

# Junior SCIENTIST

7



## Nutrition in Plants



### EXERCISE

**A. Tick (✓) the correct option :**

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

**B. Fill in the blanks :**

1. food      2. stomata      3. autotrophic, heterotrophic  
4. oxygen      5. stomata      6. Mistletoe      7. saprophytic  
8. insects      9. symbiotic plants

**C. State whether the following statements are True or False :**

1. True      2. False      3. True      4. True      5. False      6. True  
7. True      8. False      9. True

**D. Match the following columns :**

1. (c)      2. (d)      3. (e)      4. (a)      5. (b)      6. (g)  
7. (h)      8. (f)

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

1. The process of taking in food and utilising it for the various body requirement is called nutrition.
2. All green plants make their own by simple components like water, carbon dioxide, chlorophyll in the presence of sunlight by a process called photosynthesis. This mode of nutrition is called autotrophic mode of nutrition.
3. The process by which green plants make their own food is called photosynthesis.
4. The plant that live together for mutual benefits are called symbiotic plants. This kind of mutual relationship is called symbiosis.

5. A plant which depends entirely on the host plant to derive nutrition is called a total parasite. For example, Dodder (Amarbel) plant.
6. Certain fungi live in the roots of plants. Plants supply nutrients to fungi, while the fungi provides water and minerals in return. The association of algae and fungi from organisms called lichens.
7. The soil loses its nutrients because of soil erosion and continuous growth of a single type of crop.
8. Nutrients in the soil can be replenished by adding manures, fertilizers, crop rotation and growing leguminous crops.
9. Nitrogen and potassium.

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

1. The process by which green plants synthesise their food using carbon dioxide and water in presence of sunlight and chlorophyll is called photosynthesis. The requirements for photosynthesis are:

**Water and minerals :** Plants absorb water and minerals from the soil with the help of roots. These are transported up from the roots and stems to the leaves through xylem.

**Carbon dioxide :** In green plants , leaves take in carbon dioxide and release oxygen in air through tiny pores present on the leaves.

**Chlorophyll :** The leaves have a green pigment called chlorophyll that helps it to capture light energy from the Sun. Without chlorophyll, plants cannot use energy of the sunlight to prepare their food.

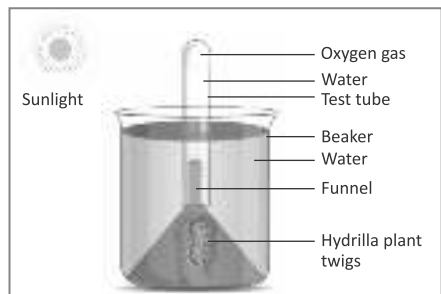
**Sunlight :** The sunlight is used to synthesis food from carbon dioxide and water. Photosynthesis cannot take place in the absence of sunlight.

2. The importance of photosynthesis are as follow :
  - (i) Food made by plants by the process of photosynthesis is used for their own growth and repair worn-out cells.
  - (ii) It helps to maintain the balance of oxygen and carbon dioxide in the air.
  - (iii) It provides us oxygen for breathing.
3. **Objective :** To show that sunlight is necessary for photosynthesis.

**Materials Required :** Twigs of an aquatic plant, beaker, funnel test tube.

**Procedure :**

- (i) Take some twigs of an aquatic plant like *Hydrilla* in beaker filled with water.



(ii) Invert a funnel over the twigs. Invert a test tube filled with water on the stem of the funnel.

(iii) Keep this set up in sunlight for some time.

(iv) What do you observe?

**Observations :** You will notice air bubbles (oxygen gas) coming out from the twigs. If this set-up is kept in the dark, no air bubbles comes out. This shows that sunlight is necessary for photosynthesis.

4. There are some plants that do not contain chlorophyll and they can-not prepare food for themselves. They depend on green plants to obtain their nutrients. So these plants have a heterotrophic mode of nutrition. Some of the heterotrophic plants are : parasitic plants, insectivorous plants, saprophytic plants and symbiotic plants.
5. There are some green plants which obtain their nutrients partly from soil and partly from small insects are called insectivorous plants. They do not get enough nitrogen from the soil as it is deficient in nitrogen and so, they eat insects to fulfil their need for nitrogen. For example:
  - Venus fly trap have leaves that are modified to catch insects. They kill them and consume and then throw out the waste.

6.

(i)

S. N.	Autotrophic Plants	Heterotrophic Plants
1.	These plants are totally dependent on themselves to meet their energy requirements.	These plants are dependent on dead autotroph or heterotrophs.
2.	These are able to manufacture their own food from inorganic substances through the process of photosynthesis.	These plants can not manufacture their own food by photosynthesis.
3.	These plants contain the green pigment chlorophyll.	These plants do not contain chlorophyll.
4.	Example : all green plants.	Example : mushrooms, fungi etc.

(ii)

S. N.	Parasites	Saprophytes
1.	Such organisms show partial or complete dependence on host for their survival.	Such organisms are dependent on dead autotrophs or heterotrophs.
2.	These organisms live in or on another living organism and derive their nutrition from the host wholly or partly without contributing anything to the latter.	These organisms cannot manufacture their own food by photosynthesis instead derive their nutrition from dead and decaying plant and animal matter.

3.	These organisms constitute higher levels in a food chain.	These organisms act upon all levels in a food chain.
4.	Examples: Painted cup, Mistletoe, Rafflesia, etc.	Examples: Mushrooms, moulds, fungi, certain bacteria, etc.

7. Nutrients in the soil can be replenished by the following methods :

**Adding manure and fertilisers :** Manure is decomposed matter of animal and plant wastes. It is rich in essential nutrients and humus. Cattledung and slurry from a biogas plant are mostly used by farmers as manure. Fertilisers are chemical compounds that are added to increase the fertility of soil. They are rich in particular nutrients like nitrogen, phosphorus, and potassium.

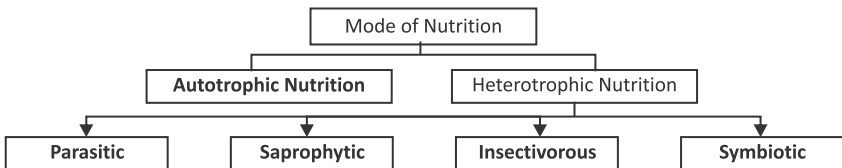
**Crop rotation :** By growing the same type of crop repeatedly, the same type of nutrients gets depleted from the soil. Hence, different types of crops should be grown to make nutrients available in the field.

8. Leguminous plants are grown to replenish nitrogen compound in the soil. Rhizobium bacteria can take atmospheric nitrogen and convert it into a soluble form. They cannot make their own food. They lives in the roots of pea, gram, moong, beans and other legumes and provide them nitrogen, in return plants provide food and shelter. They are very useful for the farmers. The farmers do not need to add nitrogen fertilizer to the soil.



## Learning With Fun

### A. Web Chart :



### B. Research and Project :

Do yourself.

### C. Activity :

Do yourself.

### D. Group Discussion :

Do yourself.



## EXERCISE

### A. Tick (✓) the correct option :

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

### B. Fill in the blanks :

1. nutrition                      2. alimentary                      3. pseudopodia, vacuole  
4. 20, 32                          5. amylase                          6. villi  
7. Liver                          8. dehydration                      9. cud

### C. State whether the following statements are True or False :

1. False    2. True    3. False    4. False    5. True    6. False  
7. True    8. False    9. True

### D. Match the following columns :

1. (e)    2. (d)    3. (g)    4. (f)    5. (c)    6. (b)  
7. (a)

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

- The process of obtaining food, mode of intake of food and its utilisation in the body for growth and development is called nutrition. The basic steps of nutrition are : ingestion, digestion, absorption, assimilation, and egestion.
- The process of breaking down complex food into smaller molecules that can be easily absorbed is called digestion. The digestion of food takes place in the alimentary canal.
- Hydra is a simple multicellular animal. It ingests food with the help of tentacles around its mouth. These tentacles entangle and kill small aquatic animals and push them into the mouth. The digestive juices inside the body help to digest, absorb and assimilate the food.
- The function of the large intestine in the human body is the absorption of water and salts from undigested food material.
- Milk teeth :**
  - These are the first set of teeth that grow during infancy and fall off at the age of 6-8 years.
  - There are 20 teeth in total 10 in each jaw.

**Permanent teeth:**

- (i) They are replaced by a second set of teeth that are never replaced.
  - (ii) There are 32 teeth – 16 in each jaw.
6. When the food has been swallowed, it moves down the oesophagus through the progressive wave of contraction and relaxation of muscles in its wall to reach the stomach.
- Such a movement of muscles is called peristalsis.
- 7. (i) It helps us in speaking, moving food around our mouth while we chew, mixing the saliva with food, pushing and swallowing the food inside the food pipe.
  - (ii) It has taste buds which allow us to know the taste of the food we eat.
  - (iii) It can distinguish four types of tastes—salty, sweet, sour and bitter.
8. Grass-eating animals like cows, sheeps, goats, etc., that digest their food in two steps are called ruminants. The chambers present in the stomach of ruminants are : rumen, reticulum, omasum and abomasum.

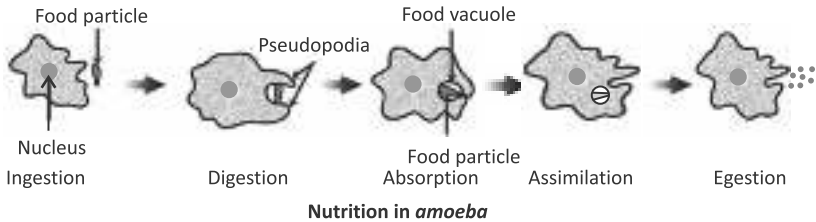
**F. Answer the following questions in detail :**

1. Human beings have a complex digestive system. The digestion of food takes place in the alimentary canal. A long, coiled food tube which is open at both ends and has many parts that digests the food in various stages is called the alimentary canal. The alimentary canal begins with the mouth and ends with the anus. It has the following parts: buccal cavity, oesophagus, stomach, small intestine, large intestine, rectum, anus.
2. Finger-like projections on the inner walls of the small intestine are called villi. These are found on the inner surface of small intestine. Villi increase the surface area of inner walls of the small intestine for absorption. The surface of villi absorbs the digested food materials.
3. The process of utilization of nutrients in the food by the cells of the body is called assimilation. The simple substances are transported to the cells of the body through the blood. Glucose is broken down with the help of oxygen to form carbon dioxide and water, and energy is released. This energy is utilized by the body for various activities. Amino acids are used to build new cells and repair the worn cells and tissues. Fatty acids and glycerol are broken down to produce energy and excess amount is stored under the skin as energy reserve.
4. There are four types of teeth inside the mouth. There are 4 incisors, 2 canines, 4 premolars and 6 molars in each jaw. Each type of teeth has separate function. Incisors are at the front and centre of the mouth. They have a sharp, straight cutting edge to cut and bite food. Canines are next to incisors. They are sharp and pointed. They are used to stab, tear and pierce food. Premolars and molars are found at the back and side of the jaw. They

are used for chewing and grinding the food before it is swallowed.

