

**CLASS-7**  
**Chapter-1**

**EXERCISE**

A. 1. Leaves 2. Stomata 3. Carbon dioxide 4.  $C_6H_{12}O_6$  5. Fungus

B. 1. Living things need food to get energy, grow, repair their body, and stay healthy.

2. The main nutrients in food are carbohydrates, proteins, fats, vitamins, and minerals.

3. Autotrophs: Organisms that make their own food.

(Example: Green plants)

Heterotrophs: Organisms that depend on others for food.

(Example: Animals, humans)

4. Carbon dioxide + Water  $\rightarrow$  (Sunlight)  $\rightarrow$  Glucose + Oxygen

Or

$6CO_2 + 6H_2O \rightarrow$  (Sunlight)  $\rightarrow C_6H_{12}O_6 + 6O_2$

5. Lichens are organisms made of algae and fungi living together in a close partnership.

D. 1. The plant is called Pitcher Plant. It gets its nutrition by trapping and digesting insects. It grows in soil that is poor in nitrogen.

2. Plants get nitrogen from the soil in the form of nitrates.

These are made by certain bacteria that change nitrogen from the air into a form plants can use. Some plants also get nitrogen through a symbiotic relationship with nitrogen-fixing bacteria.

3. Saprotrophs are organisms like fungi and some bacteria that feed on dead and decaying matter. They release special juices (enzymes) on dead material to break it down and absorb the nutrients.

4. A symbiotic relationship is when two different organisms live closely together and help each other.

For example:

- Lichens are made of an alga and a fungus. The alga makes food, and the fungus gives protection and support.
- Rhizobium bacteria live in the roots of leguminous plants and provide nitrogen to the plant.

5. Insectivorous plants are plants that trap and eat insects to get extra nutrients, like nitrogen. In the pitcher plant, the pitcher is a special leaf shaped like a cup. Insects fall inside the pitcher, and the plant digests them with juices to absorb nutrients.

6. Photosynthesis is the process by which green plants make their own food. They use carbon dioxide from the air and water from the soil. With the help of sunlight and chlorophyll (the green pigment in leaves), they make glucose (food) and release oxygen into the air. The equation is:

Carbon dioxide + Water  $\rightarrow$  (Sunlight, Chlorophyll)  $\rightarrow$  Glucose + Oxygen

D. 1. Plants need sunlight for photosynthesis, and since there is no sunlight at night, they cannot make food.

2. To reduce water loss, desert plants have spines instead of leaves, which helps them survive in hot and dry conditions.

3. Algae have chlorophyll to make food through photosynthesis, but fungi do not have chlorophyll and get food from dead or decaying matter.

4. Parasitic plants take water and nutrients from the host plant, which weakens and harms the host.

5. They have nitrogen-fixing bacteria in their roots that convert nitrogen from the air into nutrients for the soil, making it fertile.

E. 1. Chlorophyll 2. Sugar 3. Oxygen 4. Cuscuta 5. Sundew

### **WORD MAZE**

1. CHERRIES 2. TOMATO 3. CAULIFLOWER 4. SUNFLOWER 5. APPLE

6. PINEAPPLE 7. RADISH 8. SPINACH 9. BANANA

The world's biggest flower is RAFFLESIA.

### **HOTS Questions**

1. Because plants give out carbon dioxide at night, which can make the air unhealthy to breathe.
2. Because some mushrooms are poisonous and can be very harmful to our health.
3. Because manures are natural and do not harm the soil, while fertilisers are made of chemicals that can damage the soil over time.

### **Assertion-Reason Questions**

1. Both A and R are true and R is the correct explanation of A.
2. Both A and R are true and R is the correct explanation of A.
3. Both A and R are true and R is the correct explanation of A.
4. Both A and R are true and R is the correct explanation of A.
5. A is true but R is false.

## Case based Questions

(a) *Cuscuta* (also known as Amarbel)

(b) *Parasitic nutrition*

(c) The *Cuscuta* plant absorbs water and nutrients from the host tree, leaving the tree weak and deficient in nutrients. As a result, the tree's leaves cannot perform photosynthesis properly, leading them to turn yellow due to a lack of essential nutrients like nitrogen and chlorophyll.

## Chapter-2

### EXERCISE

A. 1. Proboscis 2. Tongue 3. Beak 4. Sucking tube 5.

Pseudopodia

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

C. 1. sweet 2. four 3. crown 4. four 5. stomach

D. 1. Digestion is the process by which the food we eat is broken down into simple, soluble substances that our body can easily absorb and use for energy, growth, and repair.

2. Incisors – For cutting food.

- Canines – For tearing food.
- Premolars – For crushing and grinding food.
- Molars – For grinding food.

3. The tongue helps in mixing food with saliva, making it soft. It helps in swallowing food. It has taste buds to taste different flavours.

4. Hydrochloric acid kills harmful germs in the food. It helps in the digestion of proteins. It makes the stomach acidic for digestive enzymes to work.

5. A ruminant stomach has four chambers:

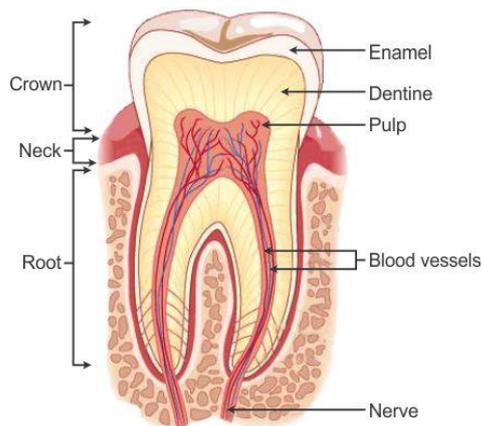
1. Rumen 2. Reticulum 3. Omasum 4. Abomasum

F. 1. The process of digestion in humans takes place in the following steps:

- Mouth: Digestion begins in the mouth where food is chewed by teeth and mixed with saliva. Saliva breaks down starch into sugar.
- Food Pipe (Oesophagus): The chewed food passes down the food pipe to the stomach through a movement called peristalsis.
- Stomach: In the stomach, food is mixed with digestive juices and hydrochloric acid which help break down proteins and kill germs.
- Small Intestine: Here, bile from the liver and digestive juices from the pancreas help in further digestion. The food is broken into simple forms like glucose, amino acids, and fatty acids.
- Absorption: The digested food is absorbed by the villi in the small intestine.
- Large Intestine: Water is absorbed, and the undigested waste is passed out of the body through the anus.

2. A tooth has the following parts:

- Crown: The visible part of the tooth.
- Neck: The part between the crown and the root.
- Root: The part of the tooth fixed inside the jaw.
- Enamel: The hard outer covering of the tooth.
- Dentine: The layer below the enamel.
- Pulp: The soft part inside the tooth containing nerves and blood vessels.



3. Liver: It produces bile juice which helps in digesting fats. It stores nutrients and vitamins. It removes harmful substances from the blood.

Pancreas: It produces pancreatic juice which helps digest carbohydrates, proteins, and fats. It controls the sugar level in the blood by producing insulin.

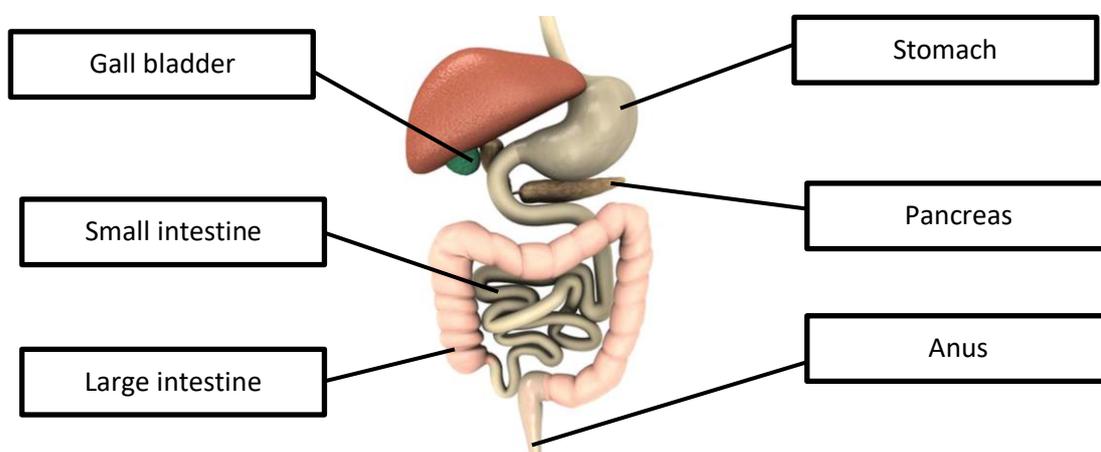
4. Villi are small finger-like projections inside the walls of the small intestine. They increase the surface area for better absorption of digested food into the blood.

5. Assimilation is the process by which absorbed nutrients are used by the body to build new cells and provide energy.

Importance:

- It helps in growth and repair of body tissues.
- It provides energy for various body functions.

G.



H. 1. Incisors 2. Enamel 3. b. Three 4. Oesophagus 5. Proteins  
6. Pancreas 7. Small intestine 8. Cellulose

### **MISCELLANEOUS QUESTIONS**

1. Mouth (Buccal cavity) 2. Stomach (by Hydrochloric acid)  
3. Liver 4. Rectum 5. Anus

### **WORD MAZE**

1. SHEEP 2. HORSE 3. AMOEBEA 4. RHINOCEROS 5.

KANGAROO

SHARK is a water animal can detect 1 part of animal blood in  
100 billion parts of water.

### **Assertion-Reason Questions**

1. *Assertion is true but reason is false.*
2. *Assertion is true but reason is false.*
3. *Assertion is false but reason is true.*
4. *Both assertion and reason are true and reason is the correct explanation of assertion.*
5. *Both assertion and reason are true but reason is not the correct explanation of assertion.*

### **Case based/Passage based Questions**

(a) A tooth cavity is a hole or decay in the tooth caused by bacteria.

It occurs when germs in the mouth act on leftover sugars from sweets and chocolates, producing acids that slowly damage the tooth's hard covering, leading to cavities.

(b) The hard covering of the tooth is called enamel.

(c)

Types of Teeth	Functions
Incisors	Cutting and biting food.
Canines	Tearing food.
Premolars	Crushing and grinding food.
Molars	Grinding food into pieces.

### Chapter-3

#### EXERCISE

A. 1. Thermometer 2. 100°C 3. 37°C 4. No 5. Mercury

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

C. 1. Metal, Copper, Aluminium 2. Wood, Rubber, Plastic

D. 1. Temperature is a measure of the average kinetic energy of the particles in a substance, indicating how hot or cold it is.

2. The two scales of temperature measurement are the Celsius scale and the Fahrenheit scale.

3. A clinical thermometer is used to measure the body temperature of a person to check if they have a fever or to monitor their health.

4. Heat is transferred through three main processes: conduction, convection, and radiation.

5. A laboratory thermometer is used to measure temperature in the laboratory.

E. 1. Celsius scale: The Celsius scale (°C) is based on the freezing point (0°C) and the boiling point (100°C) of water at standard atmospheric pressure (1 atmosphere).

Fahrenheit scale: The Fahrenheit scale (°F) is based on the freezing point (32°F) and the boiling point (212°F) of water at standard atmospheric pressure.

Key Differences:

- The Celsius scale is used more widely around the world, especially in scientific contexts.
- The Fahrenheit scale is mostly used in the United States.
- The interval between the freezing and boiling points is  $100^{\circ}\text{C}$  in Celsius, while it's  $180^{\circ}\text{F}$  in Fahrenheit.

2. Conduction is the transfer of heat through a material without the movement of the material itself. In solids, heat is transferred from the hot end to the cold end by the vibration and collision of particles.

