ADDITIONAL®
PRACTICE

SCIENCE 7

Answer Key

DNA education
New Delhi-110002

Chapter – 1. Nutrition in Plants

WORKSHEET–I

1. a. iv) b. iii) c. iv) d. ii) e. ii)

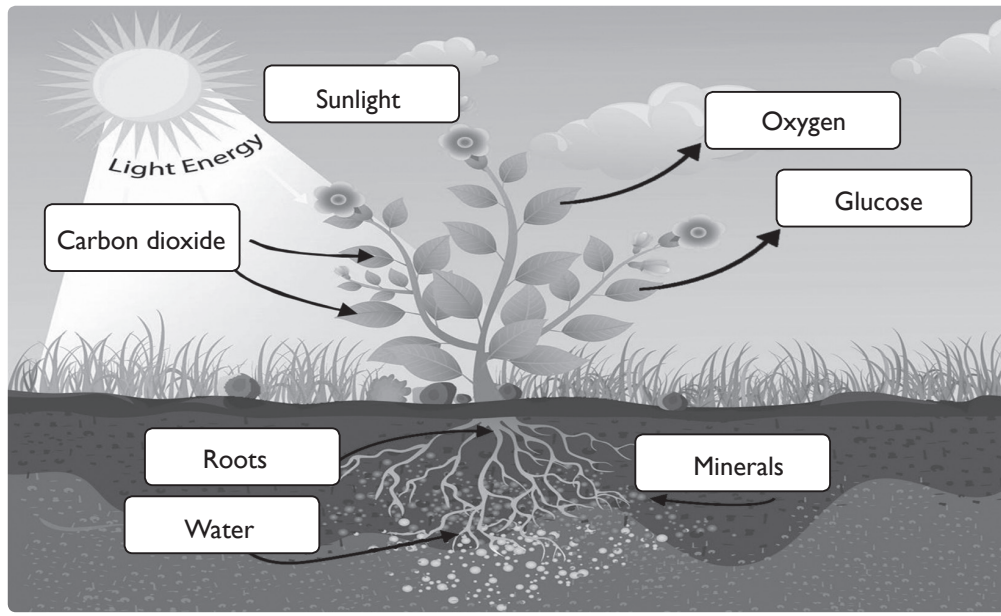
2. Pitcher plant Sundew Venus flytrap

3. a. cells b. sun c. carbohydrate d. algae
e. host

4. a. True b. False c. False d. True e. True

5. a. Because the food we eat has nutrients which provide us energy.
b. Because in green plants, chlorophyll needs sunlight to prepare food.
c. Because these white or brown patches are fungi which need moisture to grow.
d. Because it prepares its food by photosynthesis as well as traps insects to feed on.

6.



7. a. $6CO_2$ (carbon dioxide) + $6H_2O$ (water) $\longrightarrow$ $C_6H_{12}O_6$ (sugar) + $6O_2$ (oxygen).
b. It indicates presence of starch and hence the occurrence of photosynthesis.
c. *Cuscuta* is also called Amarbel. It follows parasitic mode of nutrition.
d. Because it is a major component of chlorophyll which is essential for photosynthesis.

8. a. Because green plants prepare their food themselves by the process of photosynthesis in presence of sunlight, carbon dioxide and water.
b. Lichens are the symbiotic associations of algae and fungi. They cannot grow in polluted area containing sulphur dioxide hence they disappear from such areas.
c. Oxygen is released by the green plants during photosynthesis which human beings and all other animals need for breathing.

d. For the process of photosynthesis, chlorophyll containing cells of leaves trap light energy from the sun, carbon dioxide from the air and water and minerals from the soil to synthesise carbohydrates.

e. i) In parasitic nutrition, one species (parasite) benefits while the other species (host) is harmed. On the other hand, in symbiotic nutrition, both the species live mutually and are benefitted.

ii) In autotrophic nutrition, organisms make food themselves from simple substances. Therefore, plants are called autotrophs. In heterotrophic nutrition, organisms take in food prepared by plants.

9. a.

Pitcher plant

Pitcher plants prepare food by the process of photosynthesis. But in absence of sunlight and for nitrogenous needs, their leaves, which are modified in pitchers, trap insects. Inside pitcher, there are hair which entangle the trapped insects and the lid closes. The insect is killed by the juices secreted in the pitcher and its nutrients are absorbed.

b. i) A. Mushroom B. Bread mould

ii) Saprotrophic nutrition: These are fungi which absorb nutrients from dead and decaying matter.

iii) Hot and humid weather conditions are required for the growth of these organisms.

c. No blue-black colour observed on performing iodine test on a dry leaf indicates that there is no starch present in the leaf.

10. Unlike manufactured fertilisers, natural organic manures improve soil quality and promote crop growth. They act slower and gentler as compared to manufactured fertilisers. Besides, continuous application of fertilisers to the soil decreases its fertility and also increases acidity of the soil.

ACTIVITY ZONE

S.No.	Plants	Mode of Nutrition
1.	Venus flytrap	Partial heterotrophic
2.	Mushroom	Saprotrophic
3.	Neem	Autotrophic
4.	Cuscuta	Parasitic
5.	Pitcher plant	Partial heterotrophic
6.	Mistletoe	Parasitic
7.	Lichens	Symbiotic
8.	Rose	Autotrophic
9.	Rafflesia	Parasitic
10.	Blue-green algae	Autotrophic

WORKSHEET–2

1. a. starch b. fungus c. carbon dioxide, oxygen
d. *Rhizobium* e. Stomata

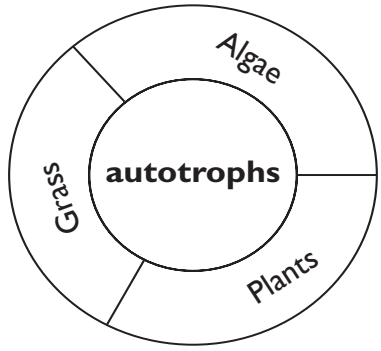
2. a. iv) b. iii) c. v) d. ii) e. i)

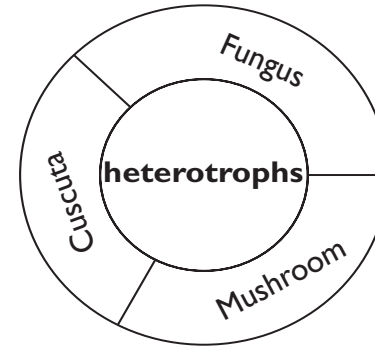
3. a. Chlorophyll b. Saprotrophic c. Iodine solution d. Stomata
e. Amerbel

4. a. iii) b. iii) c. iii) d. i) e. iii)

5. a. True b. False c. True d. True e. True

6.





7. a. Saprophytes are the plants, fungi or microorganisms that live on dead and decaying organic matter.

b. Because starch is created from the products of photosynthesis.

c. It is water movement through a plant and its evaporation from aerial parts like leaves, stems.

d. Carbohydrate (glucose) and oxygen.