5. The process of nutrition in *amoeba* is as follows :

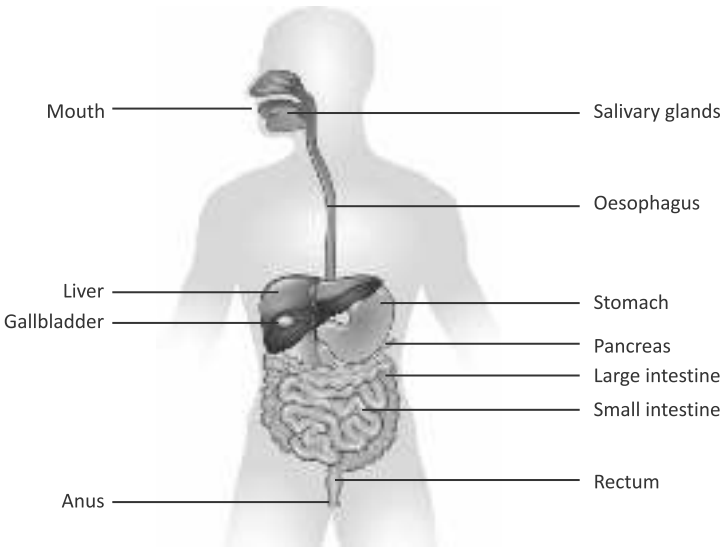
- (i) **Ingestion** : *Amoeba* engulfs its food by slowly wrapping finger-like projections around the food. The food becomes trapped in a food vacuole.
- (ii) **Digestion** : Digestive juices are released in the food vacuole. These juices break down the food into simple soluble substances.
- (iii) **Absorption** : The digested food in the food vacuole is absorbed into the cytoplasm.
- (iv) **Assimilation** : The absorbed food gets stored and then utilized for its growth, energy and multiplication.
- (v) **Egestion** : The cell membrane of the *amoeba* abruptly rips a part from any place, and the waste material is expelled out from its body.



6. Grass eating animals like cows, sheep, goats, etc., that digest their food in two steps are called ruminants. They have four compartments in their stomach namely rumen, reticulum, omasum and abomasum. The food gets partially digested in rumen. This partially digested food is called cud. The cud returns to the mouth in small lumps and the animal continues to chew it. The reticulum collects small particles from rumen and transfers them to the omasum. The reticulum traps and collects heavy dense objects consumed by the animal such as nail or a wire. The chewed food is swallowed again. It bypasses the first two chambers and reaches the third chamber called omasum. Excess water is absorbed here. In the abomasum, gastric juices are secreted and digestion is completed. After digestion in the abomasum, food is finally passed to the intestine for the absorption of nutrients. It takes more than three days for the food to pass through the entire digestive system.



## A. Picture Talk



Human Digestive System

## B. Research and Project :

Do yourself.

## C. Activity :

Teeth you use for	Number of teeth		Total
	Lower jaw	Upper jaw	
Cutting and biting	4	4	8
Tearing	2	2	4
Chewing and grinding	4+6	4+6	20

## D. Group Discussion :

Do yourself.



## EXERCISE

### A. Tick (✓) the correct option :

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

### B. Fill in the blanks :

1. energy                      2. Temperature                      3. Sir Thomas Allbutt  
4. conduction                5. 37°C                                  6. Convection  
7. insulator                    8. -10°C to 110°C                    9. hotter, colder

### C. State whether the following statements are True or False :

1. False    2. False    3. False    4. True    5. False    6. True  
7. True    8. True

### D. Match the following columns :

1. (c)    2. (d)    3. (g)    4. (f)    5. (e)    6. (b)    7. (a)

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

- The degree of hotness or coldness of an object is called its temperature. Celsius, Fahrenheit and Kelvin are common temperature scales.
- The kink prevents immediate back flow of mercury from the tube to bulb.

S. N.	Heat	Temperature
1.	Heat is a form of energy that flows from the hotter object to colder object.	The degree of hotness of coldness of an object is called its temperature.
2.	It is measured in joules or calories.	It is measured in °C, °F and K.
3.	It is not determined by a instrument.	It is directly determined by a thermometer

- The materials which do not allow the transfer of heat energy through them are known as insulators. For example, plastic, wood, etc.
- (i) The body should be in a solid state.  
(ii) The two ends should be at different temperatures.
- (i) Wash the thermometer with water or an antiseptic solution before and after use.  
(ii) The reading in the thermometer should be taken by keeping the level of mercury along the line of sight.

(iii) Never hold the thermometer by the bulb while reading it.

7. Radiation is the mode of heat transfer which takes place in vacuum and does not require any medium like solid, liquid or gas.

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

1. This thermometer has a long, narrow, uniform glass tube. It has a bulb at one end. This bulb contains mercury outside the bulb, a small shining thread of mercury can be seen. The other end of thermometer is sealed after removing air. A kink is present just above the mercury under under the tongue of a person, the mercury in the bulb expands and rises into the thread due to body heat. When the thermometer is taken out of the mouth, the mercury in the bulb contracts. The kink prevents immediate back flow of mercury from the tube to the bulb. Thus, it allows you to read the temperature that is to be used again. It is first given a jerk to bring the mercury in the thread back into the bulb.



Clinical thermometer

2. Heat has the following effects :
- (i) Heat causes temperature to rise. for example, when we hot ice in hand, ice melts due to heat of the hand.
  - (ii) Heat causes change of state of matter. For example, when we hot
  - (iii) Heat causes burning. For example, if you touch a hot objects you may get scalded.
  - (iv) Heat causes expansion. All three states of matter solid, liquid and gas expand when heated.
3. A mode of heat transfer in which there is actual movement of molecules from the hot to cold region of the substance being heated is called convection. For example, the air near the heat sources gets hot. Hot air is lighter, so its rises up. The cool air from the sides comes into and takes its place. In this way, the air gets heated.

**Application of convection:**

- (i) A room heater heats all the air in a room by setting up convection currents in the air,
  - (ii) The heating element of an electric kettle is at its bottom so that. convection can be set up to boil the water.
4. (a) Difference between clinical thermometer and laboratory thermometer .

S. N.	Clinical thermometer	Laboratory thermometer
1.	It is used for measuring the temperature of the human body.	It is used for measuring temperature of all materials.

2.	It has a range from 35°C to 42°C.	It has a range from -10 °C to 110 °C
3.	In it a kink is present just above the mercury bulb.	A kink may or may not be present in it.

(b) Difference between heat and temperature.

S. N.	Heat	Temperature
1.	Heat is a form of energy that flows from the hotter object to colder object.	The degree of hotness or coldness of an object is called its temperature.
2.	It is measured in joules or calories.	It is measured in °C, °F and K .
3.	It is not determined by a instrument.	It is directly determined by a thermometer.

(c) Difference between conduction, convection and radiation :

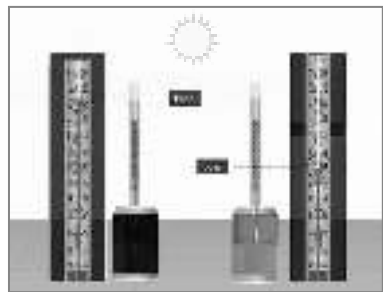
S. N.	Conduction	Convection	Radiation
1.	Heat flows without the actual movement of particles from their position.	Heat flows by the movement of the molecules themselves.	Heat flows without involving the particles of the medium.
2.	Medium is Necessary.	Medium is necessary	Medium is not necessary.
3.	It takes place in solids only.	It takes place in liquids and gases.	It take place even in the absence of medium.

5. **Objective :** To study different colour objects take in different amounts of heat.

**Materials Required :** Two aluminium container one black one white, water, thermometer.

**Procedure:**

- (i) Take two aluminium containers.
- (ii) One painted black and the other with its original colour.
- (iii) Now, fill them half with water and keep them under the sun.
- (iv) Each one should have a lid.
- (v) With the help of a thermometer note down the temperature after every minute.
- (vi) What do you observe? Which container shows higher temperature?



Black coloured container absorbs more heat than light coloured container.

**Observations:**

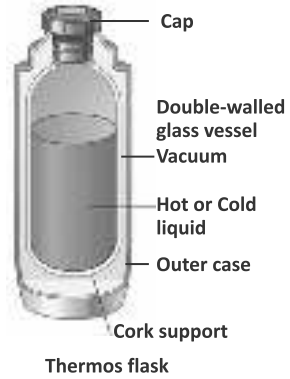
The obvious observation of yours will be the one painted black shows a higher temperature.

**Conclusion:**

A dull black surface is a good absorber of heat. A bright shiny surface is a poor absorber of heat.

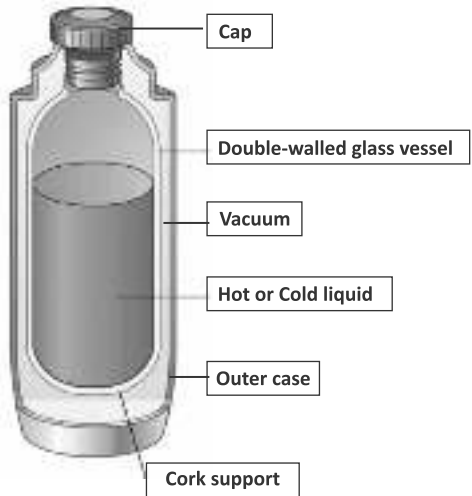
6. The flask is a double walled glass bottle. In the space between the two walls, both the pieces of glass are coated with shiny bright 'silvering'. The air is pumped out so that vacuum is formed between the two walls. A vacuum is created because it stops heat transfer by stopping conduction and convection.

Shiny surfaces are poor radiators of heat. Radiation is reduced by silvering both walls on the vacuum side. The silvering on one glass wall reduces radiation of heat and the silvering on the other glass wall reflects back any heat that may have been radiated. The stopper at the top prevents heat loss by evaporation or convection currents.



 **Learning With Fun**

**A. Picture Talk.**



**B. Research and Project :**

Do yourself.

**C. Activity :**

Do yourself.

**D. Group Discussion :**

Do yourself.



## 4 Acids, Bases and Salts



### EXERCISE

**A. Tick (✓) the correct option :**

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

**B. Fill in the blanks :**

1. organic                      2. Dilute                      3. malic  
4. HCl, H<sub>2</sub>SO<sub>4</sub>                  5. alkali                      6. litmus  
7. pink                          8. bases

**C. State whether the following statements are True or False :**

1. False    2. False    3. False    4. False    5. True    6. True  
7. False    8. True    9. False

**D. Match the following columns :**

1. (c)    2. (h)    3. (b)    4. (g)    5. (f)    6. (e)  
7. (d)    8. (a)

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

1. Citric acid.  
2. The substance which taste sour are called acids. The substance which taste bitter and are soapy to touch are called bases.  
3. Lactic acid.