Activity to demonstrate conduction:

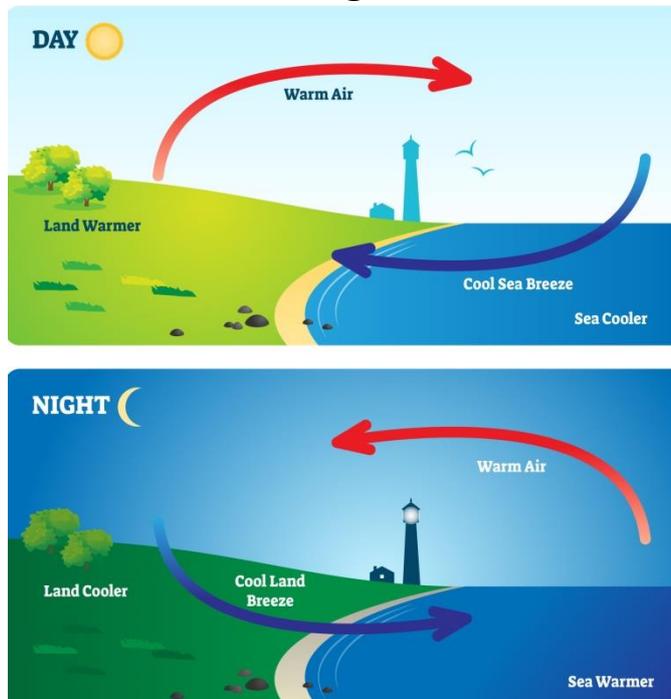
- Take a metal rod and heat one end using a Bunsen burner.
- After a while, touch the other end of the rod (use caution).
- You will feel the other end becoming hot as well, showing that heat has traveled from the hot end to the cold end through conduction.

3. Clinical thermometer: A clinical thermometer is used to measure body temperature. It has a small temperature range ( $35^{\circ}\text{C}$  to  $42^{\circ}\text{C}$ ) and is designed to be safe for human use, often with a constriction to prevent the mercury from falling back after reading.

Laboratory thermometer: A laboratory thermometer is used to measure the temperature of substances in a laboratory setting. It has a broader temperature range (typically from  $-10^{\circ}\text{C}$  to  $110^{\circ}\text{C}$  or more) and is more precise, usually without any constriction.

4. Land breeze: At night, land cools down faster than the sea, making the air over the land cooler and denser. The cooler air from the land moves towards the sea, creating a land breeze.

Sea breeze: During the day, land heats up faster than the sea, causing the air over the land to rise. The cooler air from the sea moves inland, creating a sea breeze.



5. A thermos flask is a container used to keep liquids hot or cold for a long period of time. It works on the principle of minimizing heat transfer.

Construction:

- A thermos flask consists of two containers: an inner container and an outer container. Both are usually made of glass or stainless steel.
- The space between the two containers is a vacuum, which prevents heat transfer by conduction or convection.
- The inner surface of the flask is usually silvered to reflect heat back into the liquid, minimizing heat loss by radiation.

Working:

- For hot liquids: The vacuum prevents heat from escaping through conduction or convection. The silvered

surface reflects heat back into the liquid, keeping it warm.

- For cold liquids: The vacuum prevents heat from entering the flask, and the silvered surface prevents heat from the outside environment from entering the flask, keeping the liquid cool.

F. 1. Light-coloured clothes reflect more sunlight and heat, which helps keep the body cool. Dark-coloured clothes absorb more heat, making you feel warmer in the summer.

2. The kink in a clinical thermometer prevents the mercury from flowing back once it has been raised. This ensures that the temperature reading stays at the highest point reached until it is manually shaken down.

3. A clinical thermometer is designed to measure body temperature, which generally falls within a narrow range (around 35°C to 42°C). It doesn't need to measure a wide range of temperatures, as it is specifically for medical use.

4. The handles of cooking utensils are made of insulators (like wood, plastic, or rubber) to prevent heat from transferring to your hands, making it safer to hold the utensil while cooking.

5. Solar panels have a black metal sheet because black surfaces absorb more sunlight than other colours. This allows the panel to capture more solar energy, improving its efficiency in converting sunlight to electricity.

G. 1. 186.8° F 2. 7.22° C 3. 98.6° F 4. 48.89° C

H. 1. Radiation – Heat from the Sun reaches the Earth through the vacuum of space via radiation.

2. Conduction – Heat is transferred from the flame to the vessel by direct contact between the flame and the vessel.

3. Conduction – Heat is transferred from the hot tea to the handle of the spoon through direct contact.

1. b. Not flow from iron ball to water or from water to iron ball
2. Becomes cold by the process of conduction
3.  $0^{\circ}$
4. Air
5.  $98.4^{\circ}\text{F}$

### **HOTS Questions**

1. Birds puff up their feathers in winter to trap a layer of air beneath them, which acts as insulation. This trapped air helps to keep their body warm by reducing heat loss to the environment. The puffed-up feathers create a barrier that prevents cold air from reaching the bird's body, thus conserving body heat.
2. Fire fighters wear bright and shiny suits primarily for safety and visibility. The shiny surface of the suit reflects heat and helps to protect the fire fighter from the extreme temperatures encountered while fighting fires. Additionally, the bright colour makes fire fighters easily visible in low-light or smoky environments, helping to ensure their safety and enabling others to locate them quickly during rescue operations.

### **Assertion-Reason Questions**

1. If both assertion and reason are true and reason is the correct explanation of assertion.
2. If both assertion and reason are true and reason is the correct explanation of assertion.
3. If both assertion and reason are true and reason is the correct explanation of assertion.
4. If assertion is false but reason is true.

## Case-based Questions

1. Conduction is the process of heat transfer through direct contact between particles of a material. In this process, heat energy is transferred from the hotter part of the substance to the cooler part without the movement of the material itself. Conduction primarily takes place in solids, especially in metals, as their particles are closely packed, allowing faster transfer of heat. Good conductors of heat include metals like iron, copper, and aluminium.

2. Convection is the process of heat transfer that occurs due to the movement of the fluid (liquid or gas). As a fluid is heated, it expands, becomes less dense, and rises, while cooler fluid sinks to take its place, creating convection current. This process helps in the transfer of heat. An example of convection in daily life is boiling water in a pot. The hot water at the bottom of the pot rises, while the cooler water moves down, creating a circulating flow.

3. The shiny outer surface of a thermos flask helps in minimizing heat transfer by radiation by reflecting the heat radiation away from the flask. The shiny surface has a high reflectivity, which means it reflects most of the infrared radiation (heat) rather than absorbing it. This reduces the amount of heat that is transferred into or out of the flask, maintaining the temperature of the contents inside.

## REVISION TIME-1

A. 1. Sugar 2. Sarracenia 3. Pancreas 4. Cotton 5. 37°C

B. 1. Chlorophyll 2. Stomata 3. Tooth enamel 4. Incisors 5. Sericulture

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

- D. 1. Photosynthesis is the process by which green plants make their own food using sunlight, water, and carbon dioxide, producing oxygen as a byproduct.
2. Lichens are a symbiotic association between a fungus and an alga or a cyanobacterium. They can grow in diverse environments and are known to be sensitive to pollution.
3. Toothache is a pain or discomfort in the teeth or jaws, usually caused by tooth decay, gum disease, or injury to the teeth.
4. Sheep, goats, alpacas, and camels.
5. A clinical thermometer is used to measure the body temperature of a person to check for fever or other medical conditions.

## Chapter-4

### EXERCISE

- A. 1. Sour 2. Bitter 3. Litmus 4. Lichen 5. Phenolphthalein
- B. 1. animals and plants 2. base 3. hydrogen 4. red 5. bases
- C. 1. Acidic 2. Acidic 3. Neutral 4. Basic 5. Neutral 6. Acidic
- D. 1. Mineral acids: Sulphuric acid, Hydrochloric acid  
Organic acids: Citric acid, Acetic acid
2. A litmus paper is used to test whether a substance is acidic or basic. If the paper turns red, the substance is acidic; if it turns blue, the substance is basic.
3. Magnesium hydroxide is commonly used as an antacid.
4. Litmus, Phenolphthalein and China rose
5. When an acid reacts with a base, a neutralisation reaction occurs, producing water and a salt. For example, hydrochloric acid (HCl) reacting with sodium hydroxide (NaOH) produces water (H<sub>2</sub>O) and sodium chloride (NaCl).
- E. The uses of at least five acids:

- Sulphuric acid ( $\text{H}_2\text{SO}_4$ ): Used in car batteries, as a dehydrating agent, and in the manufacture of fertilizers.
- Hydrochloric acid ( $\text{HCl}$ ): Used in cleaning metal surfaces, and in the production of chloride compounds.
- Citric acid ( $\text{C}_6\text{H}_8\text{O}_7$ ): Found in citrus fruits and used in food and beverages as a preservative and flavouring agent.
- Acetic acid ( $\text{CH}_3\text{COOH}$ ): Used in the preparation of vinegar, as a solvent, and in food preservation.
- Nitric acid ( $\text{HNO}_3$ ): Used in the manufacture of fertilizers, explosives, and as a cleaning agent.

## 2. Acids:

- Taste sour (e.g., lemon juice, vinegar).
- Release hydrogen ions ( $\text{H}^+$ ) in water.
- Turn blue litmus paper red.
- Examples: Hydrochloric acid, sulphuric acid.

## Bases:

- Taste bitter and feel slippery (e.g., soap, baking soda).
- Release hydroxide ions ( $\text{OH}^-$ ) in water.
- Turn red litmus paper blue.
- Examples: Sodium hydroxide, potassium hydroxide.

## 3. China rose (Hibiscus) petals can be used as a pH indicator.

If the petals are soaked in water, they will change colour depending on the pH:

- In an acidic solution, the petals will turn red.
- In a basic solution, the petals will turn green.
- In a neutral solution, the colour will remain the same (often a pinkish colour).

4. Neutralisation is a chemical reaction in which an acid and a base react to form water and a salt, thereby neutralising each other. For example, when hydrochloric acid ( $\text{HCl}$ ) reacts with

sodium hydroxide (NaOH), they produce water (H<sub>2</sub>O) and sodium chloride (NaCl).

Acid + Base → Salt + Water

5. Acidic soil (low pH) can hinder the growth of crops by making essential nutrients less available to plants. It can also damage plant roots and negatively affect soil microorganisms.

Acidic soil can be neutralised by adding lime (calcium carbonate), which raises the pH of the soil and makes it more suitable for plant growth.

F. 1. Bases are called antacids because they can neutralize excess stomach acid. When bases (such as magnesium hydroxide) are ingested, they neutralize hydrochloric acid (HCl) in the stomach, thereby reducing acidity and providing relief from conditions like acid reflux or heartburn.

2. Alkalis are a subset of bases that are water-soluble and release hydroxide ions (OH<sup>-</sup>) when dissolved in water. For example, sodium hydroxide (NaOH) is an alkali because it dissolves in water to form hydroxide ions. However, not all bases dissolve in water, such as copper(II) hydroxide, so all alkalis are bases, but not all bases are alkalis.

3. Strong acids, like sulphuric acid or hydrochloric acid, are highly corrosive and can cause severe burns upon contact with skin or eyes. They can also release harmful fumes. Therefore, they should be handled with great care, using proper safety equipment like gloves, goggles, and fume hoods, to avoid injury or damage.

4. Neutralisation reactions are exothermic, meaning they release energy in the form of heat. When an acid reacts with a base to form water and a salt, the reaction releases heat,

causing the temperature of the mixture to rise. This is a characteristic feature of neutralisation reactions.

5. Factory waste, especially if it contains acidic or basic substances, can be harmful to the environment. If acidic or basic waste is directly disposed of in a river, it can alter the pH of the water, harming aquatic life and disrupting ecosystems. Neutralising the waste before disposal ensures that the water remains at a safe pH level, preventing pollution and protecting the environment.