8. a. i) Parasitic – Cuscuta, Mistletoe

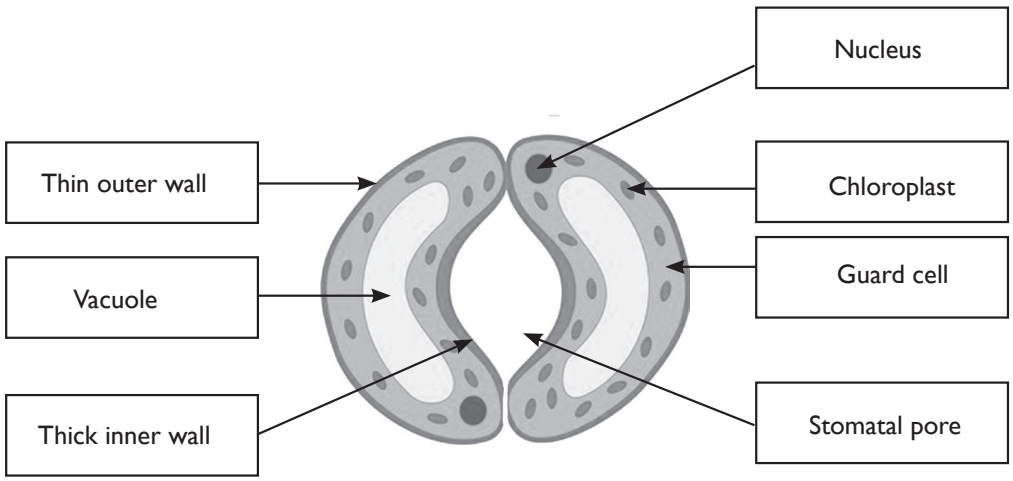
ii) Insectivorous – Pitcher plant, Venus flytrap

iii) Saprotrophic – Mushroom, Bread mould

iv) Autotrophic – Neem, Pipal

b. Because chlorophyll is present in leaves only which is an essential component of photosynthesis (food making process).

c. i)



ii) Two functions of stomata are as follows:

– Stomata help in transpiration.

– They help in photosynthesis and exchange of gases.

d. *Rhizobium* bacteria, living in the root nodules of leguminous plants, convert the atmospheric nitrogen into soluble form like nitrate and nitrite so that plants can take them up from soil. Thus, it enriches the soil and makes it fertile thereby helping the farmers.

e. A – **Nucleus:** It is a distinct, centrally located spherical structure.

B – **Cytoplasm:** It is a jelly-like substance surrounding the nucleus.

C – **Cell membrane:** It is a thin outer boundary enclosing the cell.

9. a. i) A host is harmed by the parasite while the parasite lives in or on the host and benefits by deriving nutrients at the expanse of the host.

ii) Stomata are the openings on plant leaves while guard alls are the kidney or bean shaped cells that surround these openings or stomata.

b. (4) A potted plant is left out in the sun for a few hours.

(2) A leaf is plucked from the plant.

(1) The leaf is boiled in water.

(3) The leaf is boiled in alcohol.

(5) The leaf is washed and a few drops of iodine solution are added to it.

10. The statement is justified as plants use food made by themselves. Herbivorous eat plants. Those who eat herbivores are dependent on plants indirectly. Thus, the food made by plants is used by the entire living world.

ACTIVITY ZONE

A. a. Stomata b. Leaves c. Cuscuta, Partial parasite
d. Saprophytic, Pitcher plant

B. a. Oxygen b. Pea c. Algae d. Amino acids

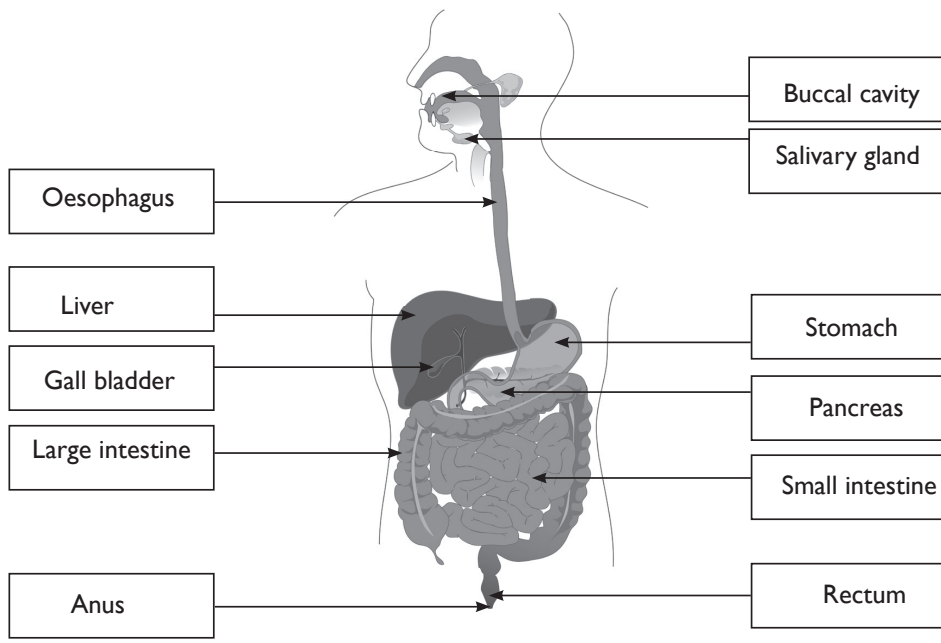
Chapter – 2. Nutrition in Animals

WORKSHEET–1

1. a. Stomach b. small intestine c. Camel d. 32
e. alkaline

2. a. True b. False c. False d. False e. False

3.



4. a. Amino acids b. Pseudopodia c. Cellulose d. Gall bladder
e. Cud

5. a. iv) b. iv) c. ii) d. i) e. iii)

6. a. Because different types of taste buds are present on tongue for testing.
b. Because bacteria causing tooth decay use sugar from food to produce acids.
c. Because it protects the inner layer of stomach from acid.
d. Because of absence of certain bacteria which digest cellulose in cattle.

7. a. It helps to create food bolus by moistening food. It also has enzyme amylase which hydrolyses starch into sugar.

b. To get rid of food left over after the nutrients are removed from it.

c. In small intestine.

d. Since glucose can be easily absorbed in blood.

e. The digested food molecules are carried around the body to where they are needed.

8. a. During assimilation, the absorbed substances are transported via blood vessels to organs where they are used to build complex substances like proteins required by the body.

b. It kills many bacteria that enter along with food and makes the medium in the stomach acidic and helps digestive juices to act.

c. It is small intestine that has millions of villi which increase surface area for food absorption. Within these villi, many blood vessels are present that absorb digested food.

d. It is pancreatic juice which contains a variety of enzymes. These enzymes assist in breakdown of proteins, fats and carbohydrates for further processing and absorption in the intestines.

e. Three functions of tongue in humans are as follows:

i) We use tongue for talking.

ii) It mixes saliva with the food during chewing and helps in swallowing food.

iii) We also taste with our tongue.

f. Gall bladder is a pear-shaped hollow structure located under the liver and on the right side of abdomen. It stores and concentrates bile which plays an important role in fat digestion.