4.

Acid	Chemical Formula
Hydrochloric acid	HCl
Sulphuric acid	H <sub>2</sub> SO <sub>4</sub>
Phosphoric acid	H <sub>3</sub> PO <sub>4</sub>
Carbonic acid	H <sub>2</sub> CO <sub>3</sub>

5. (a) Sulphuric acid (b) Formic acid
6. Here are four important properties of bases :
- They are bitter in taste and soapy to touch.
  - They turn red litmus paper blue.
  - They may or may not be soluble in water.
  - They react with acids to give salt and water.
7. Rain containing excess amount of acids is called acid rain.
8. Milk of magnesia is an antacid that helps in neutralising excess acidity in the stomach.
9. A substance that is used to test whether a substance is acidic or basic or neutral in nature. The natural indicators are—turmeric powder and china rose petals and the man-made indicators are—phenolphthalein and methyl orange.

10.

S. N.	Mineral acids	Organic acids
1.	These are derived from minerals.	These are derived from living organisms.
2.	These acids are generally strong acids.	These acids are typically weak acids.
3.	Examples : Hydrochloric acid, sulphuric acid, Nitric acid.	Examples : Acetic acid, Citric acid Lactic acid.

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

- Mineral acids are obtained from the minerals. These are also called synthetic acids as they are made in laboratories. These acids contains at least one hydrogen atom but no carbon atom. They should never be tasted and should be handled with care as they are very dangerous.  
Here are some important physical properties of acids.
  - All acids have a sour taste.
  - Acids turn blue litmus paper red.
  - Acids conduct electricity in solution form.
  - Heat is produced when a strong acid is mixed with water.
  - Acids are soluble in water.
- We use a lot of bases in our daily life. Let us learn about some of them.
  - Sodium hydroxide is widely used in the manufacturing of soaps, oil and detergents.
  - Potassium hydroxide is useful in the preparation of bio-diesel.
  - Ammonium hydroxide is used to manufacture nylons, plastics, dyes, etc.

3. Indicators are substance that are used to test whether a substance is acidic or basic or neutral in nature. They change their colour when added to a solution containing an acidic or a basic substance. They are of two types— natural indicators and synthetic indicators.
4. (a) **Ammonium hydroxide**
- It is used in chemical industries to remove grease from window panes and ink spots from clothes.
  - It is used to manufacture fertilisers
- (b) **Calcium hydroxide**
- It is used for the preparation of plasters, bleaching powder, etc.
  - It is used for the treatment of waste water.
- (c) **Sodium hydroxide**
- It is used in unblock drains.
  - It is used in petroleum refining and making rayon.
- (d) **Hydrochloric acid**
- It is used to cleaning of sink and sanitary ware.
  - It is used to make aqua-regia.
- (e) **Nitric acid**
- It is used to manufacture fertilisers.
  - It is used in rocket fuels.
- (f) **Sulphuric acid**
- It is used in cars and inverter batteries.
  - It is used as a dehydrating agent.
5. Salt refers to the product formed as a result of neutralisation reaction between an acid and a base. A salt has a pH of 7.0. Salt provide minerals to the body. Salt may be acidic, basic or neutral in nature.

Some use of salt are listed in the table below :

Name of salt	Uses
Sodium chloride	In cooking, as preservatives and in manufacture of soap.
Sodium bicarbonate	In bakery and medicines.
Copper sulphate	In making fungicides, electroplating and dyeing.
Potash alum	In water purification.

6.

Property	Acids	Bases
Taste	Sour	Bitter
Litmus test	Acids change blue litmus paper red.	Bases change red litmus paper blue.

<b>Phenolphthalein</b>	Remains colourless	Makes it pink
<b>Reactions</b>	React with bases to form salt and water (neutralisation reaction).	React with acids to form salt and water (neutralisation reaction).



## Learning With Fun

### A. Picture Talk

- 'A' When a piece of red litmus paper is dropped in baking powder in water, the red litmus paper turns blue.
- 'B' When a piece of red litmus paper is dropped in vinegar in water, there will be no colour change.
- 'C' When a piece of red litmus paper is dropped in glucose in water, there will be no colour change.
- 'D' When a piece of red litmus paper is dropped in milk in water, there will be no colour change.

### B. Research and Project :

Do yourself.

### C. Activity :

Do yourself.

### D. Group Discussion :

Do yourself.



## 5 Physical and Chemical Changes



### EXERCISE

#### A. Tick (✓) the correct option :

1. (a)    2. (b)    3. (b)    4. (a)    5. (b)    6. (d)  
7. (d)    8. (b)

#### B. Fill in the blanks :

1. irreversible                      2. Physical                      3. Chemical  
4. chemical                          5. concentrated                6. reagents  
7. chemical                          8. zinc

**C. State whether the following statements are True or False :**

1. True    2. False    3. True    4. True    5. False    6. False  
7. True    8. False    9. True

**D. Match the following columns :**

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

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

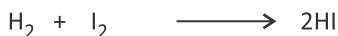
- In a physical change, there is change in the physical properties of a substance, *e.g.*, shape, state, size, mass, volume, texture, colour, etc. These changes are temporary. For example : melting of ice, inflating a balloon, etc.
- The characteristics of physical change are :
  - They are temporary in nature.
  - Heat may or may not be evolved or absorbed during a physical change.
  - No new substances are formed.
  - Only the physical properties of a substance change.
- The process of cooling a hot, concentrated solution of a substance to obtain crystals is called crystallisation.
- The examples of five common physical changes around us are:
  - Cooling of water
  - Inflating balloon
  - Melting of butter
  - Drying wet clothes
  - Tearing of paper
- A change in which one or more new substances are formed, is called a chemical change. This change is irreversible . For example : cooking of food, curding of milk, rusting of iron, digestion of food, etc.
- The changes in a chemical change can be : change in colour, evolution of gas, change in energy, formation of precipitate, etc.

7.

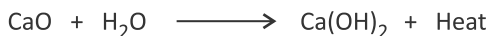
S. N.	Physical Change	Chemical Change
1.	Only physical properties such as shape, size and colour change. Chemical properties remain unchanged.	The chemical composition and chemical properties of the reacting substance change.
2.	No new substance is formed.	One or more new substances are formed.

- Reaction which involves absorption of heat energy is known as endothermic reaction. For example : when hydrogen reacts with iodine,

hydrogen iodide is formed. It absorbs a lot of energy.



Chemical reaction in which heat energy is released is known as exothermic reaction. For example : when quicklime reacts with water, slaked lime is formed. It releases a lot of energy.



9. Water and air.
10. Painting the metal surface prevents it from coming in contact with moisture and oxygen present in the atmosphere. Hence, the iron gates are often painted to protect them from rusting.

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

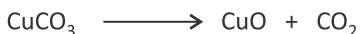
1.

S. N.	Physical Change	Chemical Change
1.	Only physical properties such as shape, size and colour change. Chemical properties remain unchanged.	The chemical composition and chemical properties of the reacting substance change.
2.	The original form of the substance can be obtained by simple physical processes.	The original form of substance cannot be obtained by simple physical processes.
3.	No new substance is formed.	One or more new substances are formed.
4.	It is usually a reversible and a temporary change. It can be easily reversed by reversing the conditions.	It is usually irreversible and a permanent change. It cannot be reversed by just reversing conditions.

2. Refer to answer of next question.
3. To obtain salt from salt solution, we must follow the steps given below :
  - (i) Pour the salt solution into an evaporating dish.
  - (ii) The dish is heated by the steam from the water in the beaker.
  - (iii) Observe inside the dish.

We will observe that the salt appears as a residue in the evaporating dish.

4. (a) Green copper carbonate ( $\text{CuCO}_3$ ) when heated over a flame, decomposes to form a black residue called copper oxide ( $\text{CuO}$ ) and releases carbon dioxide ( $\text{CO}_2$ ) gas.



- (b) When zinc reacts with dilute sulphuric acid, hydrogen gas is evolved, which can be seen in the effervescence that results.



(c) the reaction between hydrogen sulphide and chlorine produces sulphur and hydrogen chloride.



(d) When silver nitrate and sodium chloride are mixed together, an insoluble solid, silver chloride is formed.



5. Refer to answer of question 1.
6. The reaction in which metals react with moist air and develop a layer, on them, is called corrosion. During corrosion, chemical occur with the upper layer of the metal. You have must seen some iron objects lying outside and develop holes in them. This is due to corrosion.
7. Corrosion of iron is called rusting. If the iron objects are not painted, they get reddish brown layer. This brown layer is called rust. Rust form when iron is exposed to moist air. Iron reacts with moist air to form iron oxide, which is brown in colour.

There are some commonly used methods for the prevention of rusting :

- (i) Alloy formation : Iron when mixed with chromium and nickel forms stainless steel that does not at all.
- (ii) Galvanization : Zinc with oxygen forms a layer of zinc oxide which acts as a barrier between iron and the atmosphere.
- (iii) Electroplating : Chromium or nickel coating by electroplating prevents rusting of auto parts, bathroom fittings such as taps, showers, etc.
- (iv) Use of oil and grease : Applying oil on the metal surface prevents water from reaching the surface. Thus, rusting does not occur. Heavy machines are often lubricated with oil.



## Learning With Fun

### A. Picture Talk :

Melting of wax is an example of physical change while burning of wick is an example of chemical change.

### B. Research and Project :

Do yourself.

### C. Activity :

Do yourself.

### D. Group Discussion :

Do yourself.



## EXERCISE

### A. Tick (✓) the correct option :

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

### B. Fill in the blanks :

- |                |              |                          |
|----------------|--------------|--------------------------|
| 1. respiration | 2. breathing | 3. Stomata               |
| 4. food        | 5. lungs     | 6. 15-20 times / minutes |
| 7. inhalation  | 8. pleura    | 9. bronchi               |

### C. State whether the following statements are True or False :

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

### D. Match the following columns :

1. (b)      2. (c)      3. (a)      4. (g)      5. (e)      6. (d)  
7. (f)

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

- Aerobic respiration, anaerobic respiration.
- Aerobic respiration.
- $C_6H_{12}O_6 + 6O_2 \longrightarrow 6CO_2 + 6H_2O + \text{Energy}$
- The lungs are the main organs of respiratory system.
- During inhalation, the diaphragm moves downward towards the abdomen. The ribs move upwards and outwards. The space in the chest cavity increases and air rushes into the lungs.  
During exhalation, the diaphragm and the ribs move to their initial position. The diaphragm moves up, while the ribs move downwards and in-wards. The chest cavity reduces in size and air is pushed out from the lungs.
- (a) Frog : The skin and lungs  
(b) Earthworm : Moist skin  
(c) Cockroach : Spiracles  
(d) Fish : Gills  
(e) Whale : Blowholes
- The leaf surfaces of plants have tiny opening called stomata.