G.

Acids	Sources
Lactic acid	Curd
Tartaric acid	Tamarind
Malic acid	Apple
Citric acid	Lemon
Oxalic acid	Tomato
Acetic acid	Vinegar

H. 1. Sulphuric acid 2. Hydroxyl group 3. Hydrochloric acid 4. Formic acid 5. Nausadar

### **WORD MAZE**

1. MANGO 2. TOMATO 3. APPLE 4. GRAPES

AMLA is the richest source of ascorbic acid.

### **HOTS Questions**

Manu can use indicators to identify which drink is acidic, basic, or neutral. Here's how he can proceed:

1. For the acidic drink:

Manu can use litmus paper. If the drink turns blue litmus

paper red, then it is acidic and should be served to the customer who wants an acidic drink.

2. For the basic drink:

If the drink turns red litmus paper blue, then it is basic and should be served to the customer who wants a basic drink.

3. For the neutral drink:

If the drink does not change the color of either the red or blue litmus paper, it means the drink is neutral and can be served to the customer who wants a neutral drink.

By using this simple method with litmus paper, Manu can quickly identify which drink belongs to which category and serve them accordingly.

### **Assertion-Reason Questions**

1. If both assertion and reason are true but reason is not the correct explanation of assertion.
2. If both assertion and reason are true but reason is not the correct explanation of assertion.
3. If both assertion and reason are true but reason is not the correct explanation of assertion.
4. If both assertion and reason are true but reason is not the correct explanation of assertion.
5. If both assertion and reason are true but reason is not the correct explanation of assertion.
6. If both assertion and reason are true but reason is not the correct explanation of assertion.

### **Case based/Passage based Questions**

- (a) The acid responsible for curdling of milk is lactic acid.
- (b) Baking soda is basic in nature. When added to fresh milk, it neutralizes the lactic acid (which causes the milk to sour

and curdle). This neutralization process prevents the milk from turning sour and curdling, thereby extending its freshness for a longer time.

(c) A neutralization reaction is a chemical reaction in which an acid reacts with a base to form a salt and water. This reaction results in the neutralization of the acidic or basic properties of the substances involved.

Example: The reaction between hydrochloric acid (stomach acid) and magnesium hydroxide (an antacid) to form magnesium chloride and water is a neutralization reaction. This is a common example of using an antacid to neutralize excess stomach acid and relieve indigestion.

## Chapter-5

### EXERCISE

A. 1. Temporary 2. Chemical change 3. Heat 4. Fe 5. Iron oxide

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

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

D. 1. Physical Change: A physical change alters the appearance or state of a substance but does not change its chemical composition. It is usually reversible.

Example: Melting of ice into water.

Chemical Change: A chemical change results in the formation of one or more new substances, and it is often irreversible.

Example: Burning of wood to form ash and gases.

2. Four Uses of Chemical Changes:

- Food Preservation: Chemical changes like fermentation are used in preserving food items, such as in making pickles or yogurt.
- Energy Production: Chemical reactions, like combustion (burning), are used in power plants to produce electricity.
- Medicine: Chemical changes are used in pharmaceutical industries to create drugs, vaccines, and other medical treatments.
- Manufacturing of Materials: Chemical changes are used in creating new materials, like the formation of alloys (e.g., steel) or synthetic plastics.

3. Rusting is the process of the gradual degradation of iron or its alloys when they react with oxygen and moisture (water), forming iron oxide, commonly known as rust. It is a type of chemical change.

4. An alloy is a mixture of two or more metals, or a metal and a non-metal, which is made to enhance the properties of the base metal.

Examples:

- Steel (an alloy of iron and carbon)
- Bronze (an alloy of copper and tin)

5. For iron to rust, the following conditions are required:

- Presence of oxygen (usually from air)
- Presence of moisture (water or high humidity)
- Slightly acidic conditions (can speed up the rusting process)

E. 1. The formation of curd from milk is a chemical change because it involves a chemical reaction between the lactose in milk and the bacteria (lactic acid bacteria). The bacteria produce lactic acid, which causes the proteins in milk (mainly

casein) to coagulate and form curd. This process results in the formation of a new substance (curd), which has different properties from milk. The change is irreversible, and the original substance (milk) cannot be recovered from the curd, proving it's a chemical change.

2. When baking soda (sodium bicarbonate) is mixed with lemon juice (which contains citric acid), a chemical change occurs. The reaction between the acid (citric acid) and the base (sodium bicarbonate) produces carbon dioxide gas (CO<sub>2</sub>), water, and sodium citrate.

The formation of bubbles is due to the release of carbon dioxide gas, which is a gas produced during the chemical reaction. Since new substances are formed and the change is irreversible, it is a chemical change.

The reaction can be represented as:



3. The melting of ice is a physical change because when ice (solid water) melts into water, it only undergoes a change in state from solid to liquid without changing its chemical composition. Ice and water are both made of H<sub>2</sub>O molecules, and the change is reversible. If you freeze the water again, it will turn back into ice, proving that no new substances are formed and the process is physical in nature.

4. Methods of preventing rust:

Painting: Applying a layer of paint on iron or steel surfaces prevents oxygen and moisture from reaching the metal, thereby preventing rusting.

Galvanization: Coating iron or steel with a layer of zinc (galvanization) protects it from rust by acting as a barrier

against moisture and air. The zinc layer also corrodes before the iron does, providing sacrificial protection.

5. To obtain copper sulphate crystals, follow these steps:

- Dissolve copper sulphate: Start by dissolving copper sulphate in hot water to make a saturated solution. The water must be heated to help dissolve as much of the copper sulphate as possible.
- Filter the solution: Filter out any insoluble impurities from the solution.
- Evaporation: Allow the solution to cool slowly. As the water evaporates, copper sulphate crystals will start to form.
- Harvest the crystals: Once the crystals have formed and grown, carefully remove them from the solution, and let them dry.

By following this process, you can obtain pure blue copper sulphate crystals.

F. 1. Rusting of iron is faster in coastal areas than in plain areas. In coastal areas, the moisture content in the air is higher due to the presence of seawater. The salt in seawater also accelerates the rusting process by acting as an electrolyte, facilitating the chemical reaction between iron, oxygen, and water. In plain areas, the humidity and salt content are usually lower, which slows down the rusting process.

2. Painting of iron articles prevents them from rusting.

Painting creates a protective barrier between the iron and the external environment, preventing oxygen and moisture from coming into contact with the metal surface. Since rusting requires both oxygen and water, the paint effectively protects the iron from rusting by blocking these elements.

3. Evaporation of water is a physical change. Evaporation is a physical change because it involves the transition of water from liquid to gas due to heat, without altering the chemical composition of the water. The process is reversible; if the water vapor cools down, it will condense back into liquid water.

4. We should not play with fireworks. Fireworks are dangerous because they involve chemical reactions that can lead to explosions. The chemicals used in fireworks can cause burns, injuries, and even fires. Playing with fireworks also increases the risk of accidental injury or death due to mishandling or improper use.

G. 1. Magnesium + Oxygen — Magnesium oxide

2. Carbon + Oxygen — Carbon dioxide

3. Zinc + Hydrochloric acid — Zinc chloride + Hydrogen gas

4. Baking soda + Vinegar — Carbon dioxide + Water + Sodium acetate

5. Copper sulphate + Iron — Iron sulphate + Copper

H. 1. Condensation of water 2. Air 3. Zinc 4. Alloy 5.

Evaporation

### **WORD MAZE**

1. QUARTZ 2. DIAMOND 3. EMERALD 4. GARNET 5. TOPAZ 6. RUBIES

### **HOTS Questions**

1. When an apple is cut, its cells are exposed to oxygen in the air. The browning is due to a chemical reaction called oxidation. Apples contain an enzyme called polyphenol oxidase, which reacts with oxygen and phenolic compounds in the apple to produce melanin, a brown pigment. The iron

present in the apple also contributes to this oxidation process.

2. In desert areas, there is very little moisture in the air due to the dry climate. Rusting requires both moisture (water) and oxygen to occur. Without enough moisture, the chemical reaction that causes rusting (oxidation of iron) cannot take place effectively. Therefore, desert areas experience very little rusting compared to regions with higher humidity.

### **Assertion-Reason Questions**

1. If both assertion and reason are true and reason is the correct explanation of assertion.
2. Assertion is false but reason is true.
3. If both assertion and reason are true but reason is not the correct explanation of assertion.
4. If both assertion and reason are true but reason is not the correct explanation of assertion.
5. Assertion is false but reason is true.

### **Case-based/Passage-based Questions**

(a) Rusting is a chemical process in which iron reacts with oxygen and water, forming iron oxide (rust), which deteriorates the iron and reduces its strength and appearance.

(b) The conditions necessary for rusting are:

1. Presence of oxygen (from air).
2. Presence of water or moisture.
3. Presence of electrolytes (such as salt) can accelerate the rusting process.

(c) Rusting is faster in coastal areas because the air in these regions contains high moisture levels and salt particles from

seawater, which accelerate the oxidation of iron. The presence of salt acts as an electrolyte, speeding up the corrosion process. In plain areas, the air is generally drier, and the absence of salt reduces the rate of rusting.

(d) The rusting of iron can be prevented by:

1. Painting: Applying a layer of paint on iron to protect it from oxygen and moisture.
2. Galvanisation: Coating iron with zinc to prevent direct contact with water and air.
3. Using alloys: Using rust-resistant alloys like stainless steel.
4. Oil or Grease coating: Applying an oil or grease coating to prevent moisture contact.
5. Cathodic protection: Attaching a more reactive metal (such as zinc) to iron, so the more reactive metal corrodes instead of the iron.

### REVISION TIME-2

- A. 1. Milk 2. Chromium 3. Arctic Tern 4. Equator 5. A-horizon
- B. 1. T 2. T 3. T 4. T 5. F
- C. 1. Litmus paper 2. Alloying 3. Migration 4. Camouflage  
5. Percolation
- D. 1. When an acid reacts with a base, they undergo a neutralization reaction, forming salt and water as products.  
2. Rusting of iron requires the presence of oxygen from the air and moisture (water).  
3. The weather of a place is influenced by factors like temperature, humidity, wind speed, and precipitation.  
4. The polar regions are situated at the North Pole and South Pole, at the Earth's extreme northern and southern latitudes.

5. Tornadoes are violent rotating columns of air that extend from a thunderstorm to the ground, characterized by their destructive force and high wind speeds.

## **MODEL TEST PAPER-1**

Self Attempt.

### **Chapter-6**

#### **EXERCISE**

A. 1. Carbohydrates 2. Lactic acid 3. 12-20 4. Carbon dioxide  
5. Stems

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

C. 1. anaerobically 2. more 3. inhalation 4. insects 5. skin

D. 1. Hot water bath or massage helps dilate blood vessels and promotes relaxation of muscles, which improves blood flow and circulation. The increased temperature encourages vasodilation, allowing for better oxygen and nutrient delivery to tissues.

2. When you run, your muscles require more oxygen to produce energy. To meet this demand, the heart pumps faster to circulate oxygenated blood more efficiently throughout the body. This increases the heart rate to supply the body with the necessary oxygen and nutrients.

3. Mountaineers carry oxygen cylinders because the air at high altitudes has lower oxygen levels. To avoid hypoxia (insufficient oxygen), they use oxygen cylinders to ensure their body gets enough oxygen to function properly and avoid altitude sickness.