9. a. i) 1. Incisors 2. Canines 3. Premolars 4. Molars

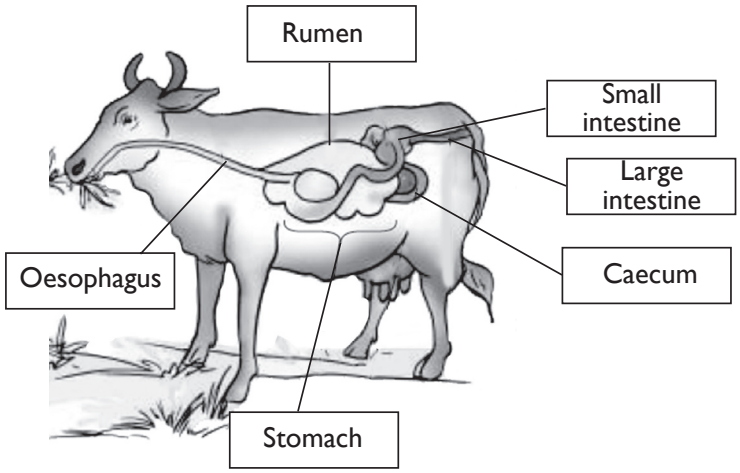
ii) 1. Incisors – For biting and cutting

2. Canines – For piercing and tearing

3. Premolars – For chewing and grinding

4. Molars – For chewing and grinding also

b.



Ruminants swallow grass and store it in a part of stomach called rumen. The food here is partially digested and is called cud. Later this cud returns to the mouth in small lumps and the animal chews it. This is called rumination. Bacteria present in rumen help in digestion of cellulose.

c. i) Stomach secretes hydrochloric acid and digestive juices. The acid kills bacteria and makes the medium acidic. Digestive juices break down proteins into simpler substances.

ii) In small intestine, the surface of millions of villi absorbs the digested food materials.

iii) In large intestine, water and some salts from the undigested food materials are absorbed.

10. a. Diarrhoea

b. Bacterial infection or food poisoning may be the cause of this disease.

c. To take plenty of fluids and ORS solution (or a mixture of a very small amount of salt and sugar dissolved in water).

ACTIVITY ZONE

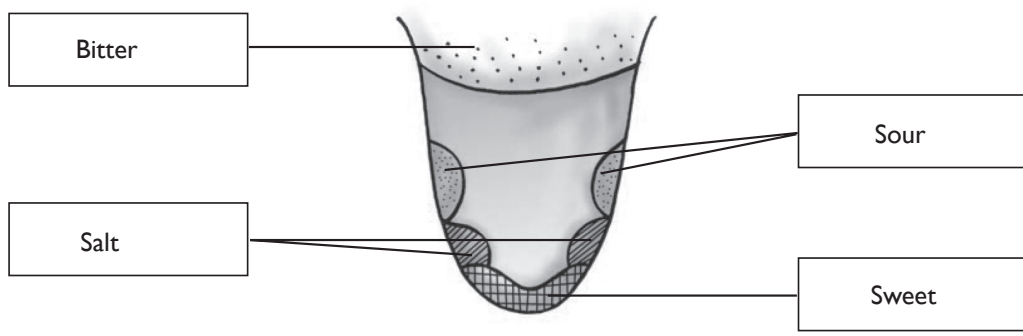
Name of Animal	Type of food	Mode of feeding
1. Mosquito	Blood	Sucking
2. Butterfly	Nectar of flowers	Siphoning
3. Snake	Small animals	Swallowing
4. Humming-bird	Nectar of flowers	Sucking
5. Lice	Blood	Sucking
6. Snail	Leaves and insects	Scraping
7. Ant	Food particles	Chewing

WORKSHEET–2

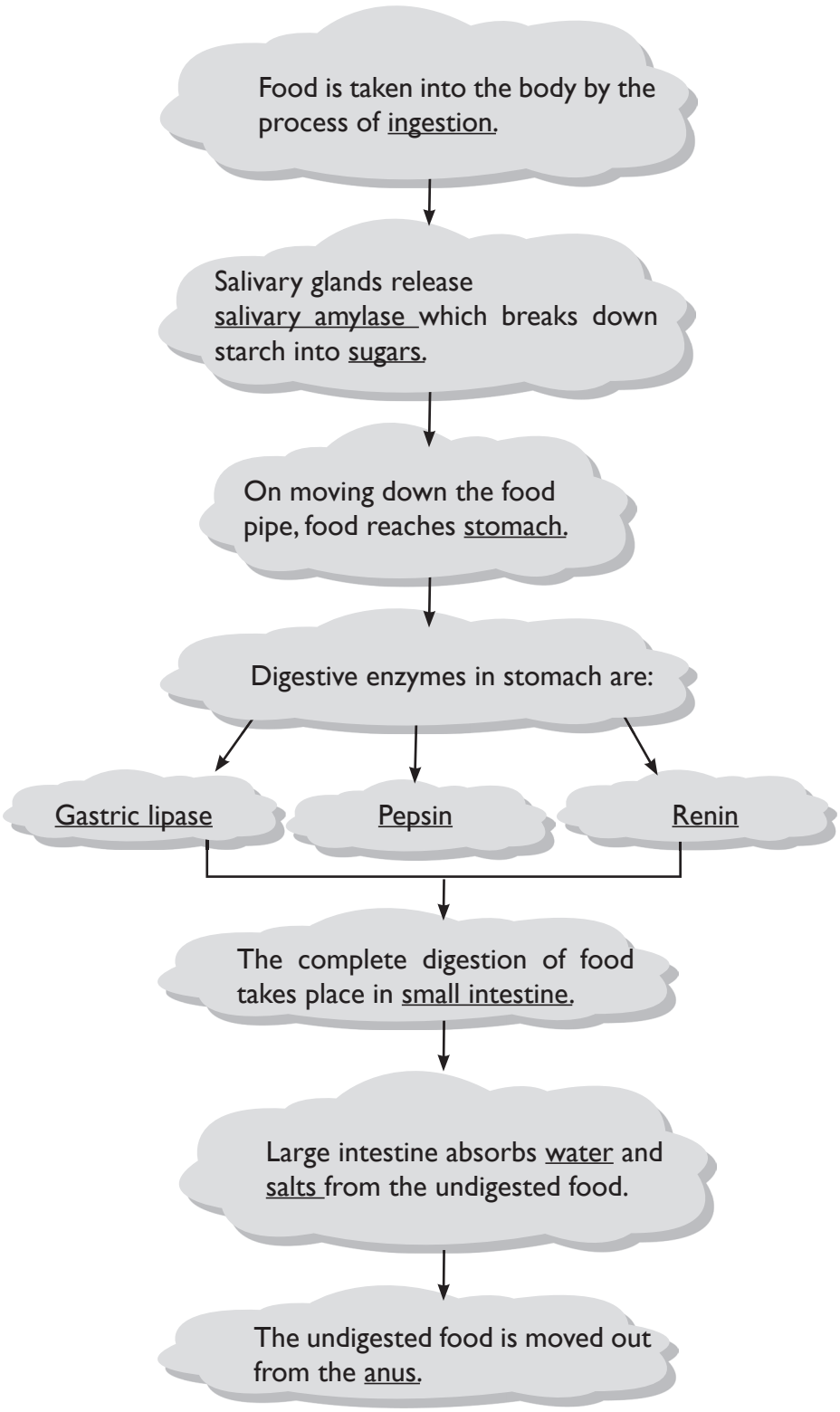
1. a. iv) b. ii) c. i) d. iii) e. ii)

2. a. v) b. i) c. iv) d. vi) e. ii) f. iii)

3.



4.



5. a. taste buds b. Stomach c. Dental floss d. Liver, pancreas
e. Enamel

6. a.

Milk teeth	Permanent teeth
• Milk teeth are the first set of teeth that grow during infancy. • They fall off at the age from six to eight years.	• Permanent teeth are the second set of teeth that replace milk teeth. • These teeth may last throughout life or fall off during old age or due to some dental disease.

b.