8. Animal cells require oxygen to perform cellular respiration that involves giving off carbon dioxide and water as waste products. Plants take in oxygen and give out carbon dioxide and water and energy is released.
9. One inhalation and one exhalation make one breath. The number of times a person breathes in a minute is called the breathing rate. A healthy adult person at rest breathes 15-20 times/minute. Breathing rate increases when you run or do heavy physical exercise (up to 25 breathes per minute).

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

1. The process of taking in oxygen-rich air and giving out carbon dioxide-rich air is called breathing. During inhalation, the diaphragm moves downward towards the abdomen. The ribs move upwards and outwards, the space in the chest cavity increases and air rushes into the lungs. During exhalation the diaphragm and the ribs move to their initial position. The diaphragm moves up, while the ribs move downwards and inwards. The chest cavity reduces in size and air is pushed out from the lungs.
2. The air we breathe eventually reaches alveoli. Each lung contains millions of alveoli. Alveoli are the site of actual gas exchange. There is a very fine network of blood vessels surrounding each alveolus. Oxygen passes easily through the thin walls of the alveoli into these blood vessels. The carbon dioxide present in the blood collected from all parts of the body, passes into the alveoli from the blood vessels. While exhaling, this carbon dioxide is expelled from the lungs.
3. (a)

S. N.	Aerobic Respiration	Anaerobic Respiration
1.	It occurs in the presence of oxygen.	It occurs in the absence of oxygen.
2.	It releases more energy.	It releases less energy.
3.	Glucose gets completely oxidised to carbon dioxide and water.	Glucose gets incompletely oxidised to alcohol and carbon dioxide (in cells) or lactic acid (in muscles) water is not formed.
4.	Water is formed.	Water is not formed.
5.	It occurs in most plants and animals.	It mostly occurs in yeast, bacteria and parasitic worms.

(b)

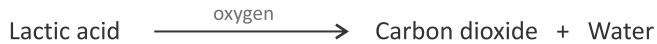
S. N.	Internal respiration	External respiration
1.	It is a chemical process in which glucose is broken down to release energy.	It is a physical process in which oxygen is inhaled and carbon dioxide is exhaled. There is no chemical reaction.
2.	It occurs inside the cells.	It occurs outside the cells.

3.	Energy is released	There is no release of energy.
----	--------------------	--------------------------------

4. During heavy exercise, the demand of oxygen in the body is high and the supply is less. In this condition, anaerobic respiration takes place in our muscles, to fulfil that extra demand of energy. The partial break down of glucose releases lactic acid and energy is given out. Accumulation of lactic acid causes cramps in the muscles.



In case of cramps, take a hot water bath or apply hot pack to relax the muscles. These activities increase blood circulation. More oxygen reaches the cells. When the muscle cells are supplied with enough oxygen, it completely breaks down the lactic acid into carbon dioxide and water which are exhaled. The person feels relief from cramps.



5. **Objective :** To show that the exhaled air has more carbon dioxide.

**Materials Required :** Beaker, straw, lime water.

**Procedure:**

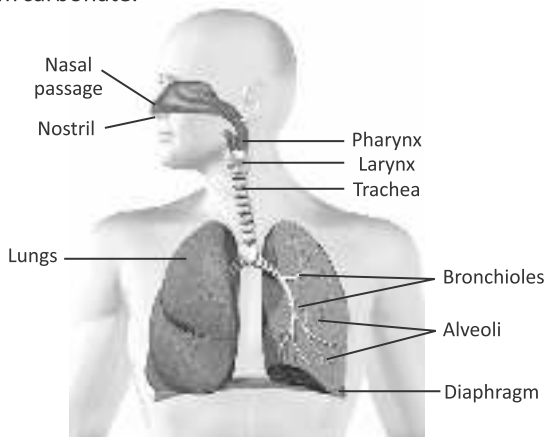
- (i) Take a glass beaker half-filled with lime water.
- (ii) Insert a straw.
- (iii) Breathe out into lime water through the straw.



Carbon dioxide in exhaled air

**Observations and Conclusion :** The lime water turns milky. This milky colour of lime water confirms the presence of carbon dioxide in the exhaled air. Carbon dioxide makes lime water milky due to the formation of calcium carbonate.

- 6.



Human breathing system

7. During respiration, plants take in oxygen and give out carbon dioxide and water and energy is released. Respiration plants can be represented as :

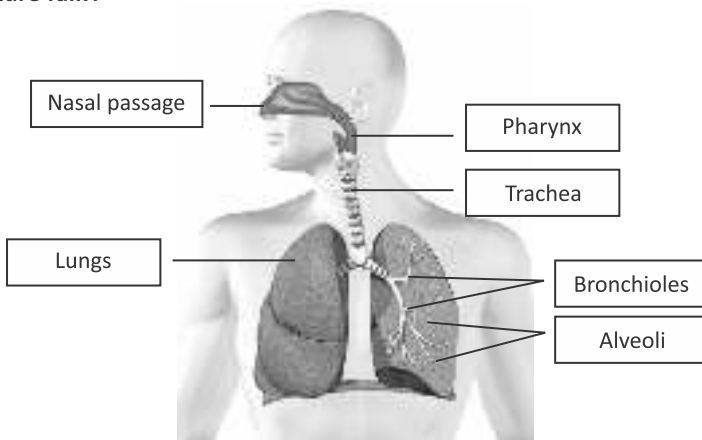


8. (a) **Earthworm** : In case of earthworm, the oxygen from the air is absorbed through the moist skin and it is carried by the blood vessels to the cells. Similarly, carbon dioxide from the cells is carried by the blood vessels and is given out through the moist skin. Earthworms die if their skin dries out.
- (b) **Fish** : Fish respire through gills. Water enters through the mouth and flows over the gills. The oxygen dissolved in the water enters the capillaries. Blood transports the oxygen to the cells in the body. Carbon dioxide is collected by the blood and brought back to the gills where it passes out into the water.
- (c) **Cockroach** : A cockroach, spiracles are present on either side of the body. Oxygen-rich air enters the body through spiracles. It passes through tracheal tubes. It diffuses into the body and reaches every cell of the body. Carbon dioxide is collected by the tracheal tubes and thrown out through spiracles.
- (d) **Frog** : Frog respire through their moist skin while in water.
- (e) **Mangrove trees** : Mangrove trees, the soil under them remains submerged in water for most part of the year. Therefore, exchange of gases is mostly not possible in soil. They develop aerial roots with lot of lenticels for this purpose.
- (f) **Amoeba** : *Amoeba* exchange of gases take places through the cell membrane.



## Learning With Fun

### A. Picture Talk :



**B. Research and Project :**

Do yourself.

**C. Activity :**

Do yourself.

**D. Group Discussion :**

Do yourself.

# CHAPTER 7 Transportation in Animals and Plants



## EXERCISE

**A. Tick (✓) the correct option :**

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

**B. Fill in the blanks :**

1. Capillaries                      2. haemoglobin                      3. pulmonary vein  
4. plasma                              5. platelets                              6. dialysis  
7. urethra                              8. xylem                              9. translocation

**C. State whether the following statements are True or False :**

1. True    2. False    3. False    4. True    5. False    6. False  
7. False    8. True

**D. Match the following columns :**

1. (b)    2. (g)    3. (c)    4. (h)    5. (a)    6. (f)  
7. (e)    8. (i)    9. (d)

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

- Circulatory system is responsible for transportation of materials in human beings.
- Haemoglobin gives blood its red colour.
- Arteries, veins and capillaries.

4.

S. N.	Arteries	Veins
1.	Transport blood away from the heart.	Transport blood towards the heart.
2.	Transport blood under high pressure.	Transport blood under low pressure.
3.	Do not have valves.	Have valves.

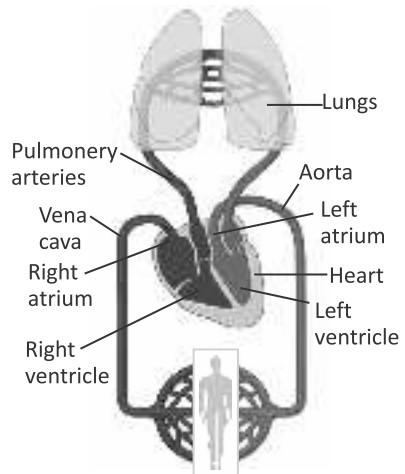
5. The upper two chambers are called auricles and the lower two chambers are called ventricles.
6. The heart pumps the blood due to the rhythmic contraction and relaxation of the four chambers of the heart. This rhythmic contraction and relaxation of the heart is known as the heartbeat.
7. Urethra is a muscular tube, through which the urine collected from the urinary bladder is passed out of the body.
8. The kidneys are located just under the rib cage on each side of the abdomen.
9. (i) The presence of excess sugar in the urine indicates that the person is suffering from diabetes mellitus.  
(ii) The presence of excessive water in the urine indicates the person is suffering from diabetes insipidus.  
(iii) The presence of blood in the urine indicates some infection, tumour or damage of the kidneys.
10. Osmosis help the roots of plants to absorb water and minerals.
11. Phloem transports food molecules to all parts of the plant.
12. Gum, resin and latex.

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

1. The function of the heart is to pump the blood to all the parts of the body. This is done by regular and alternate contraction and relaxation of the atria and ventricles. The normal blood flow is a cycle that flows like this :  
body → heart → lungs → heart → body.

**From the body to the heart :** The muscles of right atrium relax and it receives de-oxygenated blood from all the parts of the body through veins. The de-oxygenated blood is forced into right ventricle, by the contraction of right atrium.

**From the heart to the lungs :** Then the right ventricle contracts and it pumps the de-oxygenated blood into the lungs through the pulmonary artery. From there the blood goes to the lungs. During the contraction of right ventricle, the backward flow of blood into right atrium is prevented



Blood circulation in human

by the bicuspid valve. In the lungs, the de-oxygenated gives up carbon dioxide and picks up oxygen. Thus, in lungs the blood becomes oxygenated.

**From the lungs to the heart :** At the same time, the muscles of left atrium relax and it receives oxygenated blood from the lungs through the pulmonary vein. This oxygenated blood is then forced into left ventricle by the contraction of left atrium.

**From the heart to the body :** When the left ventricle contracts, the oxygenated blood is pumped to all the parts of the body except lungs through the aorta. The aorta is the biggest blood vessel in our body. During the contraction of left ventricle, the backward flow of blood into left atrium is prevented by the tricuspid valve. In the body, the oxygenated blood releases oxygen to the cells and absorbs carbon dioxide from them and becomes de-oxygenated. This de-oxygenated blood then flows back to the heart and enters through the right atrium.

In this way, the whole process is repeated again to ensure continue flow of blood in the body.