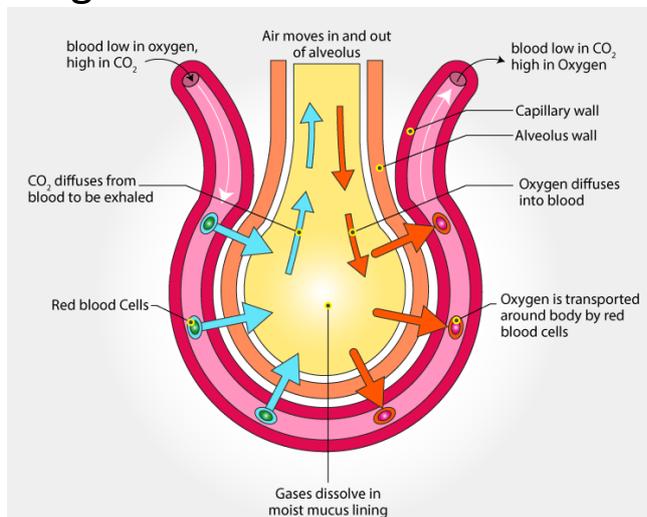
4. Breathing through the nose is better because the nasal passages filter, warm, and humidify the air before it enters

the lungs. The nose also helps remove dust, allergens, and pathogens, providing cleaner air to the lungs. Breathing through the mouth bypasses these filters, potentially allowing harmful particles into the body.

5. Frogs are amphibians, meaning they can survive both in water and on land. They have moist skin that allows them to absorb oxygen directly from water and air. Additionally, they have lungs for breathing on land. This dual breathing mechanism allows frogs to thrive in both environments.

E. 1. Gas exchange in the human lungs occurs in the alveoli. Oxygen from the inhaled air diffuses across the thin walls of the alveoli into the capillaries (blood vessels). At the same time, carbon dioxide, which is a waste product of metabolism in the body, diffuses from the blood in the capillaries into the alveoli to be exhaled.

Diagram:



2. To demonstrate this, you can perform a simple experiment with lime water. Lime water turns milky in the presence of carbon dioxide. If you exhale into a beaker containing lime water, it will turn milky, showing that exhaled air has more carbon dioxide. Inhaled air has less carbon dioxide, so lime water would not change significantly.

3. Cockroaches and other insects breathe through a system of air tubes called tracheae. These tubes open to the outside through small openings called spiracles. The tracheae carry oxygen directly to the body's cells and remove carbon dioxide. This system allows insects to efficiently exchange gases without the need for lungs.

4. Fish breathe through gills. Water enters the fish's mouth and flows over the gills, where oxygen is extracted from the water and carbon dioxide is expelled. The gills are equipped with tiny, thin membranes where gas exchange occurs, allowing the fish to absorb oxygen and release carbon dioxide as the water passes through.

5. Gas exchange in plants occurs through stomata, which are small pores on the surface of leaves. During the day, when photosynthesis occurs, plants take in carbon dioxide and release oxygen. At night, when photosynthesis stops, the process reverses, and plants take in oxygen and release carbon dioxide. Additionally, gases can also move through the plant's stems and roots.

F. 1. All living beings breathe in oxygen because it is essential for cellular respiration. Oxygen is used by cells to break down glucose and produce energy in the form of ATP (adenosine triphosphate), which is necessary for various biological processes.

2. The main difference is that aerobic respiration occurs in the presence of oxygen and produces a large amount of energy (ATP), while anaerobic respiration occurs in the absence of oxygen and produces less energy. Anaerobic respiration also results in byproducts like lactic acid (in animals) or ethanol and carbon dioxide (in yeast and some bacteria).

3. Muscle cramps are caused by the accumulation of lactic acid in muscles due to anaerobic respiration, usually during intense exercise when oxygen supply is insufficient. This buildup disrupts normal muscle function, leading to cramps.

4. No, breathing refers to the physical process of taking in oxygen and expelling carbon dioxide, while respiration is a biochemical process in cells that involves the production of energy by breaking down glucose with or without oxygen.

5. Inhalation is the process of taking air into the lungs, which involves the diaphragm contracting and the rib cage expanding to allow air to enter.

Exhalation is the process of expelling air from the lungs, which occurs when the diaphragm relaxes and the rib cage contracts, pushing the air out.

G. 1. Yeasts 2. Gills 3. Lungs 4. Diaphragm 5. Amoeba

### **Assertion-Reason Questions**

1. If both assertion and reason are true and reason is the correct explanation of assertion.
2. If both assertion and reason are true and reason is the correct explanation of assertion.
3. If both assertion and reason are true but reason is not the correct explanation of assertion.
4. If both assertion and reason are true and reason is the correct explanation of assertion.
5. If assertion is false but reason is true.

### **Case based Questions**

(a) The students suffered from muscle cramps due to lactic acid accumulation in their muscles. During intense physical activity like running a race, the body may not get enough

oxygen for aerobic respiration, leading to anaerobic respiration. This process produces lactic acid as a byproduct. The accumulation of lactic acid in the muscles can cause discomfort and muscle cramps.

(b) The type of respiration that takes place in this case is anaerobic respiration. Since the students were running intensely, their muscles required more oxygen than what was available, leading to anaerobic respiration. The final product of anaerobic respiration in muscles is lactic acid.

(c) Applying a towel soaked in warm water helps to relax the muscles and improve blood circulation. Warmth helps in dilating blood vessels, allowing more oxygen and nutrients to reach the muscles. This can help in the removal of lactic acid buildup and reduces the cramping. The heat also reduces muscle stiffness, providing relief from the cramps.

### **HOTS Questions**

1. We sneeze when we inhale dust-laden air because the dust particles irritate the mucous membranes in the nose and respiratory passages. In response to this irritation, the body triggers a reflex to forcefully expel the dust and other foreign particles from the nose and airways. Sneezing helps clear the airways and protect the lungs from these irritants.

2. Plants do not need a specialized respiratory system because they exchange gases (oxygen and carbon dioxide) directly through their stomata (tiny pores) on leaves and other green parts. Through diffusion, oxygen enters the plant for respiration, and carbon dioxide is released as a byproduct. Since plants don't have lungs or other specialized organs for gas exchange, their simple diffusion process through stomata is enough to meet their needs.

## **WORD MAZE**

1. WALRUS 2. SHEEP 3. PEACOCK 4. SLOTH 5. ELEPHANT

WHALE takes in about 2,000 litres of air during a single breath.

## **Chapter-7**

### **EXERCISE**

A. 1. Plasma 2. Four 3. 72 4. Haemoglobin 5. Heart

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

C. 1. veins 2. stronger 3. cardiac 4. Systole 5. leaves

D. 1. The main function of white blood cells (WBCs) is to fight infections and protect the body against harmful microorganisms by identifying and destroying pathogens.

2. Capillaries are the smallest blood vessels in the body that connect arteries and veins. They allow the exchange of oxygen, nutrients, and waste products between the blood and tissues.

3. Heartbeat can be measured manually by feeling the pulse at points like the wrist or neck. Each pulse corresponds to one heartbeat, and the rate can be counted over a minute.

4. Excretion is the process of eliminating waste products and harmful substances from the body, such as urine, sweat, and carbon dioxide.

5. The two types of vascular tissues in plants are xylem (transports water and minerals) and phloem (transports food).

E. 1. The circulatory system in humans consists of the heart, blood, and blood vessels (arteries, veins, and capillaries). The heart acts as a pump that circulates blood throughout the body. Blood is responsible for transporting oxygen, nutrients,

hormones, and waste products. The circulatory system is divided into two main circuits:

- Pulmonary circulation: Carries deoxygenated blood from the heart to the lungs for oxygenation and then back to the heart.
- Systemic circulation: Carries oxygenated blood from the heart to the rest of the body, providing oxygen and nutrients to tissues, and returning deoxygenated blood back to the heart.

Flow of blood:

- Oxygen-poor blood flows into the right atrium of the heart from the body, then into the right ventricle, from where it is pumped to the lungs via the pulmonary artery.
- Oxygen-rich blood returns from the lungs to the left atrium, then passes into the left ventricle, from where it is pumped to the body through the aorta.

2.

Arteries	Veins
Carry oxygenated blood (except pulmonary arteries).	Carry deoxygenated blood (except pulmonary veins).
Thick, muscular, and elastic walls to withstand high pressure.	Thinner walls with less muscle and elastic tissue.
Have no valves (except in the aorta and pulmonary artery).	Have valves to prevent backflow of blood.
Blood flows under high pressure from the heart.	Blood flows under low pressure back to the heart.
Smaller in diameter compared to veins.	Larger in diameter compared to arteries.

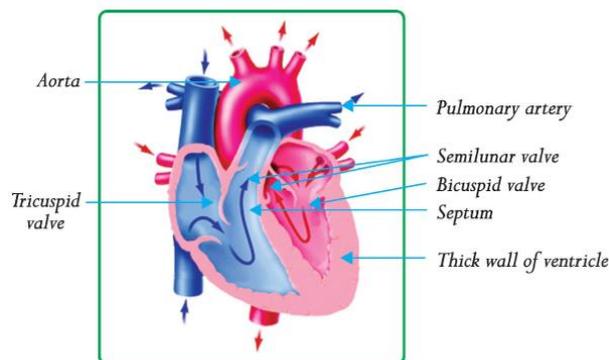
3. The human heart is a four-chambered organ consisting of two atria (upper chambers) and two ventricles (lower chambers). The heart is divided into the right and left halves by the septum.

- Right side: Receives deoxygenated blood from the body through the superior and inferior vena cava and pumps it to the lungs through the pulmonary artery for oxygenation.
- Left side: Receives oxygenated blood from the lungs through the pulmonary veins and pumps it to the rest of the body through the aorta.

Valves: The heart has four main valves to regulate blood flow:

- Tricuspid valve (right atrium to right ventricle)
- Bicuspid/mitral valve (left atrium to left ventricle)
- Pulmonary valve (right ventricle to pulmonary artery)
- Aortic valve (left ventricle to aorta)

Diagram:



4. The primary excretory organs in humans are the kidneys, which filter the blood to remove waste products and excess substances, forming urine. The excretory system includes:

- Kidneys: Filter the blood, remove wastes like urea, and regulate the body's water and salt balance.

- Ureters: Tubes that transport urine from the kidneys to the bladder.
- Bladder: Stores urine until it is ready to be excreted.
- Urethra: A tube that carries urine from the bladder to the outside of the body.

Working: The kidneys filter blood through tiny filtering units called nephrons. They remove waste (like urea) and excess water and salts, which are then expelled as urine. The urine travels from the kidneys to the bladder via the ureters and is eventually excreted through the urethra.

5. In plants, the transport of water and minerals occurs primarily through xylem tissue. Water and minerals are absorbed from the soil through the roots and transported upwards through the xylem vessels. The movement of water from the roots to the leaves is driven by processes like capillary action, transpiration, and root pressure:

- Capillary action: The narrow xylem vessels allow water to move up through adhesion and cohesion forces.
- Transpiration: The loss of water vapour from the leaves creates a suction force that pulls more water up from the roots.
- Root pressure: Water is absorbed by the roots from the soil, and some pressure helps push water up the plant.

F. 1. Blood appears red because of the iron-containing pigment haemoglobin in red blood cells, which binds to oxygen. When oxygen binds to haemoglobin, it gives blood its bright red colour. In deoxygenated blood, the colour is darker red.

2. Arteries have thick elastic walls because they carry blood under high pressure from the heart. The elastic tissue allows

the arteries to stretch and recoil as blood is pumped through them, helping to maintain the pressure and flow of blood.

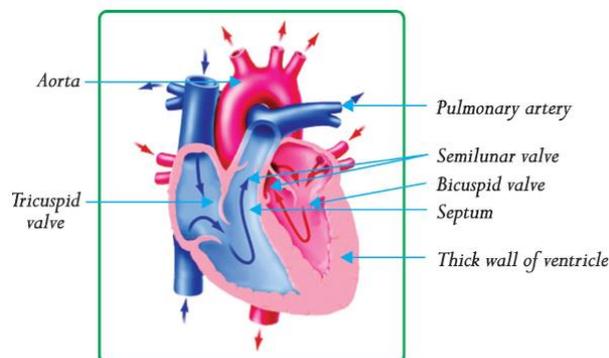
3. Veins have valves to prevent the backflow of blood. Since veins carry blood under low pressure, especially from the lower parts of the body, the valves ensure that blood flows only in one direction, toward the heart.