Molars	Premolars
• Molars have four cusps or points. • Molars are slightly larger in size than premolars. • These are present in the rear of the mouth.	• Premolars have two cusps or points. • Premolars are slightly smaller in size than molars. • They are present between canines and molars.

7. a. It is breakdown of complex components of food into simpler substances.

b. To protect the lining of the stomach from acid.

c. These increase surface area for absorption of food.

d. Since fat globules in goat's milk are smaller than those in cow's milk.

e. It helps to create food bolus by moistening food. It also has salivary amylase which hydrolyses starch into sugar.

8. a. Fats are digested in small intestine. Bile juice breaks down large globules of fat into smaller globules. This is called emulsification of fats. The bile also makes medium alkaline so that the pancreatic enzyme containing lipase further digests fats to form fatty acids.

b. Digestion of cellulose takes longer time because the enzymes are produced by the ruminant bacteria that live in the gut of herbivores. Longer small intestine ensures that food stays for a longer duration and proper digestion is possible.

c. A – **Oesophagus:** Muscles of oesophagus contract to move food to the stomach. This is called peristalsis.

B – **Stomach:** It secretes mucus, hydrochloric acid and digestive juices which help in digestion.

d. Three digestive glands present in our digestive system are as follows:

– **Salivary gland:** It produces saliva which keeps mouth and other parts of digestive system moist. Saliva also breaks down starch into sugars.

– **Liver:** It processes the nutrients absorbed from small intestine. It secretes bile which helps in fat digestion.

– **Pancreas:** It secretes pancreatic juice which acts on carbohydrates, fats and proteins and changes them into simpler forms.

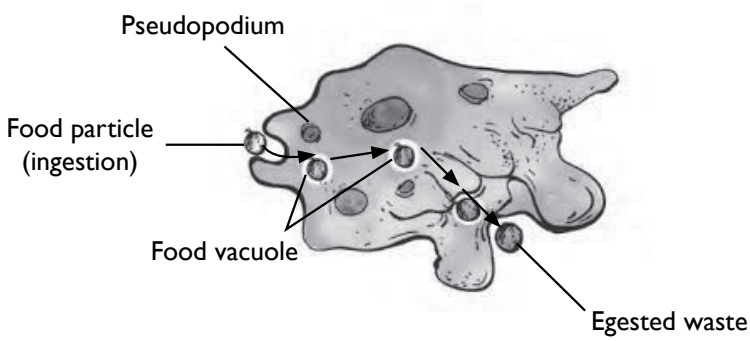
e. Tooth decay is the damage of teeth. If we do not clean our teeth and mouth after eating, many harmful bacteria begin to grow in it. These bacteria break down sugars present from the left over food and release acids. These acids gradually damage the teeth causing tooth decay. To prevent tooth decay, one should clean teeth with a brush and dental floss twice

a day and rinse the mouth after every meal. One should not put unwanted objects in the mouth.

f. i) Ingestion is the process of taking food into the body whereas egestion is the process of removing faecal matter through the anus.

ii) During absorption, the digested food passes into blood vessels in the wall of intestine while assimilation is the transportation of absorbed substances via blood vessels to various organs of the body where they are used to build complex substances.

9. a.



Feeding and digestion in amoeba

Amoeba pushes out pseudopodia around food particle and engulfs it which becomes trapped in a food vacuole. Digestive juices are secreted into food vacuole which break down food into simpler substances. The digested food is absorbed and is used for growth, maintenance and multiplication. Undigested residue of the food is expelled outside by the vacuole.

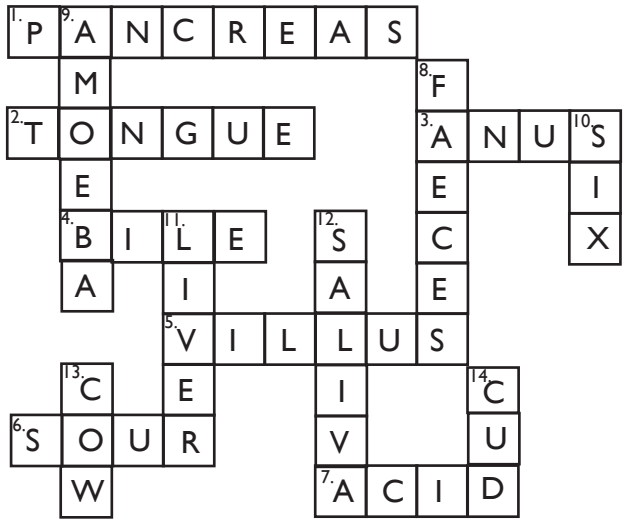
b. i) Test tube A shows blue-black colour while test tube B does not show this colour.

ii) Chewing has made food into smaller particles and salivary amylase has mixed with it.

iii) It indicates that salivary amylase present in saliva has broken down starch into simple sugars so no blue-black colour is observed in test tube B.

10. Because salivary amylase present in saliva breaks down starch into simple sugars.

ACTIVITY ZONE



Chapter – 3. Heat

WORKSHEET–1

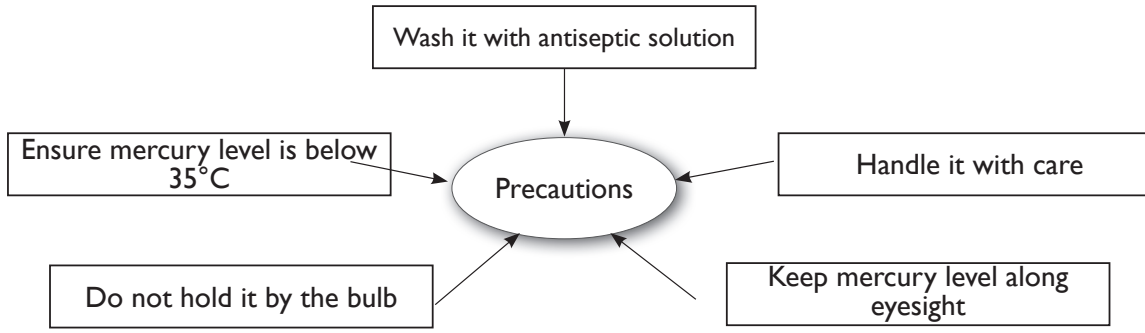
1. a. iii) b. ii) c. iv) d. ii) e. i)

2. a. Celsius b. faster c. Clinical d. convection e. convection

3. a. True b. False c. False d. True e. True

4. Ice - cold Sun - Hot Volcano - Hot Fire - Hot
Tea - Hot Glowing bulb - Hot Ice cream - cold Lemonade - cold

5.



6. a.

Conductors	Insulators
These are the materials which allow heat to pass through them easily. For example: copper, aluminium, iron.	These are the materials which do not allow heat to pass through them easily. For example: plastic, rubber.

b.

Clinical thermometer	Laboratory thermometer
• It is used to measure body temperature. • Temperature range is 35°C to 42°C.	• It is used to measure the temperature of objects. • Temperature range is –10°C to 110°C.