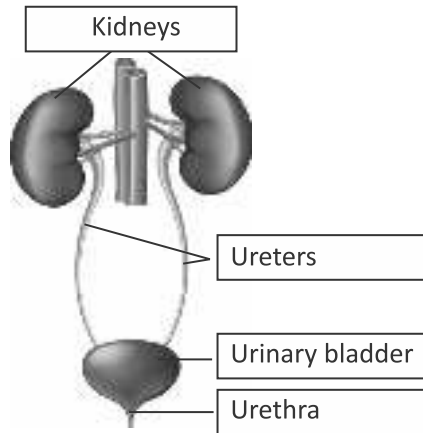
2. Refer the ans no. 1 from long question :
3. During the passage of dirty blood through the kidneys that is through the tubular part of the nephron the useful substances such as glucose, amino acids, salts and water are reabsorbed by the blood capillaries surrounding the nephron. Only the waste substances such as urea, some salts and excess material (also called urine) present in the tubule is passed to the urinary bladder.
4. The urinary system consists of the following organs : (i) a pair of kidneys, (ii) a pair of ureters, (iii) urinary bladder and (iv) urethra.
  - (i) **Kidneys** : They mainly act as excretory organs and also control the balance of water and mineral ions in the body.
  - (ii) **Ureters** : Ureter are tubular structure which carry urine from kidneys to the urinary bladder.
  - (iii) **Urinary bladder** : The function of urinary bladder is to store urine temporarily.
  - (iv) **Urethra** : Urethra is a muscular tube, through which the urine collected from the urinary bladder is passed out the body.
5. Plants absorb water and minerals through root hair. They increase the surface area of the root for the absorption of water and mineral in nutrients dissolved in water. The water present in soil passes into the roots hair through a semipermeable membrane by the process of osmosis. The root hairs are in direct contact with the water surrounding the soil. Therefore, the concentration of water content outside the root

hair is more than the inside of it. Thus, water molecules move from outside soil into the root hair by osmosis.

6. The process by which plants release excess water into the atmosphere is called transpiration. Transpiration is significant for plants in many ways :
- (i) It maintains salt-water balance in the plant.
  - (ii) It removes excess water from the cells of the plant to prevent plant decay.
  - (iii) It helps in the distribution of dissolved substance to all parts of the plant.
  - (iv) It cools down all parts of the plant.
  - (v) Its pull is used to absorb more water and minerals. It is strong enough to draw water even in a tall tree.

### Learning With Fun

#### A. Picture Talk :



#### B. Research and Project :

Do yourself.

#### C. Activity :

Do yourself.

#### D. Group Discussion :

Do yourself.



## EXERCISE

### A. Tick (✓) the correct option :

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

### B. Fill in the blanks :

1. Budding                      2. bud                              3. tuber  
4. Rhizomes                    5. *bryophyllum*                6. stock  
7. pollination                 8. spore                            9. pea  
10. wind, water, animals

### C. State whether the following statements are True or False :

1. False    2. True    3. False    4. True    5. True    6. False  
7. True    8. True

### D. Match the following columns :

1. (g)    2. (d)    3. (a)    4. (f)    5. (b)    6. (c)  
7. (e)

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

- In asexual reproduction, only single parents is needed, resulting in off springs that are genetically identical to the parent.
- Each spore is a tiny, spherical, unicellular body which is covered by a hard protective layer to withstand unfavourable conditions such as high temperature and low humidity.
- The leaves of *Bryophyllum* has adventitious buds in the notches of on their margins. When the buds come in contact with moist soil, each bud becomes capable of growing into a new plant.
- The filament of spirogyra breaks into two or more fragments due to external factors like water currents or other reasons. Then, all the parts in the fragment start individual.
- (a) **Tuber** : Stem tubers are modified stems to store food. They are found in plants like potato.  
(b) **Bulb** : Bulbs are underground stems that have extended thick and fleshy aves. Bulbs contain several buds near the node like onion, garlic, tulip, lily and tuberose grow from bulbs.  
(c) **Corm** : In plants such as Gladiolus and Colocasia, reproduction takes place with the help of swollen underground stems called corms.

- (d) **Rhizome** : Rhizomes are root-like stems. Ginger, turmeric and banana grow horizontally under the ground. New roots and shoots form at the nodes with shoots growing upwards to form new plantlets. Lateral buds grow out to form new rhizomes.
- (e) **Runner** : Runners are stems that grow horizontally above the ground. In plants such as grasses and wild strawberries , shoots develop from the sides which have buds. These buds grow into new plants.
6. Fungi, ferns, mosses reproduce by spore formation.
  7. Tissue culture is used for large scale plant multiplication to develop exact copies of plants with desired qualities, which are disease-free and have a higher yield.
  8. In grafting, the stems of two different plants are joined together so as to produce a new variety of fruit plants containing the characteristics of both. Out of the two plants, one plant has a strong root system while the other has a strong shoot system. For example : mango.
  9. (a) The transfers of the pollen grains from the anthers of a flower to the stigma of the same flower or another flower of the same plant is called self-pollination. It occurs only in bisexual plants.  
The transfer of the pollen grains from the anthers of a flower to the stigma of another flower on a different plants of the same kind is called cross-pollination. It occurs in both bisexual as well as unisexual plants.
  - (b) The flowers which contain either only the pistil or only the stamens are called unisexual flowers. Corn, papaya and cucumber have unisexual flowers.  
The flowers which contain both stamens and pistil are called bisexual flowers. Mustard, rose and petunia have bisexual flowers.

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

1. Asexual reproduction can take places in an organism by the methods : budding, spore formation, fragmentation.

**Budding** : Budding is the process in which a small part of the body of the parent organism grows out as a small bulb like projection called the bud. This bud, after being developed, detaches itself from the parent's body to grow independently into a new organism. It takes place in microorganisms such as yeast, corals and hydra.

**Spore formation** : In this method of reproduction, the parent plant produces hundreds of tiny spores which can grow into new plants. Each spore is a tiny, spherical, unicellular body which is covered by a hard protective layer to withstand unfavourable conditions such as high temperature and low humidity. Spore formation is a method of asexual reproduction which is found in non-flowering plants such as fungi, ferns and mosses.

It is the process of breaking up of parent animal into small parts, each of which can grow into a new complete individual. This process of asexual reproduction is found in green algae such as *spirogyra*.

2. Vegetative propagation is the production of new plants from the vegetative parts of the plant. Roots, stems and leaves are the vegetative parts of a plant. The production of new plants from the parts of old plants can take place naturally or artificially.

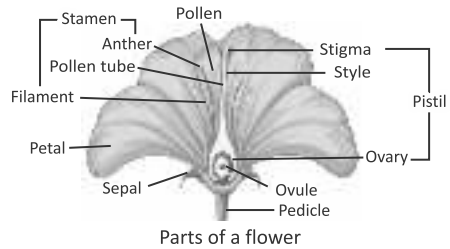
**Natural methods :** Natural vegetative propagation takes places form roots, stems and leaves of a plant.

**Artificial methods :** The process of propagating plants through artificial methods is called as artificial propagation.

3. A complete flower is made up of four whorls on it. These are sepals, petals, stamens and pistil.

**Sepals :** They make the outermost whorl of a flower and are green in colour. The sepals collectively form calyx.

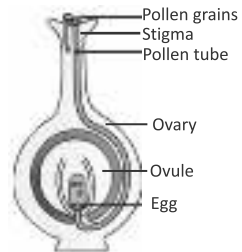
**Petals :** Petals make the second whorl of a flower. Petal collectively form collectively form corolla.



**Stamens :** Stamens make the third whorl of a flower. Stamen is the male reproductive organ of a plant. It consists of two parts: filament and anther. Filament is a tabular structure. Anther is a knob-like structure containing pollen sacs filled pollen grains. Pollen grains act as the male gametes or the male reproductive cells.

**Pistil :** Pistil is the centrally located female reproductive parts of a flower. It is made up to stigma, style and the ovary. A pistil has a swollen base called ovary. The stigma is a flattened structure which receives the pollen from the anthers through the process of pollination. The style is a long tubular structure which connects stigma with ovary and provides passage to the pollen tube. The ovary contains numerous ovules. Ovules contain the female gametes of a plant.

4. Fertilisation is the process of fusion of male gametes (pollens with the female gametes (ovum) in the ovules. When the pollen grains get transferred to the stigma of the same or some other flower of the same kind, then stigma of the flower secretes a sugar containing liquid. The pollen grains respond



Fertilisation in a flowering plant

to this liquid and start growing. After pollination a thin tube is sent out into the pistil from the pollen grains called the pollen tube. The pollen tube carrying the male cells grows in size through style to reach the female ovule in the ovary. As it reaches the ovule, the tip of the tube opens and release male gametes to fertilise the female ovule to form the zygote.

5. The transfer of pollen grains from the anthers of stamens to the stigma of pistil is called pollination.
6. **Insects** : The insects sit on the flowers in order to collect nectar, edible pollen grains. During this visit, the pollen grains released from the anthers stick to their body and get carried away to some other flower where the body when brushes against the stigma transfers the pollen to bring about pollination. Sweet pea, orchid and jasmine are examples of insect pollinated flowers. The insects such as honey bees, butterflies, moths are the pollinating agents.

**Birds** : Some birds are smaller in size and have long beaks which help them to suck the nectar from the flowers. While doing so, some pollen grains get attached to their beaks and get carried away to other flowers where they get deposited to the stigmas of these flowers. Humming birds, sun birds and honey eaters are common bird pollinators.

**Wind** : Wind pollinated plants like ragweeds, do not have sepals and petals, nor do they produce nectar to attract birds or insects. The pollen grains of such plants are very smooth and light to be carried away by wind. Plants like wheat, maize, paddy, etc, are wind pollinated.

**Water** : Aquatic plant such as *Vallisneria* release their pollen grains into the water which is passively carried to other flowers by water currents for pollination. All the aquatic plants are not pollinated by water. Most of them bear flowers above the water surface and are pollinated by wind or insects.

7. If the seeds get scattered only around the plant, they will not be able to grow since each one of them compete for these factors and will not be able to develop into a healthy plant. Therefore, it is necessary to get seed's dispersed for proper germination and growth. Different agents for dispersal include wind, water, birds animals and even self-explosion.

**Dispersal by water** : Many aquatic plants and plants that live near water have seeds that can float and are carried by water. For example, a coconut seed.

**Dispersal by wind** : It is one of the common modes of dispersal for seeds that are light in weight and have hairy structures. These are blown away by wind to far distances. For example, cotton.