4. The left side of the heart is stronger and bigger because it has to pump oxygenated blood to the entire body through the aorta, which requires more force. The right side only pumps blood to the lungs, which is a shorter distance and requires less force.

5. Lobsters and crabs have blue blood because their blood contains a copper-based molecule called hemocyanin instead of the iron-based haemoglobin found in human blood.

Hemocyanin is blue when it is oxygenated, which gives their blood a blue colour.

G.



H. 1. b. 72-80 2. Septum 3. c. Stethoscope 4. Nephrons 5. Ammonia

### **HOTS Questions:**

1. The four main blood groups are A, B, AB, and O. These groups are based on the presence or absence of antigens on the surface of red blood cells.

2. Rh+ (Rh positive) blood means that the Rh antigen is present on the surface of red blood cells. Rh- (Rh negative) blood means the Rh antigen is absent. The presence or absence of this antigen is important in blood transfusions and pregnancy.

3. People living in high-altitude areas have more red blood cells and higher blood volume to compensate for lower oxygen levels in the air. This increase helps them carry more oxygen in their blood to meet the oxygen demands of their body in low-oxygen environments.

### **Assertion- Reason Questions**

1. Assertion is false but reason is true.
2. Assertion is false but reason is true.
3. If both the assertion and reason are true but reason is not the correct explanation of assertion.
4. If both assertion and reason are true and reason is the correct explanation of assertion.
5. Assertion is false but reason is true.

### **Case based/Passage based Questions**

(a) The main function of kidneys is to filter waste products and excess substances (such as water, salts, and urea) from the blood, which are then excreted as urine. Kidneys also help regulate blood pressure, electrolyte balance, and acid-base balance in the body.

(b) Renal failure, also known as kidney failure, occurs when one or both kidneys stop functioning effectively. This means they cannot filter waste and excess fluids from the blood, leading to the buildup of toxins and waste in the body. It is dangerous because it can lead to toxic accumulation, fluid

imbalance, and electrolyte disturbances, all of which can be life-threatening if not treated.

(c) Dialysis is an artificial process used to remove waste, excess water, and toxins from the blood when the kidneys are no longer able to perform this function effectively. It acts as an external substitute for kidney function in cases of renal failure. There are two main types of dialysis: haemodialysis (where blood is filtered outside the body) and peritoneal dialysis (where a dialysis solution is introduced into the abdominal cavity to absorb waste products).

(d) The filtering unit of the kidney is called a nephron. Each kidney contains millions of nephrons, which filter blood to remove waste products and excess substances.

## **WORDMAZE**

1. RIBS
  2. HEART
  3. STOMACH
  4. SKIN
  5. LUNGS
- BRAIN

## **Chapter-8**

### **EXERCISE**

A. 1. Fertilization 2. Budding 3. Pollination 4. Pericarp 5. Radicle

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

C. 1. Asexual reproduction involves only one parent and produces genetically identical offspring, while sexual reproduction involves two parents (male and female), leading to offspring with genetic variation.

2. The reproductive parts of a flower are the stamen (male reproductive organ) and the pistil (female reproductive organ).

3. The two types of pollination are self-pollination and cross-pollination.

4. Three agents of pollination are wind, insects, and animals.

5. Germination is the process in which a seed develops into a new plant, beginning with the absorption of water and the growth of the embryo within the seed.

D. 1. Binary Fission: Involves the division of a single organism into two identical parts. For example, bacteria reproduce through binary fission.

Budding: A new organism develops as an outgrowth or "bud" from the parent. For example, yeast and hydra reproduce by budding.

Spore Formation: Organisms produce spores, which grow into new individuals. For example, mosses, fungi, and ferns reproduce through spores.

Vegetative Propagation: A new plant grows from a vegetative part of the parent plant like roots, stems, or leaves. For example, potatoes (from tubers) and strawberries (from runners) reproduce through vegetative propagation.

2. Cutting: A part of the plant (like a stem or leaf) is cut and planted to grow a new plant. Example: rose and tomato plants.

Grafting: A portion of one plant is attached to the rootstock of another plant. Example: apple trees.

Layering: A branch is bent to the ground and covered with soil to develop roots, after which it can be detached and grown. Example: blackberry.

Tissue Culture: A small piece of plant tissue is cultured in a nutrient medium to grow a new plant. Example: orchids.

3. During fertilization in plants, the male gamete (pollen) fuses with the female gamete (ovule). The pollen grain reaches the stigma, forms a pollen tube, and the male gamete travels down the tube to fertilize the ovule, resulting in the formation of a zygote, which eventually develops into a seed.

4. Wind Dispersal: Seeds are carried away by wind. Example: dandelions.

Water Dispersal: Seeds are dispersed by water. Example: coconuts.

Animal Dispersal: Seeds attach to the fur or feathers of animals and are carried to new locations. Example: burdock.

Self-Dispersal: Some plants eject their seeds from the fruit. Example: pea plants.

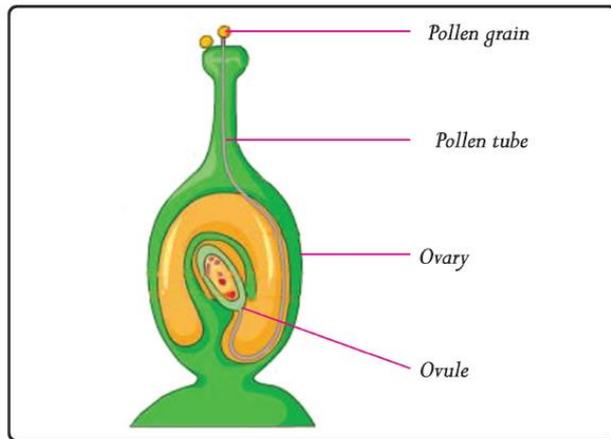
5. (a) Yeast: Yeast reproduces asexually through budding. A small bud forms on the parent cell and eventually detaches to become a new individual.

(b) Spirogyra: Spirogyra reproduces asexually through fragmentation (breaking into pieces), and sexually through conjugation, where two filaments exchange genetic material.

(c) Potato: Potatoes reproduce asexually through vegetative propagation from tubers (the eyes of the potato).

(d) Bryophyllum: Bryophyllum reproduces asexually through vegetative propagation by leaf buds, which grow into new plants.

E.



F. 1. Yeast cells reproduce rapidly because they reproduce asexually by budding, which is a quick process. Under optimal conditions (warmth, moisture, and nutrients), yeast cells can reproduce within hours, doubling their number in a short period.

2. Spores are covered with hard protective coats to protect the genetic material inside from harsh environmental conditions such as drying out, extreme temperatures, and physical damage. The tough outer coat helps ensure that spores can survive until they find a suitable environment to germinate.

3. Flowers pollinated by insects are usually brightly coloured to attract the insects, such as bees and butterflies. The bright colours serve as a visual signal, drawing the insects to the flower for pollination.

4. Seeds dispersed by wind are light and often have structures like wings or hairs that help them float or glide through the air. Their lightweight nature allows them to be carried over long distances by the wind, increasing the chances of reaching a suitable place for germination.

5. Seeds dispersed by animals often have hooks or spines to attach to the fur or feathers of animals. These hooks help the seeds cling to animals as they move from place to place. This

method of seed dispersal ensures the seeds travel over larger distances, increasing the likelihood of reaching a new location suitable for growth.

G. 1. Rose 2. Blackberry 3. Apple tree 4. Spirogyra

H. 1. Strawberry 2. Callus 3. Papaya 4. Zygote 5. Mesocarp

### **HOTS Questions**

1. Most plants produce a large number of seeds to increase the chances of successful germination. Since not all seeds will grow into new plants due to factors like predation, weather conditions, and competition for resources, producing many seeds helps ensure that at least some will find a suitable environment to grow.

2. Pomegranate is an example of a fruit that becomes useless if its seeds are thrown away. The seeds of a pomegranate are edible and contain juice, which is the most valuable part of the fruit. Without the seeds, you lose the nutritious and flavourful part of the pomegranate.

3. Flowers like Rafflesia emit a smell of rotting meat to attract carrion-eating insects (such as flies and beetles) for pollination. These insects are drawn to the foul odor, which mimics the scent of decaying flesh, and in the process, they help transfer pollen from one flower to another, enabling pollination.

### **Assertion- Reason Questions**

1. If both the statements are true and reason is the correct explanation of assertion.

2. If assertion is true but reason is false.

3. If both the statements are true and reason is the correct explanation of assertion.

4. If both the statements are true and reason is the correct explanation of assertion.

5. If both the statements are true and reason is the correct explanation of assertion.

### **Case based/Passage based Questions**

(a) The method used by the gardener is layering. In layering, a branch of a plant is bent to the ground and covered with moist soil, where it develops roots before being separated and transplanted.

(b) Some plants that can be grown by layering include:

- Jasmine
- Blackberry
- Raspberry
- Grape vines

(c) The method used to grow a rose plant is cutting. In this method, a stem or a part of the plant is cut off and planted in soil, where it develops roots and grows into a new plant.

### **WORDMAZE**

1. CABBAGE 2. MANGO 3. TOMATO 4. BANANA 5. POTATO 6. POMEGRANATE

BAMBOO is the fastest growing plant on land.

## **Chapter-9**

### **EXERCISE**

A. 1. Meter per second (m/s) 2. Second (s) 3. Oscillatory motion 4. Distance travelled 5. Atomic clocks

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

C. 1. Slow motion refers to when an object moves at a low speed, taking a longer time to cover a distance. Fast motion refers to when an object moves at a high speed, covering more distance in less time.

2. Oscillation is the repetitive back-and-forth motion of an object around a central point. The time period of a pendulum is the time taken for one complete oscillation or swing from one extreme to the other and back again.

3. A stopwatch is used to measure the duration of time for an event or activity, typically in seconds or fractions of a second.

4. Electronic wristwatches measure time using a quartz crystal. The quartz crystal vibrates at a precise frequency when an electric current passes through it, and these vibrations are counted to keep track of time.

5. Uniform motion occurs when an object moves at a constant speed, covering equal distances in equal intervals of time. Non-uniform motion occurs when an object moves with changing speeds, covering unequal distances in equal intervals of time.

D. 1.

---

To calculate the **average speed** of a moving body, you can use the following formula:

$$\text{Average Speed} = \frac{\text{Total Distance}}{\text{Total Time}}$$

Where:

- **Total Distance** is the entire distance the body has traveled.
- **Total Time** is the total time taken to cover that distance.

### Example:

If a car travels 100 kilometers in 2 hours, the average speed would be:

$$\text{Average Speed} = \frac{100 \text{ km}}{2 \text{ hours}} = 50 \text{ km/h}$$

2. The principle on which a mechanical clock works is based on periodic motion. A clock uses a regular, repeating motion (such as the swinging of a pendulum or the vibration of a quartz crystal) to divide time into equal parts. For example, in a pendulum clock, the pendulum swings back and forth in a regular motion, and the clock keeps time by counting these regular swings.

In electronic clocks, the time is kept by the oscillations of a quartz crystal. The quartz crystal vibrates at a constant frequency when subjected to an electric current, and these vibrations are counted to keep track of time.

3.

---

To find the distance between New Delhi and London, we can use the formula for distance:

$$\text{Distance} = \text{Speed} \times \text{Time}$$

Given:

- **Speed** = 950 km/h
- **Time** = 7 hours

Now, substitute the values into the formula:

$$\text{Distance} = 950 \text{ km/h} \times 7 \text{ hours} = 6650 \text{ km}$$

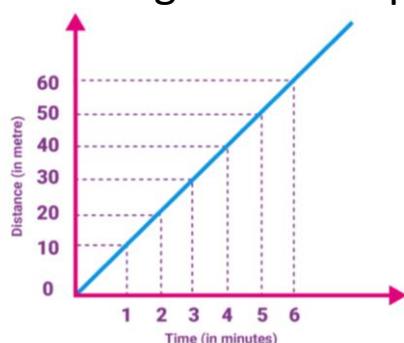
So, the distance between New Delhi and London is **6650 kilometers**.