7. a. Two conditions required for heat transfer through conduction are as follows:
i) Object should be solid. ii) Temperature difference should be there.

b. Because metals are good conductors of heat.

c. Because convection currents need movement of particles.

d. 35°C – 42°C.

e. Conductor - Copper, Insulator - Plastic

8. a. Because mercury has high coefficient of expansion so the slightest change in temperature is notable when used in thermometer. It has a high boiling point which also makes it suitable to measure high temperature.

b. Heat from the sun reaches the earth by radiation. The transfer of heat by radiation does not require any medium. It can take place irrespective of whether a medium is present or not.

c. Because the clinical thermometer is designed to measure the temperature of human body only and the temperature of human body normally does not go above 42°C.

d. Temperature is a reliable measure of the hotness or coldness of an object. Celsius (C) and Fahrenheit (F) are the two units in which it is measured.

e. It is so because atoms/molecules in solids are located closer together. Metals are the best solids for conducting heats having lightly packed atoms.

9. a. **A – Sea breeze:** During day time, the air over land becomes hotter and rises up. Cooler air from sea rushes in towards land. The warm air from land moves towards sea to complete the cycle. The air from the sea is called sea breeze.

B – Land breeze: At night, water cools down more slowly than the land. So cool air from the land moves towards the sea. This is called land breeze.

b. Two practical applications of conduction, convection and radiation are as follows:

Conduction: i) Heating of utensils while cooking.

ii) Heating of metallic plate in electric iron.

Convection: i) Cooling system in a car radiator.

ii) Convection currents causing air to move and hence affecting the climate.

Radiation: i) Heat from the sun reaching earth.

ii) Heat felt by a frame.

10. Because it produces quick cooling in the room. This is so since cooled air from air conditioners comes down and the warm air from below rises up and a convection current is set up.

ACTIVITY ZONE

Observations:

When in sun, water in glass with black surface has high temperature as compared to water in glass with white surface. When in shade, water in glass with white surface has high temperature comparatively.

Conclusion:

Glass with black surface has absorbed more heat compared with white surface when in sun. When in shade, black surface has lost more heat in comparison with white surface.

Inference:

Dark surfaces of objects absorb more heat compared with light surfaces which reflect most of the heat. Dark surfaces lose heat faster compared with light surfaces.

WORKSHEET–2

1. a. 0°C, 100°C b. 98. 6°F c. Mercury d. convection e. Radiation

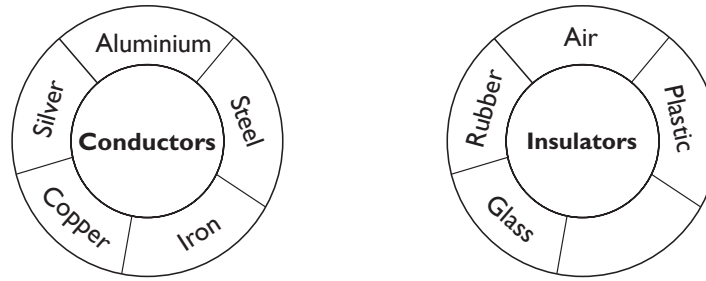
2. a. iii) b. v) c. ii) d. i) e. iv) f. vi)

3. a. Temperature b. Conduction c. Joule d. Insulators e. Laboratory

4. a. i) b. iii) c. iv) d. iii) e. iv)

5. Conduction Convection Radiation

6.



7. a. From the hotter end to the colder end of the object.

b Principle of thermal expansion, i.e., when a substance gets hotter, it expands.

c. Kink prevents mercury level from falling on its own.

d. Radiation

8. a. Because insulators are poor conductors of heat, due to which they do not get heated and we are able to hold the utensils with their help.

b. Heat is the energy that flows between two objects that are at different temperatures while temperature is a measure of how hot or cold a substance is.

c. Mass, temperature difference, specific heat capacity of the substance, nature of material (conductor or insulator), extent of contact are the factors.

d. i) Convection ii) Radiation iii) Convection

e.

Type:	Clinical thermometer	Digital thermometer	Laboratory thermometer
Range:	35°C – 42°C	35°C – 45°C	–10°C – 110°C

9. a. i) To receive the cooler sea breeze.

ii) Because light colours absorb less heat as compared to dark colours.

iii) Since mercury has high coefficient of expansion and the slightest change in temperature is notable.

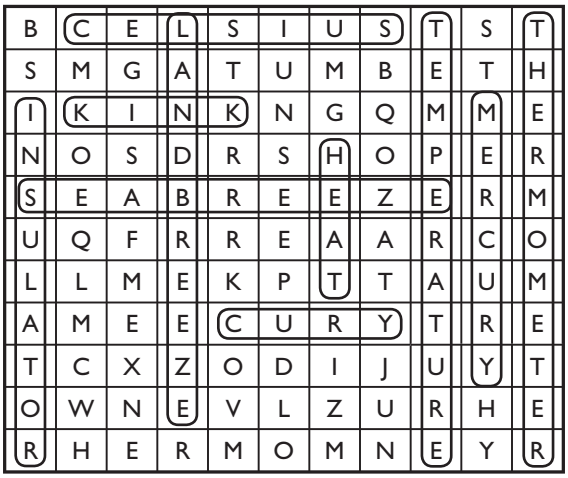
iv) Because atoms/molecules in solids are located closer together.

v) A kink is present near the bulb of thermometer which prevents mercury from falling and rising.

b. The figure shows the process of conduction. It this, a few metal rods are placed on a tripod. A few small pieces of wax are fixed on rods and one end of rods is heated. Wax pieces near flame fall first and the farthest at last which shows that heat is transferred from the hotter end to the colder end of an object.

10. Since a clinical thermometer is designed to measure only human body temperature having a temperature range of 35°C to 42°C.

ACTIVITY ZONE



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

Chapter – 4. Acids, Bases and Salts

WORKSHEET–1

1. a. acidic b. synthetic c. neutralisation d. curd e. blue

2. Litmus Turmeric China rose

3. a. Sodium hydroxide b. Magnesium hydroxide c. Calcium hydroxide
d. Sodium hydroxide e. Ascorbic acid f. Sodium hydroxide

4. a. iii) b. iii) c. i) d. iii) e. iv)

5.

S. No.	Indicator	Colour in acids	Colour in bases
1.	Litmus	Red	Blue
2.	Turmeric	Yellow	Red
3.	China rose	Dark pink	Green
4.	Phenolphthalein	Colourless	Pink
5.	Methyl orange	Red	Yellow

6. a. Because antacid contains magnesium hydroxide which neutralises the effect of excessive acid.

b. Because mineral acids are highly corrosive.

c. Because soap solution is basic in nature.

d. Because organic matter releases acids which neutralises basic nature of soil.

7. a. Natural - Turmeric, China rose; Synthetic - Phenolphthalein, methyl orange.

b. Because all these contain acids.

c. Hydrochloric acid

d. Sodium chloride and water are produced (neutralisation reaction).

e. Acids turn blue litmus red.

8. a. These are specific type of substances which are used to test whether a substance is acidic or basic. Turmeric and China rose are natural indicators.

b. These wastes contain acids. If they are directly flushed into water bodies, the acids will kill fish and other organisms.

c. Salt and water are produced and heat is evolved. It is called neutralisation reaction.

d. The rain containing excess of acids is called acid rain. Rain becomes acidic because carbon dioxide, sulphur dioxide and nitrogen dioxide dissolve in rain drops to form carbonic acid, sulphuric acid and nitric acid. Acid rain causes damage to buildings, historical monuments, plants and animals.

e. On adding turmeric, sodium hydroxide will turn red. Other two liquids will turn yellow. Add red coloured solution to two yellow liquids. One yellow liquid will change red colour of sodium hydroxide into yellow colour. This liquid is hydrochloric acid. The other liquid is sugar solution.

f.