**Dispersal by animals** : Some seeds like *Xanthium* and *Urena* have hook like structures with which they get stuck onto the body of animals or on the

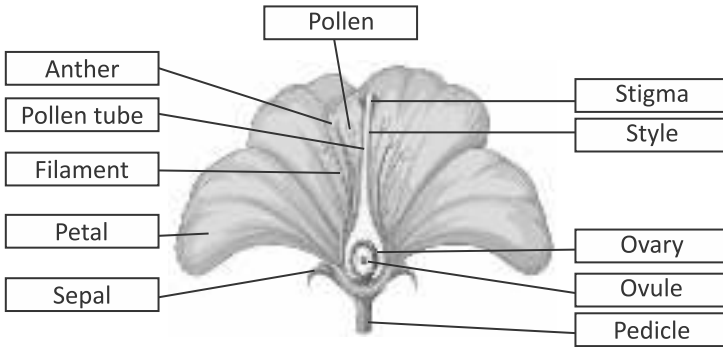
clothes of human beings moving to different places. They then get dispersed to distant places.

**Explosion :** Sometimes fruits like peas burst open forcible after drying when they are exposed to the environment. The force with which they burst off scatters the seeds in all directions.

8. Germination is the process of developing seeds into new plants. Once the seeds are scattered, they need certain environment conditions for their growth. Usually, this is determined by how deep the seed is planted, water availability, air, soil and temperature. When all these conditions become favourable, the seed starts germinating into a baby plant with the help of food stored in the seeds.

## Learning With Fun

### A. Picture Talk :



### B. Research and Project :

Do yourself.

### C. Activity :

Do yourself.

### D. Group Discussion :

Do yourself.



## EXERCISE

### A. Tick (✓) the correct option :

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

### B. Fill in the blanks :

1. oscillatory                      2. mineral                      3. graph  
4. pie                                  5. straight                      6. motion  
7. Speed

### C. State whether the following statements are True or False :

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

### D. Match the following columns :

1. (f)    2. (d)    3. (g)    4. (a)    5. (h)    6. (b)  
7. (e)    8. (i)    9. (c)

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

- Oscillatory motion is executed by a simple pendulum.
- The time period of a simple pendulum does not depend on the mass of the bob.
- An object is said to be in motion when it changes its position with respect to its surrounding.
- A simple pendulum is a system in which a spherical metallic bob, tied to a string, is suspended from a rigid support.

5. No. of oscillations = 120

Time taken = 1 min = 60 sec

$$\begin{aligned} \therefore \text{Time period} &= \frac{\text{Total time}}{\text{No. of oscillations}} = \frac{1 \text{ min}}{120} = \frac{60}{120} \text{ sec} \\ &= \frac{1}{2} \text{ sec} = 0.5 \text{ sec} \end{aligned}$$

6. Distance travelled by an object in unit time is called speed. The S.I. unit of speed is m/s.

7.  $36 \text{ km/h} = \frac{36 \times 5}{18} \text{ m/s} = 10 \text{ m/s}$                       [ $\because 1 \text{ km/h} = \frac{5}{18} \text{ m/s}$ ]

8. An object is said to be at rest when it does not change its position with respect to its surroundings.

An object is said to be in motion when it changes its position with respect to its surrounding.

9. If a body covers equal distance in equal intervals of time, then the body is said to be in uniform motion.

On the other hand, if a body covers unequal distances in equal intervals of time, the body is said to be in non-uniform motion.

10. Speed of Aman's bicycle = 30 km/h

Speed of Ravi's bicycle = 35 km/h

Distance between Aman's home and school = 12 km.

Distance between Ravi's home and school = 10 km.

$$\begin{aligned} \text{Time taken by Aman to reach school} &= \frac{\text{Distance covered}}{\text{speed}} \\ &= \frac{12}{30} \text{ h} = \frac{12}{30} \times 60 \text{ min} \\ &= 24 \text{ min} \end{aligned}$$

$$\begin{aligned} \text{Time taken by Ravi to reach school} &= \frac{\text{Distance covered}}{\text{speed}} \\ &= \frac{10}{35} \text{ h} = \frac{10}{35} \times 60 \text{ min} \\ &= \frac{120}{7} \text{ min} = 17.14 \text{ min} \end{aligned}$$

It is clear that Ravi reaches school first.

$$\begin{aligned} \therefore \text{Difference between their arrival time} &= (24 - 17.14) \text{ min} \\ &= 6.86 \text{ min} \end{aligned}$$

11. Fig. (a) shows as the time increase the distance travelled increases with same proportion. It indicates that the object is moving with a uniform speed. Its speed is not changing at all. The graph of uniform motion is a straight line.

Fig. (b) Shows distance time graph of a body with non-uniform speed. It shows objects travels unequal distances in equal intervals of time. It is a curved line.

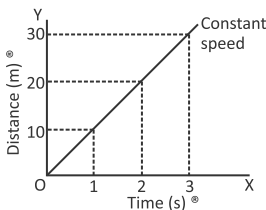


Fig. (a)

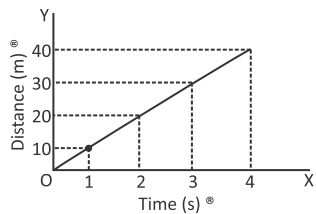


Fig (b)

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

- To measure the time period of a simple pendulum we will perform the following activity.

**Materials Required :** A bob tied to a 50 cm string, a stand to suspend the pendulum, a stopwatch.

**Procedure :**

- Tie the bob or stone to the string and suspend it from a rigid support or stand.
- Pull the bob to the right by some distance and release it.
- Now, mark the extreme positions and the mean position with chalk or pen on a fixed item like the table or the wall.
- Stop the pendulum. Bring the bob to one extreme position and then release.

Note down the time taken to complete 20-80 oscillations in table. The time period can be calculated by the following formula.

$$\text{Time Period} = \frac{\text{Time taken}}{\text{Number of oscillation in that time}}$$

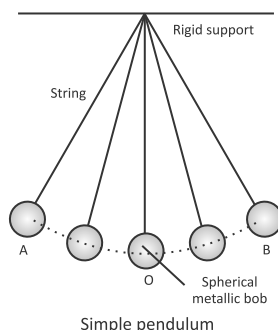
**Table : To calculate time period of a simple pendulum**

S.N.	No. of oscillations	Time taken (s)	Time period (s)
1.	20		
2.	30		
3.	40		
4.	50		
5.	60		

This shows that the time period of a simple pendulum is independent of the number of oscillations. The kind of simple pendulum is the basis for working of a clock. So the oscillatory motion is used to measure time.

- Simple pendulum undergoes a periodic motion, *i.e.*, the bob when released from one end, moved to other end and this motion is repeated. This back and forth motion of pendulum is also called oscillatory motion.

One oscillation is said to be complete when the bob moves from one extreme position *A* to another extreme position *B* and back to *A* from *B* through *O*. Position *O* is called the



mean position, where the pendulum comes to rest or is at rest. The time taken to complete one oscillation is called time period.

3. Ancient people made devices such as sundial, sand clock, etc. for measuring time.

**Sundial** : A simple sundial consists of a horizontal circular board with a triangular plate of metal fixed vertically on it. The plate is kept along North–South direction. The Sun casts a shadow of this plate on the board. The edge of the shadow falls at different angles of different times of the day with the movement of the Sun. The position of the shadow is utilised to mark the time of the day.

**Sand clock** : Sand clock is also known as sand glass. It consists of two identical glass bulbs connected to each other by a small hole. Sand flows from one bulb to another through the hole. In a fixed interval of time, the entire sand in the top hole. In a fixed interval of time, the entire sand in the top bulb flows down to the bulb at the bottom. This fixed interval of time is the unit in which time can be measured. When the whole of sand comes down, the sand clock is inverted so as to repeat the process. The sand clock is usually filled with so much sand that it takes one hour to fall from the upper bulb to the lower bulb.

4. Factors affecting time period are as follows.

- (i) The length of the pendulum.
- (ii) Acceleration due to gravity.

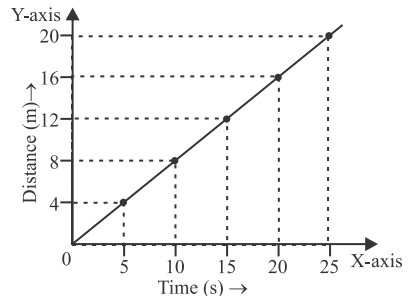
However, it is not affected by the mass of the bob and the amplitude of oscillation. It has been experimentally found that the time period of a freely oscillating pendulum is given by the following expression.

$$T = 2\pi\sqrt{\frac{l}{g}}$$

Where,  $T$  is the time period of the pendulum, ' $l$ ' is the length of the pendulum and  $g$  is the acceleration due to gravity acting on the pendulum.

5. (i) Take a sheet of graph paper.  
(ii) Make two perpendicular lines to show the X-axis and Y-axis.  
(iii) The X-axis represents time and Y-axis represents distance.

Times (s)	Distance (m)
0	0
5	4
10	8
15	12
20	16
25	20



- (iv) The table given below shows the time taken and the distance covered by a cyclist in seconds and metres, respectively.
- (v) Choose a suitable scale to represent the two quantities on the two axis.
- (vi) Now, plot the points that correspond to the set of values of time and distance given in the table. Join all the points to obtain a graph.
6. (a) The boy will be at point *E*.
- (b) The distance travelled by the object in 16 s will be 7 km.

$$\begin{aligned}
 \text{Average speed} &= \frac{\text{Total distance covered}}{\text{Total Time taken}} \\
 &= \frac{2 + 4 + 6 + 8 + 12}{24} \\
 &= \frac{32}{24} = \frac{4}{3} \\
 &= 1.33 \text{ m/s}
 \end{aligned}$$



### Learning With Fun

#### A. Picture Talk :

Time taken by the bob to move from :

$$A \text{ to } C = t \text{ and } C \text{ to } O = t_2$$

$$\therefore A \text{ to } O = t + t_2$$

$$\text{Similarly } O \text{ to } B = t + t_2$$

$$\therefore A \text{ to } B = 2(t + t_2)$$

Time period of simple pendulum = time taken by the bob to move from *A* to *B* and *B* to *A*.

#### B. Research and Project :

Do yourself.

#### C. Activity :

Do yourself.

#### D. Group Discussion :

Do yourself.



## EXERCISE

### A. Tick (✓) the correct option :

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

### B. Fill in the blanks :

1. filament                      2. current                      3. positive, negative  
4. MCBs                        5. magnetic                    6. electromagnet  
7. bell                            8. armature

### C. State whether the following statements are True or False :

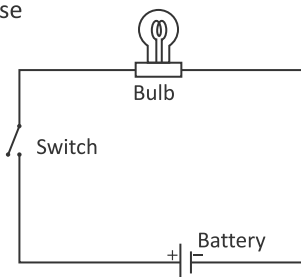
1. False    2. False    3. False    4. False    5. True    6. True  
7. True

### D. Match the following columns :

1. (h)    2. (j)    3. (g)    4. (f)    5. (d)    6. (a)  
7. (b)    8. (c)    9. (i)    10. (e)

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

- Electric circuit is the path in which electric current flows from a source across various components.
- A fuse prevents a large amount of electric current from flowing into electrical appliances, thus preventing them from damage and fire.
- Heating effect of electric current utilise the filament in an electric bulb.
- Fuse
- 



Electric circuit

- A fuse contains a short piece of wire, made of an alloy of lead and tin, or a low melting alloy, that melts easily. If the circuit carries a load that is too large the fuse wire melt, breaking the circuit and stopping the current.
- Electro magnets are used in lifting loads, storing information on tapes, in electric motors electric bells etc.