4. In a uniform motion, the distance covered is directly proportional to time, meaning that the object travels equal distances in equal time intervals.

A typical distance-time graph for uniform motion is a straight line, where the slope (the rise over run) represents the speed. The graph will have:

- The x-axis representing time.
- The y-axis representing distance.

The line will be straight and have a constant slope, indicating constant speed.



The graph shows a straight line because the speed is constant.

5. To solve this problem, we need to:

1. Draw Distance-Time graphs for both Table 1 and Table 2.
2. Calculate the speed of the car from the data in each table.

Table 1:

Time (s)	Distance (m)
0	0
1	15
2	30
3	45
4	60
5	75

Table 2:

Time (s)	Distance (m)
0	0
1	10
2	25
3	45
4	65
5	90

### 1. Drawing the Distance-Time Graphs:

To draw the graphs, you would plot the Time on the x-axis and the Distance on the y-axis for each table. Each point corresponds to the values from the tables.

#### **Table 1 Graph:**

- Plot the points: (0, 0), (1, 15), (2, 30), (3, 45), (4, 60), (5, 75).
- Connect the points to form the graph.

#### **Table 2 Graph:**

- Plot the points: (0, 0), (1, 10), (2, 25), (3, 45), (4, 65), (5, 90).
- Connect the points to form the graph.

### 2. Calculating Speed:

To calculate the speed, we use the formula:

---

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}}$$

For Table 1:

- Total distance = 75 m (at time 5 seconds)
- Total time = 5 s

$$\text{Speed} = \frac{75 \text{ m}}{5 \text{ s}} = 15 \text{ m/s}$$

For Table 2:

- Total distance = 90 m (at time 5 seconds)
- Total time = 5 s

$$\text{Speed} = \frac{90 \text{ m}}{5 \text{ s}} = 18 \text{ m/s}$$

E. 1. Handspan 2. Quartz watch 3. Quartz clock 4. Car travelling on a straight empty road 5. Distance = Speed X Time 6. Odometer 7. Time

### **Assertion- Reason Questions**

1. If both the statements are true and reason is the correct explanation of assertion.
2. If both the statements are true but reason is not the correct explanation of assertion.
3. If both the statements are true and reason is the correct explanation of assertion.
4. If both the statements are true and reason is the correct explanation of assertion.

### **Case based/Passage based Questions**

(a) Average speed of an object refers to the total distance travelled by the object divided by the total time taken to cover that distance.

It is a scalar quantity, meaning it only considers the magnitude of the motion and not the direction.

The formula for average speed is:

$$\text{Average Speed} = \frac{\text{Total Distance}}{\text{Total Time}}$$

(b) An object is said to be in uniform motion if it travels equal distances in equal intervals of time, regardless of the duration. The speed remains constant throughout the motion.

(c) The device used to measure the speed of a moving vehicle is called a speedometer.

(d)

Given:

- Distance = 30 km
- Time = 40 minutes =  $\frac{40}{60} = \frac{2}{3}$  hours

Now, calculate the speed:

$$\text{Speed} = \frac{30 \text{ km}}{\frac{2}{3} \text{ hours}} = 30 \times \frac{3}{2} = 45 \text{ km/h}$$

So, the speed of the car is 45 km/h.

## WORDMAZE

1. CAMEL 2. SHEEP 3. DEER 4. TIGER 5. OCTOPUS 6. PARROT 7. HORSE

CHEETAH is the fastest creature on land.

## HOTS Questions

1. The graph 1 represents the motion of a car and the graph 2 represents the man.

2. Beetle

## REVISION TIME-3

A. 1. Lactic 2. Diaphragm 3. Nephrons 4. Mesocarp 5. Time

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

C. 1. Inhalation 2. Haemoglobin 3. Ventricles 4. Pistil 5.

Pollination

D. 1. Gaseous exchange takes place in the alveoli of the lungs.

2. Heartbeat is measured using a stethoscope or a device called a pulse oximeter to count the number of beats per minute.

3. The two types of vascular tissues in plants are xylem and phloem.

4. Germination is the process by which a seed develops into a new plant.

5. A stopwatch is used to measure time intervals accurately.

## Chapter-10

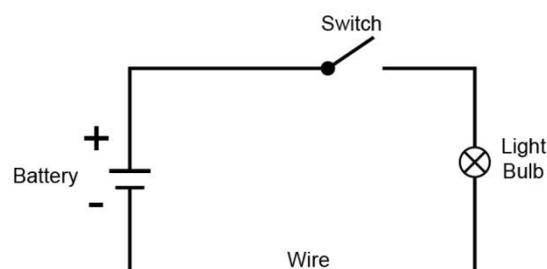
### EXERCISE

A. 1. Circuit 2. Two 3. Battery 4. Tungsten 5. Hans Christian Oersted

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

C. 1. high 2. low 3. prevents 4. temporary magnet 5. switch

D. 1. An electric circuit is a closed path through which electric current flows from the power source (like a battery) to various components (such as bulbs) and back to the power source. It includes components like wires, a switch, and a load.



2. We use symbols for electric components because they simplify circuit diagrams, making them easier to understand and work with. Symbols are standardized and allow for clearer, more efficient communication between engineers and electricians.

3. An electric fuse is a safety device that protects electrical circuits from overloading or short circuits. It contains a thin wire that melts and breaks the circuit when the current flowing through it exceeds a safe limit, thus preventing damage to other components.

4. Fuse wires are generally made of materials like tin, copper, or alloy with a low melting point, such as lead or zinc, which melt when the current exceeds the safe limit.

5. Fires in electric circuits can be caused by:

- Overloading the circuit (too many devices drawing power).
- Short circuits (when the current flows through an unintended path).
- Faulty wiring or damaged insulation.
- Use of electrical appliances that are defective or not designed for high voltage.
- Overheated electrical components or wires.

E. 1. Electric iron: It uses the heating effect of electric current to generate heat, which is used for ironing clothes.

Electric heater: This appliance uses the heating effect of electric current to produce heat, which is then used for warming a room.

2. Short-circuiting occurs when an unintended path with very low resistance is formed in an electrical circuit, allowing current to flow through it uncontrollably. This leads to an

excessive flow of current, which can cause overheating, fire, or damage to electrical components.

Causes of short-circuiting:

- **Damaged insulation:** If the insulation around wires is damaged, the live wire may come into contact with a neutral wire or the earth, causing a short circuit.
- **Loose connections:** A loose wire connection or faulty switch can cause an unintentional path for the current.
- **Faulty electrical appliances:** Malfunctioning appliances or their internal wiring can result in short-circuiting.
- **Worn-out wires:** Over time, wires can wear out, exposing the conductive materials, which can cause a short circuit.

3. A fuse contains a thin wire that is designed to melt when the current flowing through it exceeds a certain limit. When excess current flows due to a short circuit or overload, the fuse wire melts, breaking the circuit and stopping the flow of electricity. This prevents the electric current from reaching the electrical appliances, protecting them from potential damage like overheating, fire, or burnout.

4. **Electric Bell:** Electromagnets are used in electric bells to create a magnetic field that moves the striker to hit the bell and produce sound.

**Magnetic Crane:** Electromagnets are used in cranes to lift heavy metallic objects such as scrap metal.

**MRI Machines:** Electromagnets are used in magnetic resonance imaging (MRI) machines in the medical field to create strong magnetic fields for imaging the inside of the body.

5. An electric bell works based on the principle of electromagnetism. It consists of a coil of wire, a hammer, a

spring, and a contact arm. When the switch is pressed, electric current flows through the coil of wire, turning it into an electromagnet. This electromagnet attracts the hammer, which strikes the bell, producing sound. The contact arm is connected to a circuit breaker that opens when the hammer moves, cutting off the current to the electromagnet. This deactivates the magnet, and the spring pulls the hammer back to its original position, restarting the cycle. The hammer strikes the bell repeatedly until the switch is released.

F. 1. In an open circuit, the path for the electric current is incomplete. For current to flow, there must be a continuous closed loop. An open circuit means there is a break (like a switch being "off" or a wire being disconnected), which prevents the flow of electricity.

2. Copper wires have a very low resistance to electric current. Since heating occurs due to the resistance of the material (according to the heating effect of electric current), copper wires don't heat up significantly because their resistance is minimal. This is why copper is commonly used for electrical wiring.

3. The filament of an electric bulb is made of tungsten because it has a very high melting point (around  $3422^{\circ}\text{C}$ ). This allows it to withstand the high temperature generated when the electric current passes through the filament without melting or breaking. Tungsten also has good resistance to electrical flow, which is necessary for the filament to glow.

4. The wire of a fuse is made from an alloy of lead and tin because this alloy has a low melting point. When the current exceeds the safe limit, the heat generated will cause the wire to melt, breaking the circuit and preventing damage to the

electrical components. The lead-tin alloy ensures the wire melts quickly and efficiently at the right temperature.

5. Miniature Circuit Breakers (MCBs) are used instead of fuses because they offer better protection, convenience, and reliability. Unlike fuses, which must be replaced once they blow, MCBs can be reset after tripping. MCBs automatically disconnect the circuit when there is an overload or short circuit, and they do so more efficiently and with greater precision. They also provide faster response and can handle multiple trips without degrading in performance, making them more practical for modern electrical systems.

G. 1. Battery 2. Electric iron 3. Heating

### **Assertion-Reason Questions**

1. Assertion is true and reason is false.
2. Both assertion and reason are true but reason is not the correct explanation of assertion.
3. Assertion is true and reason is false.
4. If both assertion and reason are true and reason is the correct explanation of assertion.
5. If both assertion and reason are true and reason is the correct explanation of assertion.

### **Case based/Passage based Questions**

(a) An electromagnet is a type of magnet created by passing an electric current through a coil of wire wrapped around a magnetic material, like an iron nail. When the current flows through the wire, it generates a magnetic field, making the iron nail behave like a magnet.

(b) The pins got attracted to the iron nail because the current flowing through the copper wire around the nail created a

magnetic field, magnetizing the iron nail. This magnetic field made the iron nail behave like a magnet, attracting the pins, which are made of ferromagnetic materials (like iron).

(c) If the student used an aluminium rod instead of an iron nail, the pins would not be attracted to the rod. This is because aluminium is not a magnetic material. Unlike iron, aluminium does not become magnetized when an electric current passes through the coil around it, so the magnetic field generated by the coil wouldn't be strong enough to attract the pins.

### **HOTS Questions**

1. The heating effect of current can result in wastage of energy in situations like:

**Power lines:** When electric current flows through power lines, some energy is lost as heat due to the resistance of the wires. This leads to power loss during transmission.

**Overheating in electrical appliances:** In some appliances like electric motors, excessive heating can occur, reducing the efficiency of the device and causing energy wastage.

**Inefficient bulbs:** Incandescent bulbs produce a lot of heat, but most of their energy is wasted as heat rather than light, making them inefficient compared to energy-saving bulbs like LEDs.

2. When a current is passed through the coil, it will generate a magnetic field around the coil, making it behave like a magnet. The coil, which is initially aligned in the east-west direction, will experience a force due to the Earth's magnetic field and will rotate to align itself in the north-south direction. This happens because the magnetic field generated by the current interacts with the Earth's magnetic field,

causing the coil to align itself with the magnetic poles of the Earth.

## Chapter-11

### EXERCISE

A. 1. Incident ray 2. Real image 3. Concave mirror 4. Pole 5. Seven

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

D. 1. Reflection of light is the bouncing back of light when it strikes a smooth surface. The light changes direction but remains in the same medium.