S. No.	Substance	Taste (sour/bitter/other)	Acid/Base
1.	Lemon juice	Sour	Acid
2.	Vinegar	Sour	Acid
3.	Grapes	Sweet	Acid
4.	Cucumber	Other	Base
5.	Curd	Sour	Acid
6.	Baking soda	Bitter	Base

9. a. In this activity, 2-3 drops of phenolphthalein indicator are added to acid. Now, sodium hydroxide solution is added to the acidic solution till pink colour appears. On adding one more drop of hydrochloric acid, it becomes colourless. One more drop of sodium hydroxide changes it pink. Thus, on mixing acidic and basic solutions, both neutralise the effect of each other (neutralisation reaction).

b. (i) Since excess of oily and spicy food leads to acidity and indigestion which causes pain.

(ii) Hydrochloric acid was produced.

(iii) It was an antacid.

(iv) Milk of magnesia and Alka-Seltzer

10. Sample A should be treated with powdered chalk as it turns blue litmus solution red and is acidic in nature. Chalk reduces acidity of soil. Sample B should be treated with manure since blue litmus has no effect on it and so it is basic in nature.

ACTIVITY ZONE

I show red colour with acid,
But no change with base.
am prepared from a symbiotic plant,
Can you guess my name?

Litmus

I am princess of the kitchen,
Can be used as an antibiotic or antiseptic
Show reddish brown colour with soap
But with acid ther

Turmeric

I am product of
Acid-base reaction,
Neither sour nor bitter,
Can you identify my nature?

Salt

When stomach produces more acid,
You can use me as an antacid.
I am your friend in the kitchen,
Also used in fermentation.

Backing soda

I am colourless with acid,
but pink with bas
I am an indicato
Identify me and get grac

Phenolphthalein

WORKSHEET–2

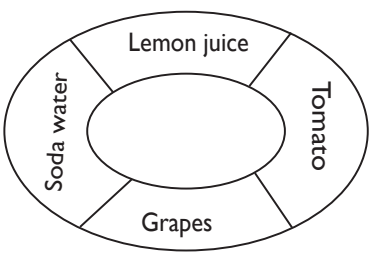
1. a. iv) b. iii) c. iv) d. iii) e. iii)

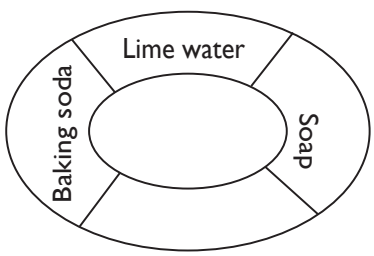
2.

Oxalic acid	Lactic acid	Sodium hydroxide	Citric acid
Sodium bicarbonate	Tartaric acid	Formic acid	Citric acid

3. a. iii) b. iv) c. i) d. v) e. ii)

4.





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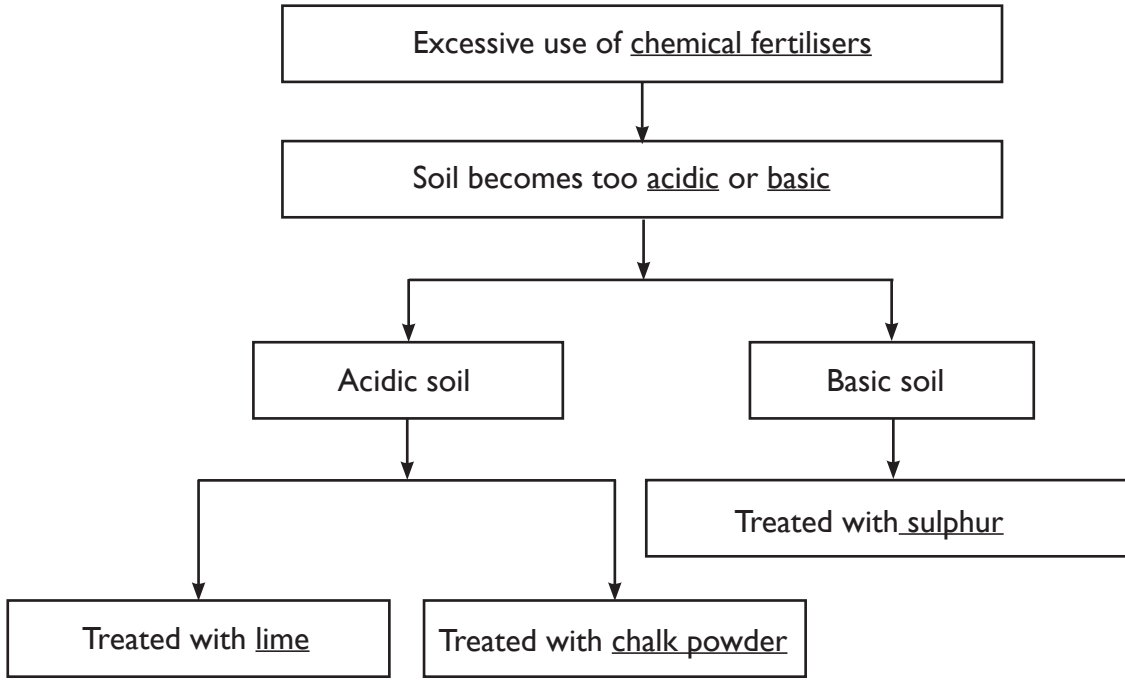


6.

S. No.	Substance	Acid/Base present
1.	Vinegar	Acidic acid
2.	Lime water	Calcium hydroxide
3.	Milk of magnesia	Magnesium hydroxide
4.	Ant's sting	Formic acid
5.	Tamarind	Tartaric acid
6.	Orange	Citric acid
7.	Window cleaner	Ammonium hydroxide

7. a. It will turn red.

b. Formic acid

c. i) Spinach ii) Lemon

d. Pink colour

8. a. On adding phenolphthalein, an acid gives pink colour while a base remains colourless.

b. Salts are produced during neutralisation reaction in which an acid and a base are reacted.

c. One industrial use of acids and bases is as follows:

– Sulphuric acid is used in manufacturing of fertilisers.

– Sodium hydroxide is used in manufacturing of soap and detergents.

d. Since acids will react with metals forming metal salts and liberating hydrogen gas.

e. The reaction between an acid and a base is called neutralisation reaction. Salt and water are produced with evolution of heat. Example: Reaction between hydrochloric acid and sodium hydroxide produces sodium chloride and water.

$$HCl + NaOH \longrightarrow NaCl + H_2O$$

9. a. Antacids are a class of medicines that neutralise acid in the stomach. They contain ingredients such as calcium, magnesium or sodium bicarbonate which act as bases to counteract stomach acid and make its pH more neutral.

b. The waste of many factories contains acids. These acids will kill fish and other aquatic organisms if they are allowed to flow into the water bodies. These factory wastes are neutralised by adding basic substances.