8. When an electric current flows through a conducting wire, a part or whole of the electrical wire, energy is converted into heat energy. This is called the heating effect of electricity.
9. A device made of a long wire that has been wound many times into a tightly packed coil is called a solenoid.

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

1. (a) **Cell** : An electric cell is a device that is capable of changing chemical energy into electrical energy.



(b) **Battery** : For more power, we connect two or more cells together in a circuit. The positive terminal of the first cell is connected to the negative terminal of the second cell and so on. Such a combination of two or more cell is known as battery.



(c) **Switch** : A switch is a key which is used to break or complete the circuit.



(d) **Conducting wires** : Conducting wires offer some resistance to the flow of electric current.

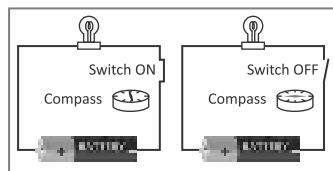


2. MCBs have been replacing electric fuse from wiring at most of the places. The electric fuse has a big practical problem. Whenever the wire fuses, one needs to replace the wire to resume electric supply. But in case of MCBs one just needs to switch it ON to resume the electric supply.
3. A fuse is a part of a circuit which prevents too much current from flowing. This is a safety device. A fuse contains a short piece of wire, made of an alloy of lead and tin, or a low melting alloy that melts easily. If the circuit carries a load that is too large, the fuse wire melts, breaking the circuit and stopping the current.
4. **Objective** : To show that current and magnetism are related to each other.

**Materials Required** : Copper wire, a cell, a switch, a magnetic compass.

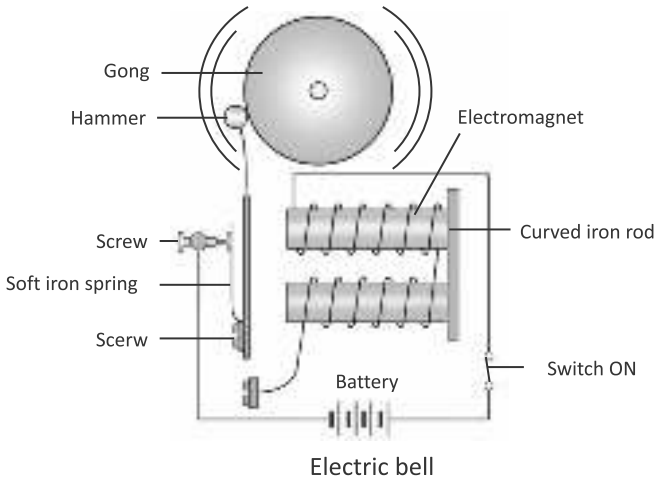
**Procedure and Observation :**

- (i) Take a copper wire and connect to a cell through a switch as shown in Fig. Place a magnetic compass near the wire. You will see that the compass needle gets deflected from its original position.
- (ii) Now release the switch. What happens?
- (iii) The compass needle returns back to its original position.
- (iv) You must have guessed from this activity that a current carrying wire behaves like a magnet.



**Conclusion:** This activity shows that current and magnetism are related to each other.

5.



**Step 1 :** When the switch of the electric bell is pressed, the current starts flowing through the circuit to the electromagnet.

**Step 2 :** This electromagnet attracts the soft iron strip and it moves away from the screw. This causes the hammer to strike the gong.

**Step 3 :** As the iron strip moves away from the screw, it breaks the circuit and the current stops flowing. Now the electromagnet loses its magnetism and the soft iron strip comes back to its original position and makes contact with the screw again. This completes the circuit and process is repeated as long as the switch is pressed and causes the hammer to hit the gong repeatedly. Thus, the sound of the electric bell is heard.



## Learning With Fun

**A. Picture Talk :**

(a) ✗

(b) ✓

**B. Research and Project :**

Do yourself.

**C. Activity :**

Do yourself.

**D. Group Discussion :**

Do yourself.

**EXERCISE****A. Tick (✓) the correct option :**

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

**B. Fill in the blanks :**

1. Luminous                      2. equal                      3. regular  
4. virtual                      5. perpendicular                      6. magnified  
7. converging                      8. Newton

**C. State whether the following statements are True or False :**

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

**D. Match the following columns :**

1. (e)    2. (d)    3. (c)    4. (f)    5. (g)    6. (b)  
7. (a)

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

1. The laws of reflection are :  
(i) The incident ray, the reflected ray and the normal at the point of incident, all lie in the same plane.  
(ii) The angle of incidence is equal to angle of reflection *i.e.*,  $\angle i = \angle r$ .
2. The nature of image formed by a plane mirror is virtual, upright and of the same size as the object.
3.  $\angle i = \angle r$
4. Virtual image is the image that cannot be taken on screen. The formation of these images does not involve any real intersection of light rays.
5. Real image is the image that can be taken on screen as it is formed the real intersection of light rays.
6. Concave mirror is used in the headlight of a car.
7. A real image is formed on a cinema screen.
8. When you stand in front of a mirror and raise your right hand. You will see that your left hand seems to be raised in the mirror. Your hands seem to be interchanged. This behaviour is known as lateral inversion.
9. Concave mirror can form a real image.

10. Concave mirror are used as reflectors in torches and car headlights to form a powerful beam of light.

Convex mirror are used as street light reflectors because they able to spread light over a bigger area.

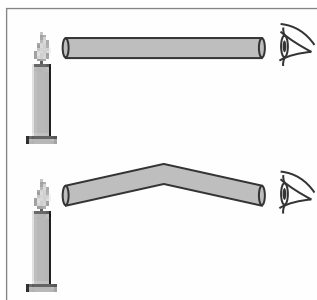
11. A convex lens is converging lens because a convex lens usually magnifies images.

A concave lens is called diverging lens because it diverges all the light passing through it.

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

1. The property of light to travel in a straight line is called rectilinear propagation of light. Let us understand it with an activity.

- (i) Place a light candle on a table.
- (ii) Place the straight hollow plastic tube in a line with the flame of the candle.
- (iii) Keep one eye closed and try to see the candle through this hollow tube.
- (iv) Observe the flame of the candle when the tube is straight.
- (v) Now, bend the tube and try to see the flame of candle again.



**Observation :** The flame cannot be seen through the bend tube.

**Conclusion :** This activity verifies that light travels in a straight line.

2. To show that light travels in a straight line.

**Materials Required :** A straight hollow plastic tube, a candle and a match box.

**Procedure :**

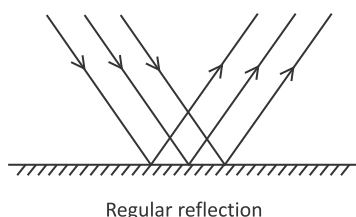
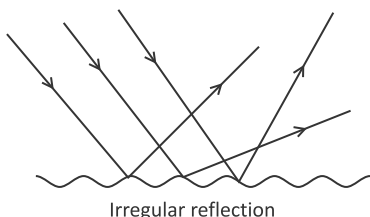
- (i) Place a light candle on a table.
- (ii) Place the straight hollow plastic tube in a line with the flame of a candle.
- (iii) Keep one eye closed and try to see the candle through this hollow tube.
- (iv) Observe the flame of the candle when the tube is straight.
- (v) Now, bend the tube and try to see the flame of candle again.

**Observation :** The flame can not be seen through the bend tube.

**Conclusion :** This activity verifies that light travels in a straight line.

3. **Regular reflection :** When a beam of parallel lights rays is incident on a smooth or a plane surface, the reflected rays will also be parallel. This type of reflection is called regular reflection.

**Irregular reflection** : When a beam of parallel light rays is incident on a rough surface, the reflected rays scatter in different directions . This type of reflection is called irregular reflection.



4. **Objective** : To observe reflection of light.

**Materials Required** : A looking glass.

**Procedure:**

- (i) Stand out in the sun, near a wall.
- (ii) Now, hold a plane mirror such as a looking glass in such a way that the sunlight falls on the glass and from the glass to the wall.



**Observations** : The mirror bounces back the light falling on its surface.

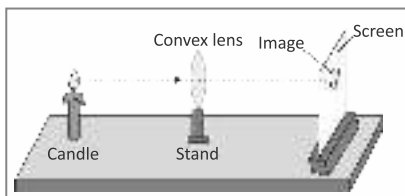
**Conclusion** : By turning the mirror, we can reflect light in all directions.

5. **Objective** : To study image formation by concave and convex lens.

**Materials Required** : A concave lens, a convex lens, a lens holder, a candle and a screen.

**Procedure:**

- (i) Mount a convex lens on a lens holder and place a lighted candle at a distance of about 50 cm from the lens.
- (ii) Also place a white screen on the table, on the other side of the lens.
- (iii) Now, adjust the distance of the candle from the lens, try to obtain an image of the candle on the screen.
- (iv) We may have to move the screen towards or away from the lens to get a sharp image of the flame.
- (v) Now, vary the distance of the candle from the lens.
- (vi) Try to obtain the image of the candle flame every time on the screen by moving.
- (vii) Observe and record the nature of the image and its distance from the lens.

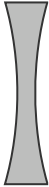



### Observations:

- (i) When the object is far away from the lens, the image is very close to the lens, real and inverted.
- (ii) As the object is brought closer to the lens, the image becomes bigger and moves further away from the lens.
- (iii) When the object is very close to the convex lens, a virtual, erect and magnified image is formed. It is also formed on the same side of the lens. This type of image which is formed on the same side of the lens, is used as a magnifying glass to read the small letters of script.

6.

### Difference between Concave Lens and Convex Lens

S. N.	Concave Lens	Convex lens
1.	It is thicker at the edges and thinner at the middle.	It is thicker at the middle and thinner at the edges.
2.	It is a diverging lens.	It is a converging lens.
3.	When the lens is held close to the object, the image formed is virtual, erect and diminished.	When the lens is held close to the object, the image formed is virtual, erect and magnified.
4.	<p style="text-align: center;">Diverging lens</p>  <p style="text-align: center;">Concave lens</p>	<p style="text-align: center;">Converging lens</p>  <p style="text-align: center;">Convex lens</p>

7. A Newton's disc is a disc, with segments in rainbow colours. When the disc is rotated, the colours fade to white. In this way Isaac 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.



