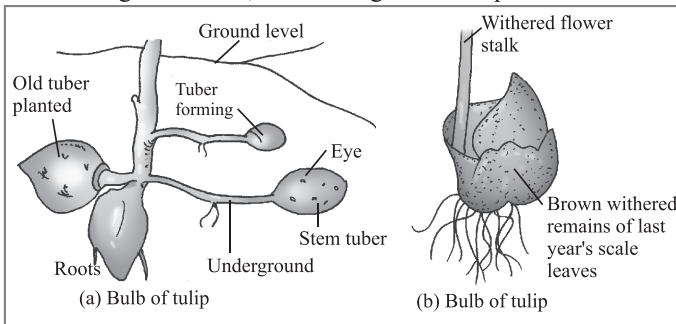
**Budding in Hydra**

- (iii) **Spore Formation :** In lower plants including bryophytes special reproduction units develops asexually on the plant body, called spores. A protective covering enables the spores to survive extreme temperature, lack of food and water. They germinate whenever they get favourable condition.



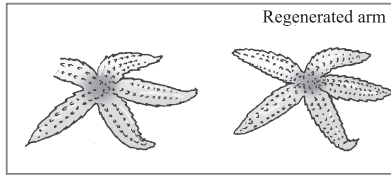
**Spore formation in fungus**

- (iii) **Vegetative reproduction :** It involves formation of new plants from vegetative cell, buds or organs of the plant.



**Underground stem of potato**

- (iv) **Regeneration** : The process of growing of full organisms from body parts or growing a lost part is called regeneration.  
For example, Hydra.



**Regeneration of a limb in starfish**

5. To a scientist, water is the elixir of life which is to be used judiciously and with care.
6. Afforestation means planting more and more trees. These trees while provide shade, increase green cover and lead to more rain. Thus, afforestation will help in reducing global warming.