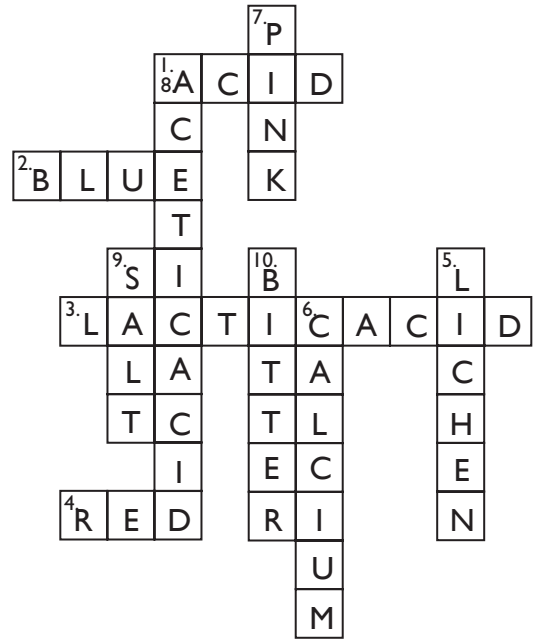
c. Three uses of acids and bases are as follows:

Acids: Strong acids like sulphuric acid, are used in mineral processing, nitric acid/sulphuric acid are used in fertilisers, sulphuric acid in used in batteries.

Bases: Ammonia is used in the production of fertilisers, aluminium hydroxide is used in making gastric medicine — antacid, and calcium hydroxide is used in making cement and lime water.

10. Take China rose petals in a beaker, add warm water in it and keep it for some time till water becomes coloured. This coloured water is an indicator which turns acidic solution to dark pink (magenta) and basic solution to green. In case of distilled water, there is no colour change.

ACTIVITY ZONE



Chapter – 5. Physical and Chemical Changes

WORKSHEET–1

1. a. physical b. reversible c. faster d. galvanisation
e. crystallisation

2.

S. No.	Change	Changes in Physical Property	Reversible/Irreversible
1.	Cutting an apple	Change in shape, size	Irreversible
2.	Making ball with clay	Change in shape	Reversible
3.	Drying clothes	Change in weight	Reversible
4.	Churning of milk	Change in state	Irreversible
5.	Freezing of water	Change in state	Reversible
6.	Making a dress	Change in shape	Irreversible
7.	Tearing paper	Change in shape, size	Irreversible
8.	Crushing plastic bottle	Change in shape, size	Reversible

3. a. False b. True c. False d. False
e. True

4. a. Physical b. Chemical c. Physical d. Physical
e. Chemical

5. a. ii) b. ii) c. iii) d. iii)
e. iii)

6. a. Chemical change b. Galvanisation c. Crystallisation d. Magnesium oxide
e. Light green

7. a. The process of plating one metal onto another by hydrolysis to prevent corrosion is called electroplating.

b. It makes the water slightly alkaline.

c. $Ca(OH)_2 + CO_2 \longrightarrow CaCO_3 + H_2O$

d. Since substances are changed into different substances. Also combustion and oxidation occur.

e. Presence of air and moisture.

8. a. Water pipes are galvanised (zinc coated) to reduce the corrosive attack by water.

b. Yes. Because enzymes in the stomach and intestines break down large molecules into simpler molecules so that body can easily absorb the food.

c. Melting of solid wax to form liquid wax and evaporation of liquid wax to form wax vapour are physical changes. The burning of wax vapour is a chemical change.

d. Take water in a beaker and add a few drops of dilute sulphuric acid and heat it. When it boils, add copper sulphate powder and stir it. Continue adding copper sulphate powder till no more powder can be dissolved. Filter the solution and allow it to cool. Crystals of copper sulphate will be seen at the bottom of the beaker.

e. Physical changes do not produce any new substances after the reaction, for example tearing of paper, while chemical changes produce one or more new substances and energy is either given off or absorbed, for example, conversion of milk into curd.

9. a. Iron displaces copper from solution which gets deposited as a red brown residue. Blue coloured solution changes to light green due to the formation of ferrous sulphate. It is a displacement reaction.

$$Fe + CuSO_4 \longrightarrow FeSO_4 + Cu$$

b. Nail will form rust in test tube A because water and air are needed for rust formation. In test tube B, oil layer will prevent air from reaching nail and in test tube C also, moisture/water is absent. So, no rust formation will take place in test tubes B and C.

10. Because rusting of iron occurs if iron comes in contact with moist air. In coastal areas, air contains high percentage of moisture because of sea or ocean, rusting occurs faster in coastal areas.

ACTIVITY ZONE

S. No.	Activity	Change in colour	Evolution of gas	Reversible/ Irreversible	Physical/ Chemical change
1.	Burning of paper	Yes	Yes	Irreversible	Chemical
2.	Dissolution of sugar in water	No	No	Reversible	Physical
3.	Heating of wax	No	No	Reversible	Physical
4.	Reaction of lemon juice with baking soda	No	Yes	Irreversible	Chemical
5.	Reaction of iron nails with copper sulphate solution	Yes	No	Irreversible	Chemical

WORKSHEET–2

1. a. galvanisation b. Copper sulphate c. crystallisation
d. permanent, irreversible e. iron oxide

2. a. ii) b. ii) c. ii) d. i) e. ii)

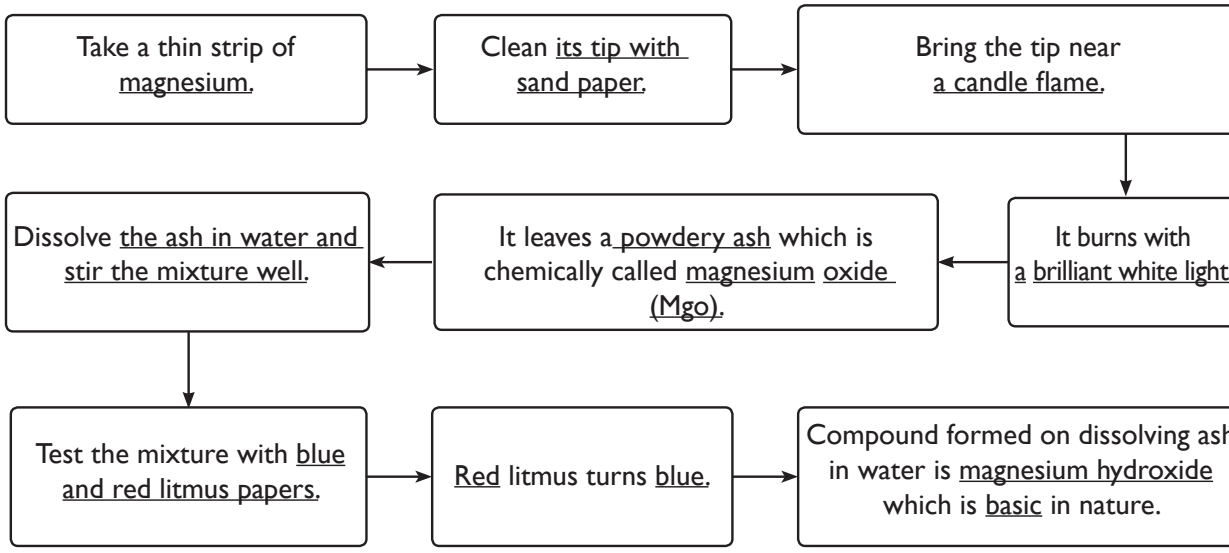
3.