### Learning With Fun

#### A. Picture Talk :

The image formed by a plane mirror is laterally inverted. This is the reason why the word **AMBULANCE** is written in an inverted manner **ƆИИΛJUBMΛ** on an ambulance. van. This is done so that the other vehicles ahead of the ambulance can see the word **AMBULANCE** clearly in the rear view mirror and give way immediately.

**B. Research and Project :**

Do yourself.

**C. Activity :**

Do yourself.

**D. Group Discussion :**

Do yourself.

**CHAPTER**  
**12 Forests : Our Lifeline**



**EXERCISE**

**A. Tick (✓) the correct option :**

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

**B. Fill in the blanks :**

1. Emergent                      2. transpiration                      3. Fungi, bacteria  
4. food web                      5. humus                      6. erosion  
7. wind, water                      8. oxygen, carbon dioxide

**C. State whether the following statements are True or False :**

1. True    2. True    3. False    4. False    5. True    6. True  
7. True    8. False

**D. Match the following columns :**

1. (h)    2. (g)    3. (f)    4. (e)    5. (a)    6. (b)  
7. (d)    8. (c)

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

1. An area with large number of trees which serves as a natural habitat for animals and plants.
2. The sequence of who eats whom in a biological community to obtain nutrition is called food chain. For example, grass is eaten by a grasshopper, grasshopper is eaten by a frog, frog is eaten by a snake and snake is eaten by an eagle.
3. The roof formed by the branches of the tall trees over other plants is called canopy.
4. Wood, fruits, fibres, gums, medicines.
5. Emergent layer, canopy layer, understorey layer, forest floor.
6. The green plants make their own food by the process of photosynthesis. These are called producers. Whereas the organisms that eat the autotrophs. These are called consumers.

7. (i) Soil is eroded easily by wind and water.  
(ii) Leads to destruction of different species of plants and animals resulting in disturbance in the food chain.  
(iii) Rainfall becomes scanty if there are no trees.  
(iv) Loss of forest products provided by plants and animals living in the forests.  
(v) Tribes living in the forest may lose their habitat.
8. Fungi and bacteria.

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

1. There are four types of forests in India. These are :
  - (i) **Evergreen forests** : Evergreen forests are found in tropical tract of our country mainly, concentrated in hilly areas with heavy rainfall. They remain green throughout the year.
  - (ii) **Coniferous forests** : These are restricted to Himalayan and Sub-Himalayan regions.
  - (iii) **Deciduous forests** : These forests are found in plateau region of Northern India and parts of central India.
  - (iv) **Scrub forests** : With parched vegetation, poor growth of plants, such forests are spread over drier parts of our country.
2. Plants depend on animals, insects and birds for the process of pollination. Plants also depend upon animals such as bird, rats, squirrels, grazing animals and humans for dispersal of seeds.  
In turn, animal like cows and goats make use of this food made by plants for their survival. Many animals such as birds and arboreal live on trees. Thus, plants provide shelter to animals.
3. In a forest, there are several food chains working at a time. These food chains are interrelated with each other and form the food web. They are more complex than food chains. For example, grass can be food for grasshoppers as well as cows goat, deer, rabbit and horses.
4. Food web shows how plants and animals are connected in many ways to help them survive. They are all connected like a spider web. If one part is removed, it can affect the whole web. For example, if frogs become extinct, the number of grasshoppers would increase rapidly. As a result, they will eat more plants including crops and there will be an acute shortage of plants for other herbivores. Soon, the herbivores would starve to death which in turn will impact the carnivores and the whole food chain gets disturbed. Thus, a balance is always needed in the nature so that the number of species is maintained in an ecosystem.
5. The five main functions of forests are :
  - (i) **Medicinal plants** : Medicinal plants such as Neem, Amla, Eucalyptus and cinchona are also produced from forests.

- (ii) **Fruits and nuts** : We get fruits and dry fruits from forest. Apple orange, pear, mango, lychee, coconut, etc. grow in forests. We also get several nuts and spices from plants growing in forests.
  - (iii) **Fibres** : Plant fibre has many uses. Jute is derived from the stems of jute plants. The leaves of hemp and sisal are used to make fabrics for various applications.
  - (iv) **Absorbs carbon dioxide** : Forests absorb carbon dioxide from the atmosphere during the process of photosynthesis.
  - (v) **Supply oxygen** : Plants and trees release oxygen during photosynthesis. This provides all animals including us with oxygen to breathe and helps to maintain the appropriate ratio of oxygen to carbon dioxide in the atmosphere.
6. Increasing human population and modernization has resulted in the cutting down of forests on a large scale. This is called deforestation.

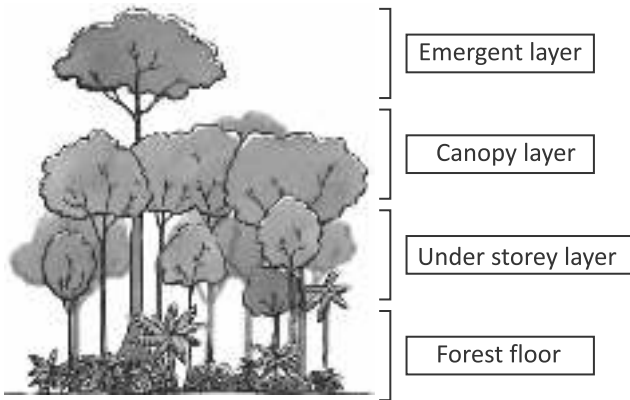
**Effects of deforestation :**

- (i) Leads to destruction of different species of plants and animals resulting in disturbance in the food chain.
  - (ii) Soil is eroded easily by wind and water.
  - (iii) Rainfall becomes scanty if there are no trees.
  - (iv) Loss of forest products provided by plants and animals living in the forests.
  - (v) Increased levels of carbon dioxide in the atmosphere due to the absence of trees may lead to global warming which in turn can melt polar ice caps.
7. Here are some steps to conserve forests :
- (i) **Afforestation** : Afforestation is planting of trees in barren lands to increase the area under forests.
  - (ii) **Control over forest fire** : Forests get destroyed by fire due to natural processes like lightning or by friction between trees during speedy winds or due to negligence from humans.
  - (iii) **Protection from overgrazing** : Overgrazing of cattle, sheep, horses etc. in forests should be checked regularly.
  - (iv) **Role of government in forest conservation** : Strict laws should be formed by the government of a country to protect national parks, wildlife sanctuaries of a country to protect national parks, wildlife sanctuaries and biosphere reserves.
  - (v) **Creating public awareness** : Create awareness among people to save the forests by making them aware of the importance of forests and the ill effects of deforestation.



## Learning With Fun

### A. Picture Talk :



### B. Research and Project :

Do yourself.

### C. Activity :

Do yourself.

### D. Group Discussion :

Do yourself.

## CHAPTER 13 Wastewater Story



## EXERCISE

### A. Tick (✓) the correct option :

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

### B. Fill in the blanks :

1. manhole                      2. bacteria                      3. grit separation  
4. sedimentation              5. Biogas                        6. chlorine, ozone  
7. septic                         8. chemical

### C. State whether the following statements are True or False :

1. False    2. False    3. True    4. True    5. True    6. True  
7. True    8. False

**D. Match the following columns :**

1. (f)    2. (a)    3. (c)    4. (d)    5. (g)    6. (e)    7. (b)

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

1. Water that is discarded after use is called wastewater.
2. Metals, nitrates.
3. Chlorine.
4. In bio-toilets, waste matter is converted to methane and water.
5. A channel of pipes that carries out sewage from our houses is called sewer system.
6. A manhole is an opening from the surface to the sewer, for a person to enter to repair or change the sewer pipes in case of a leakage.
7. The solid wastes that settle at the bottom in the primary treatment of waste water is called sludge.

**Uses of sludge :**

- (i) Sludge is used as manure.
  - (ii) It produces biogas which can be used either as a fuel or to produce electricity.
8. Storm water is the runoff water after it rains or snows.
  9. If we keep the drains closed, the drain water will not flow out and it will also help us in keeping our surroundings clean.
  10. Chlorine gas is passed through treated sewage because it kills disease causing organisms.
  11. Sewer system gets block because of plastic bags and overflow.

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

1. Water pollution is the contamination of water bodies as lakes, rivers, ground water and oceans. Water pollution occurs due to the discharge of undesirable substances into natural water bodies. Sources of water pollution :
  - (i) Sewage pipes are released various microbes, disinfectants and detergents into water bodies.
  - (ii) Agricultural farms release fertilizers and pesticides into large water bodies through canals.
  - (iii) Water bodies are exposed to toxic metals and sulphur due to mining activities.
2. Domestic wastewater contains anything that might go down the drain, for example- soaps, bits of food, hairs, human excreta, urine, tooth paste detergent etc. Many disease causing microorganisms are also present in this water. Such a liquid waste which has dissolved and suspended impurities called sewage.

**Sources of Sewage**

- (i) **Organic impurities** : Human faces, animal waste, urea, pesticides, herbicides, oil, fruit and vegetable wastes.

(ii) **Inorganic impurities** : Metals, nitrates, phosphates, etc.

(iii) **Nutrients** : Nitrogen and phosphorus.

(iv) **Microorganisms** : Organisms which cause cholera, typhoid, hepatitis, jaundice and many other diseases.

- The sewer system or the wastewater system consists of a network of big and small pipes called sewers. This sewage is collected through a network of pipes forming the sewer system. The sewer system carries sewage from the point of production to the point of disposal (treatment plant).
- The government is unable to provide proper sanitation through underground drainage to every place. To avoid these problems, low-cost onsite sewage disposal systems should be used. These system collect human excreta and store it in a hole or a pipe and later direct it to a sewage treatment plant.

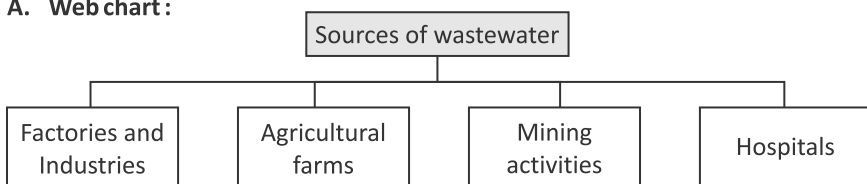
Some of these alternative methods of sewage disposal are septic tanks, biotoilets, chemical toilets, vermicomposting toilets.

- The wastewater from the washroom, kitchen and balcony of every house goes down the drain. The pipes from each house are connected to a sewer main. The sewer main flows into larger pipes until they reach the treatment plant (WWTP).
- Crowded places such as bus stations, railway stations, airports and hospitals always face the problem of poor sanitation. Since a large number of people gather at these places, the waste generated is also large. Rainy season worsens this problem often there are mud pools on the road and sewers overflow due to lack of maintenance. This becomes a breeding ground for flies, mosquitoes and other insects.



## Learning With Fun

### A. Web chart :



### B. Research and Project :

Do yourself.

### C. Activity :

Do yourself.

### D. Group Discussion :

Do yourself.