2. Regular reflection occurs when light rays strike a smooth, polished surface (like a plane mirror), and the reflected rays are parallel to each other, forming a clear image.

3. The laws of reflection are:

- The angle of incidence is equal to the angle of reflection.
- The incident ray, the reflected ray, and the normal to the surface at the point of incidence all lie in the same plane.

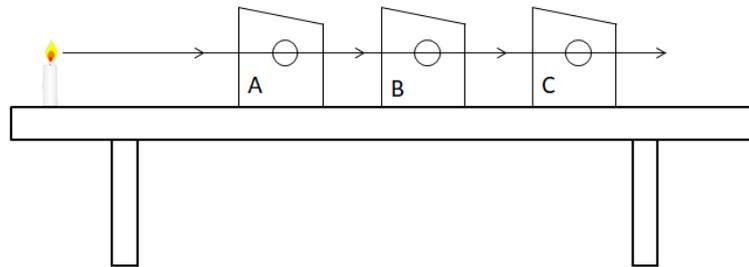
4. Lateral inversion refers to the reversal of the left and right sides of an image. It is the effect seen in plane mirrors where the image appears flipped horizontally.

5. Two uses of concave mirrors are:

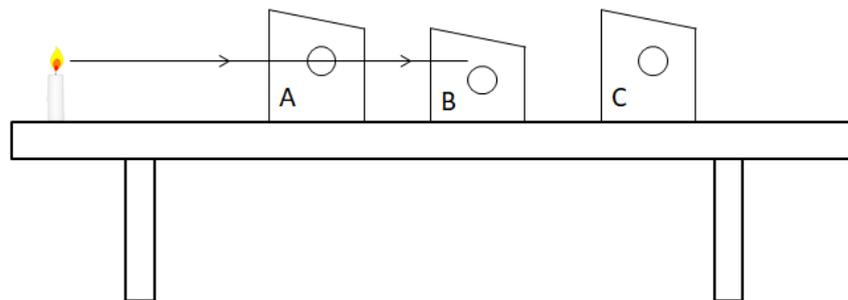
- Used in shaving mirrors or makeup mirrors for magnifying the image.
- Used in headlights of vehicles to focus light in a particular direction.

E. 1. We will consider a setup containing, a table having a candle at one end of the table and three cardboard pieces having holes cut out at the same position placed at different

distances on the table in a straight line as in the diagram below.



Since, all the holes are aligned in a straight line at the same level with the candle, hence a viewer on the other end of the table will be able to see the candle through the holes initially. Now let's consider, the cardboard labelled B is displaced by a small distance.



Now, when we try to view the candle from one end of the table, we will be unable to see the candle through the holes, we will be unable to see the candle. Since, the displaced cardboard causes the light travelling in a straight line to get obstructed by the cardboard B. Hence, we can confirm that the light wave follows rectilinear propagation.

## 2. Characteristics of the image formed by a plane mirror:

- Virtual and erect: The image is virtual, meaning it cannot be projected onto a screen, and it is upright (erect).
- Same size as the object: The image formed is of the same size as the object.

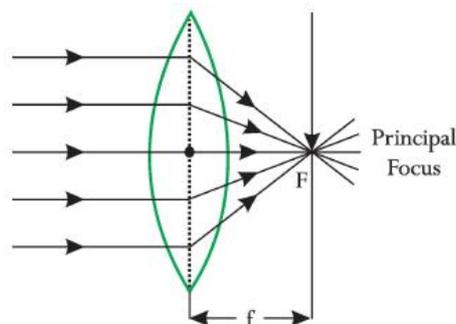
- Laterally inverted: The left and right sides of the image are reversed (lateral inversion).
- Equidistant from the mirror: The image is at the same distance behind the mirror as the object is in front of it.
- Same shape as the object: The image retains the shape of the object.

3.

Property	Real Image	Virtual Image
Formation	Formed when light rays actually meet.	Formed when light rays appear to meet.
Can it be projected?	Yes, on a screen.	No, it cannot be projected.
Nature of Image	Inverted (upside down).	Erect (upright).
Formation Example	Formed by concave mirrors or converging lenses.	Formed by plane mirrors, convex mirrors, or diverging lenses.
Location	In front of the mirror or lens.	Behind the mirror or lens.

#### 4. Convex Lens (Converging Lens):

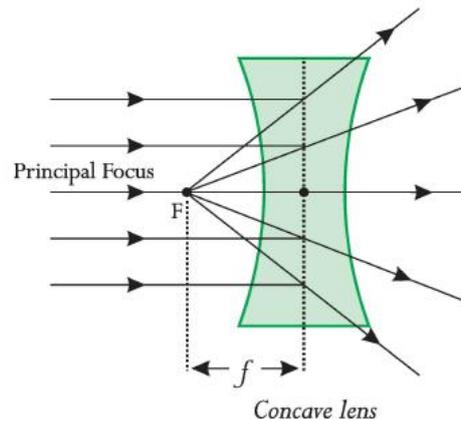
A convex lens converges parallel rays of light to a single point called the focal point. Parallel rays converge to a single point on the opposite side of the lens.



#### 5. Concave Lens (Diverging Lens):

A concave lens diverges parallel rays of light away from a

point. It appears to originate from a common point called the focal point on the same side as the object. Parallel rays diverge, and the extensions of the rays appear to converge at the focal point.



5. Dispersion is the phenomenon where white light is separated into its constituent colours (spectrum) when passed through a medium like a prism. This occurs because different colours (wavelengths) of light bend by different amounts when refracted through the prism.

How to split sunlight into its seven colours:

Using a prism, sunlight is passed through the prism, and it gets refracted and spread out into seven colours: red, orange, yellow, green, blue, indigo, and violet. This is known as the spectrum of light.

F. 1. A smooth and shiny surface ensures that light reflects uniformly, producing a clear and sharp image. Any roughness or imperfections would scatter the reflected rays, causing a blurred or distorted image.

2. The image formed by a plane mirror is virtual, meaning the light rays do not actually meet at the image location. The rays appear to diverge from the image but never actually converge, so it cannot be projected onto a screen.

3. A convex rear-view mirror provides a wider field of view, making it safer for the driver to see more of the road and other vehicles. It also forms a diminished (smaller) image, which allows the driver to see a larger area. A plane mirror would provide a limited field of view.

4. A convex lens is called a converging lens because it converges parallel rays of light to a single point (the focal point). This property makes it useful for applications like magnification or focusing light.

G. 1. a virtual and erect image of the same size 2. virtual, diminished and erect image 3. Convex lens 4. Convex mirror 5. Spectacles

### **Assertion and Reason Questions**

1. If assertion is false and reason is true.
2. If assertion is true and reason is false.
3. If assertion is false and reason is true.
4. If both assertion and reason are true but reason is not the correct explanation of assertion.

### **Case-Based/Passage-Based Questions**

(a) The seven colours were obtained due to the dispersion of sunlight when it passed through the water. The mirror surface reflects the sunlight, and the water causes refraction, splitting the white light into its constituent colours.

(b) The phenomenon responsible is dispersion.

(c) An example of dispersion in nature is the formation of a rainbow. When sunlight passes through raindrops, the light is dispersed into seven colours, forming a rainbow.

(d) The seven colours of sunlight are: Red, Orange, Yellow, Green, Blue, Indigo and Violet.

## **HOTS Questions**

1. The image formed by a plane mirror is always virtual, erect, and of the same size as the object. The size of the mirror does not affect the size of the image formed, but the field of view changes. A smaller mirror will show only part of the image of the object, while a larger mirror will show a wider or complete image of the object. The image remains the same in terms of size, whether the mirror is big or small.
2. Newton's disc needs to be rotated very fast because the colours blend together due to the persistence of vision in our eyes, making the disc appear white when spun quickly. When rotated slowly, the individual colours are visible to the eye and do not mix, so the disc would not appear white.
3. This statement refers to the fact that the convex mirror used in the rear view mirror of vehicles reduces the size of the image, making objects appear smaller and farther away than they actually are. However, the actual distance is shorter than what is perceived, hence the statement "Objects in the mirror are closer than they appear."
4. The common property among these letters is that they look the same in a plane mirror. If you reflect these letters in a mirror, they would remain the same, making them symmetrical with respect to their vertical axis.

## **WORDMAZE**

IF WE WERE TO WRITE LIKE THIS, WE WOULD ALWAYS NEED THE HELP OF MIRRORS TO MAKE SENSE OF WHAT WE HAVE WRITTEN.

## Chapter-12

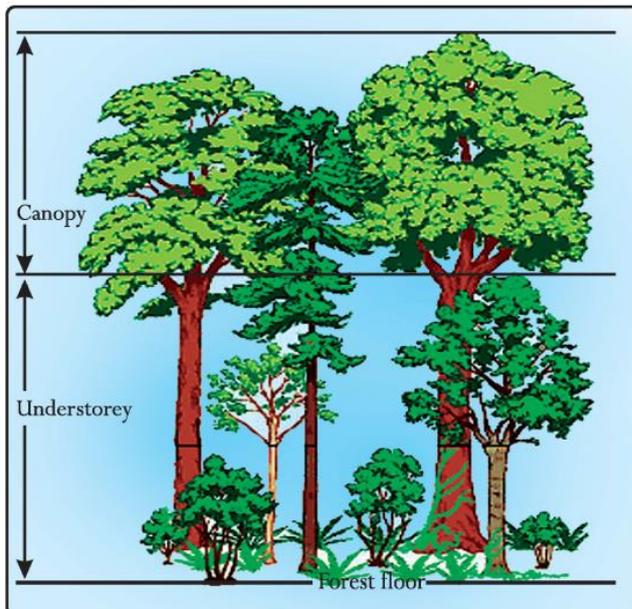
### EXERCISE

A. 1. Canopy 2. Tropical Rainforests 3. Sundari 4. Acacia 5. Deforestation

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

C. 1. The canopy is the uppermost layer of a forest, formed by the branches and leaves of tall trees. It absorbs most of the sunlight and is home to various animals and plants.

2. The understorey is the layer of vegetation beneath the canopy in a forest. It includes shrubs, small trees, and plants that thrive with limited sunlight.



3. Wood 2. Medicines 3. Fruits 4. Rubber 5. Resins

4. The different ways in which forests are useful to us:

- Provide oxygen
- Maintain the water cycle
- Prevent soil erosion
- Provide habitat
- Source of raw materials
- Help in regulating climate

5. Causes of deforestation:

- Agricultural expansion
- Urbanization
- Illegal logging
- Mining
- Fires

D. 1. Evergreen forests are forests that remain green throughout the year, meaning the trees in these forests do not shed their leaves during any season. These forests are typically found in regions with tropical or subtropical climates, where there is a high amount of rainfall and warm temperatures year-round. They are known for their dense vegetation and wide variety of plant and animal species. These forests are found in places like the Amazon rainforest, Southeast Asia, and parts of Africa.

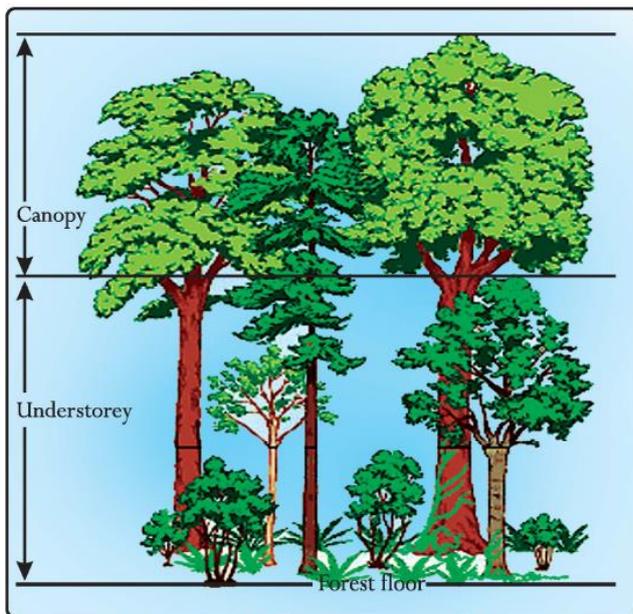
Characteristics of Evergreen Forests:

- Tall trees with thick foliage.
- A variety of plant species including shrubs, vines, and tall trees.
- High biodiversity, home to many animal species like monkeys, tigers, and various birds.
- They help maintain the water cycle, prevent soil erosion, and provide oxygen.

2. A forest can be divided into three main layers based on the height and types of plants and animals:

- Canopy (Topmost Layer):
  - The canopy is the uppermost layer of a forest, formed by the branches and leaves of tall trees. It absorbs most of the sunlight and forms a dense layer of foliage.
  - It provides food and shelter for many animals like birds, insects, and some mammals.

- Understorey (Middle Layer):
  - This layer consists of smaller trees, shrubs, and plants that receive limited sunlight filtering through the canopy. It includes bushes, ferns, and smaller trees.
  - It is home to various small animals like insects, reptiles, and some birds.
- Forest Floor (Bottom Layer):
  - The forest floor is covered with a layer of soil, moss, and decomposing organic matter like fallen leaves, branches, and plants.
  - It is inhabited by decomposers (fungi, bacteria), insects, and some small mammals.



## 2. Animals are dependent on forests for:

- Food and Shelter: Forests provide food for animals in the form of fruits, leaves, small animals, and insects. They also provide shelter in trees, caves, and underbrush.
- Protection: The dense vegetation of forests offers protection from predators, extreme weather conditions, and other environmental factors.

- **Breeding Grounds:** Many animals use forests as their breeding grounds. For example, birds build nests in the trees, and mammals find suitable places to raise their young.
- **Water:** Forests help maintain water sources like rivers, lakes, and streams, which animals depend on for drinking water.

3. Plants are dependent on animals for:

- **Pollination:** Many plants depend on animals, especially insects like bees and butterflies, for pollination. This allows plants to reproduce by transferring pollen from one flower to another.
- **Seed Dispersal:** Animals help in the dispersal of seeds by eating fruits and later excreting the seeds in different locations, allowing the plant species to spread.
- **Nutrient Cycling:** As animals feed on plants, they help in breaking down plant matter into nutrients that return to the soil. This benefits the plants by enriching the soil with essential nutrients.
- **Protection:** Some plants have developed mutual relationships with animals, such as ants protecting certain plants from herbivores in exchange for food or shelter.

5. We conserve forests by:

- **Afforestation and Reforestation:** Planting more trees in areas that have been deforested to restore the natural balance of forests.
- **Sustainable Forest Management:** Practicing sustainable logging methods, where only a certain amount of trees are cut down at a time, and efforts are made to regenerate the forest.

- Reducing Deforestation: Enforcing stricter regulations to prevent illegal logging, clearing forests for agriculture, and other harmful activities.
- Promoting Awareness: Educating people about the importance of forests and the need to conserve them through campaigns, media, and community-based programs.
- Supporting Eco-friendly Products: Encouraging the use of products made from recycled materials or sustainable resources to reduce pressure on forests.

#### E. Food Chain 1:

Grains → Rat → Snake → Eagle

Explanation:

- Grains are eaten by rats.
- Rats are eaten by snakes.
- Snakes are eaten by eagles.

#### Food Chain 2:

Water Plants → Small Water Animals → Small Fish → Big Fish  
→ Bear

Explanation:

- Water plants are eaten by small water animals (like plankton).
- Small water animals are eaten by small fish.
- Small fish are eaten by big fish.
- Big fish are eaten by bears.

F. 1. Kashmir 2. Cinchona 3. Forests 4. Uttarakhand 5. Dry regions

### **Assertion-Reason Questions**

1. If both assertion and reason are true and reason is the correct explanation of assertion.

2. If both assertion and reason are true and reason is the correct explanation of assertion.
3. If assertion is true and reason is false.
4. If both assertion and reason are true and reason is the correct explanation of assertion.
5. If both assertion and reason are true and reason is the correct explanation of assertion.

### **Case-based/Passage-based Questions**

(a) Rainforests are dense forests that receive high amounts of rainfall throughout the year. They are typically located near the equator, where the climate is warm and humid.

Rainforests are home to a vast diversity of plant and animal species, and they have multiple layers, including the canopy and understorey.

(b) Some common trees found in rainforests include:

1. Mahogany
2. Ebony
3. Rubber trees
4. Kapok trees
5. Cedar

(c) The Amazon forest is called the "Lungs of Earth" because it plays a crucial role in absorbing carbon dioxide from the atmosphere and producing oxygen through photosynthesis. The forest absorbs tonnes of carbon dioxide every year and produces about 20% of Earth's oxygen, which helps in maintaining a balance in the atmosphere and slowing down climate change.

(d) Forests help maintain the balance of carbon dioxide and oxygen in the air by:

- Absorbing carbon dioxide: During photosynthesis, plants and trees absorb carbon dioxide from the atmosphere and convert it into glucose and oxygen.
- Releasing oxygen: As a byproduct of photosynthesis, forests release oxygen into the air, which is essential for the survival of humans and animals.
- Storing carbon: Trees and plants store carbon in their biomass (wood, leaves, etc.), reducing the amount of carbon dioxide in the atmosphere, which helps in mitigating climate change.

These processes contribute to maintaining the balance of gases in the atmosphere, making forests vital to the health of the planet.

## **WORDMAZE**

DEODAR

## **HOTS Questions**

1. a. Grass  
b. Cat and Fox  
c. Grass-Snail-Bird-Cat; Carrot-Rabbit-Fox  
d. If the bird population decreases, there will be a disruption in the food web. If birds were feeding on insects, the insect population might increase. This could lead to changes in other populations in the food web. Additionally, the decrease in birds could affect the predators that relied on them as a food source, leading to shifts in the entire ecosystem.
2. In a forest, there is no waste because all materials are recycled through natural processes. Dead plants and animals decompose, returning nutrients to the soil, which is then used by plants. This cycle ensures that nothing goes to waste,

as all organic matter is broken down by decomposers (like fungi, bacteria, and insects) and reused in the ecosystem.

## Chapter-13

### EXERCISE

A. 1. Sewage 2. Anaerobic bacteria 3. Methane 4. Chlorine 5. Earthworm

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

C. 1. Sewage is the waste water and excrement that is discharged from homes, industries, and other establishments. It contains human waste, chemicals, detergents, and other pollutants.

2. Sewage can be treated to extract useful byproducts such as biogas (methane) used for energy. Additionally, treated water may be recycled for non-potable purposes like irrigation or industrial use. Sludge can be converted into compost or used in energy production.

3. Some contaminants in sewage include:

- Bacteria (e.g., E. coli)
- Viruses
- Organic matter (like food scraps, oils)
- Chemicals (detergents, pharmaceuticals)
- Heavy metals (like lead, mercury)

4. A sewage system is a network of pipes, pumps, and treatment plants used to collect, transport, and treat sewage or waste water from homes, industries, and streets before being released into the environment.

5. Two alternate methods for sewage disposal:

- Septic tanks: A method where sewage is stored in underground tanks and naturally treated by bacteria.

- Vermiculture: The use of earthworms to process organic waste and convert it into compost, helping reduce sewage contamination.

D. 1. Discharging untreated sewage into rivers or seas contaminates the water with harmful chemicals, pathogens, and nutrients. It causes oxygen depletion, harming aquatic life, and spreads waterborne diseases. The excess nutrients lead to eutrophication, promoting harmful algae blooms. This pollution disrupts ecosystems, endangers biodiversity, and makes water unsafe for consumption and recreation, posing risks to human health and the environment.

2. Oils and fats solidify when they cool, forming blockages in drains and sewage systems. These blockages prevent the free flow of wastewater, leading to clogs and potential overflows. Additionally, they can interfere with the wastewater treatment process, making it harder to treat water efficiently. Oils and fats also contaminate water bodies, harming aquatic life and disrupting ecosystems.

3. The steps for clarifying water from wastewater include:

- Screening: Large debris is removed using bar screens.
- Primary Treatment: Suspended solids are allowed to settle in a sedimentation tank.
- Secondary Treatment: Biological processes, often using bacteria, break down organic matter.
- Tertiary Treatment: The water is filtered and chemically treated to remove remaining impurities.
- Disinfection: Chlorine or ultraviolet light is used to kill any remaining pathogens.

4. Bar screens in wastewater treatment plants function as the first line of defence, removing large solid materials like sticks, plastic, and rags from incoming wastewater. These screens

prevent the solids from damaging pumps and equipment downstream. They ensure that only smaller, manageable particles enter further stages of treatment, enhancing the efficiency of the entire treatment process.

5. Minimizing waste at the source can be done by:

- Reducing consumption: Buying only what is necessary to avoid excess waste.
- Reusing items: Using products multiple times before discarding them.
- Composting: Organic waste like food scraps can be composted instead of thrown away.
- Switching to eco-friendly products: Using biodegradable or reusable items.
- Avoiding packaging: Opting for bulk items with minimal packaging.

E. 1. Sewage 2. Algae 3. Mercury

### **Assertion and Reason Questions**

1. If both assertion and reason are true and reason is the correct explanation of assertion.
2. If assertion is true and reason is false.
3. If both assertion and reason are true and reason is the correct explanation of assertion.
4. If both assertion and reason are true and reason is the correct explanation of assertion.

### **Case-Based / Passage-Based Questions**

(a) Most rivers in our country are getting polluted due to the discharge of untreated sewage, industrial effluents, and agricultural runoff. Industrial wastewater often contains toxic chemicals and heavy metals, while untreated sewage carries

harmful bacteria and other pathogens. The lack of proper sewage treatment facilities and insufficient regulation of industries further exacerbate the pollution.

(b) The main causes of pollution in the Yamuna River include:

- Industrial effluents: Factories along the river release harmful chemicals and toxins into the water.
- Untreated sewage: Large amounts of untreated sewage from cities like Delhi, Agra, and Mathura are discharged into the river.
- Improper waste management: The lack of effective sewage treatment plants that meet the required standards contributes to the pollution.

(c) A wastewater treatment plant is a facility designed to treat used or contaminated water (sewage) from homes, industries, and other sources. It removes pollutants such as suspended solids, chemicals, and harmful microorganisms through physical, chemical, and biological processes. The treated water is then either safely discharged into rivers or lakes or reused for non-potable purposes.

(d) Sewage treatment generally involves the following steps:

- Screening: Removal of large solids and debris from wastewater using bar screens.
- Primary treatment: Settling of suspended solids in a sedimentation tank.
- Secondary treatment: Biological treatment where bacteria break down organic matter in the wastewater.
- Tertiary treatment: Further purification of water by filtration, chemical treatment, and sometimes disinfection using chlorine or ultraviolet light.

- Disposal or reuse: The treated water is either safely discharged into the environment or reused for non-drinking purposes like irrigation or industrial use.

#### **REVISION TIME-4**

A. 1. Two 2. Ice 3. 100 °C 4. Mangrove 5. Roundworm

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

C. 1. Battery 2. Dispersion 3. Pollutants 4. Canopy 5. Deforestation

D. 1. A switch is used to open or close an electric circuit, allowing or stopping the flow of electricity.

2. The heating effect of electric current is used in electric heaters, electric stoves, and irons.

3. Rectilinear propagation of light refers to the property of light that it travels in a straight line.

4. Eutrophication is the process where water bodies become overly enriched with nutrients, leading to excessive growth of algae and depletion of oxygen.

5. The three layers of a forest are the canopy, understory, and forest floor.

#### **MODEL TEST PAPER-2**

Self Attempt.