S. No.	Change	Physical / Chemical	Reversible / Irreversible
1.	Stretching of rubber band	Physical	Reversible
2.	Glowing of bulb	Physical	Reversible
3.	Burning of wood	Chemical	Irreversible
4.	Rusting of iron	Chemical	Irreversible
5.	Melting of ice	Physical	Reversible
6.	Digestion of food	Chemical	Irreversible
7.	Cutting of wood	Physical	Irreversible
8.	Tearing of paper	Physical	Irreversible

4. a. iii) b. v) c. iv) d. ii)
e. i)

5. a. LPG b. $CuSO_4$ c. Iron oxide d. Ozone layer
e. Sodium hydrogen carbonate

6.



7. a. The arrow (→) in a chemical reaction implies 'becomes'.
b. Nonmetallic oxides turn blue litmus red.
c. Magnesium (Mg) + Oxygen (O_2) → Magnesium oxide (Mgo)
d. When baking soda is added to vinegar, carbon dioxide gas comes out.
e. Since acids in pickle will react with metal, spoiling pickle and corroding metal.

8. a. The formation of manure from leaves is a chemical change because the manure formed has different composition from the leaves.

b. The oxidation reaction causes a sort of rust to develop on the slice of an apple, which damages its cells, allowing oxygen in air to react with enzyme and other chemicals inside the slice of an apple.

c. If ultraviolet radiations were not absorbed by the ozone layer, it would reach the earth's surface and cause harm to us and other life forms.

d. Three characteristics of chemical changes are as follows:

i) New substances are formed.

ii) Chemical changes are generally irreversible.

iii) Change in colour/odour/temperature can occur.

e. When baking soda is mixed with lemon juice, bubbles are formed with the evolution of carbon dioxide. Heat is also evolved. This is a chemical change. This change is irreversible in nature.

9. a. Five methods to prevent rusting are as follows:

i) Prevent iron articles from coming in contact with oxygen or water or both.

ii) Apply a coat of oil or grease on the iron object which should be applied regularly to prevent rusting.

iii) Deposit a layer of zinc metal on iron. It is called galvanisation.

iv) Paint the bare metal with any durable acrylic paint.

v) Use stainless steel wherever and whenever possible.

b. i) Take a teaspoonful of vinegar in a test tube and add a pinch of baking soda to it. A hissing sound and bubbles of CO_2 gas are produced. Pass this gas through freshly prepared lime water.

ii) When vinegar and baking soda are mixed, a hissing sound is produced and bubbles of carbon dioxide come out.

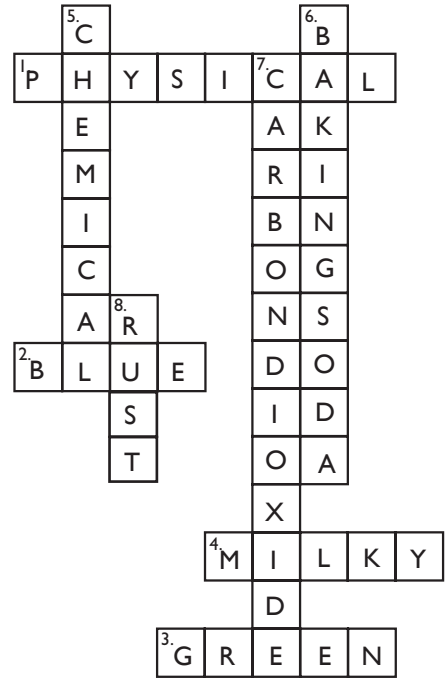
$Ca(OH)_2 + CO_2 \rightarrow CaCO_3 + H_2O$

iii) Lime water turns milky and calcium carbonate is formed.

$NaHCO_3 + CH_3COOH \rightarrow CH_3COONa + H_2O + CO_2(g)$

10. Changes in both the processes A and B are irreversible and are chemical changes.

ACTIVITY ZONE



Chapter – 6. Respiration in Organisms

WORKSHEET–1

1.

Cell surface	Stomata	Gills	Tracheae
Lungs	Lungs	Lungs	Lungs/Skin

2.

Parameters	Aerobic	Anaerobic
Presence of oxygen	Present	Absent
Amount of energy released	More energy is released.	Less energy is released.
End products	CO_2, water, energy	CO_2, alcohol, lactic acid, energy
Word equation	Glucose $\rightarrow$ CO_2 + water + energy	Glucose $\rightarrow$ alcohol + CO_2 + energy
Examples of organisms	Humans	Yeast

3. a. iii) b. iv) c. i) d. iv)
e. ii)

4. [1] [4] [2] [1]

5. a. Aerobic b. bronchi c. downward d. haemoglobin
e. 15-18

6. a. Because less energy is required while sleeping.

b. 0.04%

c. Lactic acid

d. 15-18 times per minute.

e. All the floor of the chest cavity

7. a. Because these unwanted particles like dust get past the hair in the nasal cavity and irritate the lining of cavity, as a result of which we sneeze.

b. On doing so, the roots of plant will not get enough oxygen to breathe as water fills up air spaces present between soil particles. Thus, root will decay and plant will die.

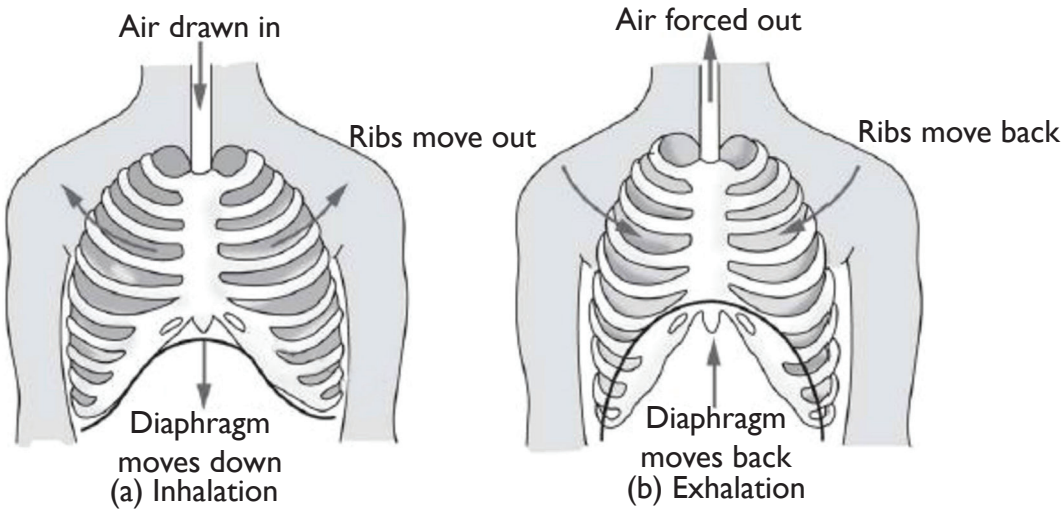
c. Because nose has hair which filter out dust particles when we breathe. It also maintains correct balance of O_2 and CO_2 in blood. Breathing through mouth may lead to dry mouth.

d. Plant leaves have small pores called stomata, through which they take in oxygen and give out carbon dioxide. In cells, oxygen is used to break down glucose into carbon dioxide and water.

e. During exhalation, ribs move down and inwards, while diaphragm moves up to its former position. This reduces the size of chest cavity and air is pushed out of the lungs.

f. During heavy exercise, the cramps occur when muscle cells respire anaerobically. The partial break down of glucose produces lactic acid. The accumulation of lactic acid causes muscle cramps. They can be healed by a hot water bath or a massage.

8. a.



Mechanism of breathing in human beings

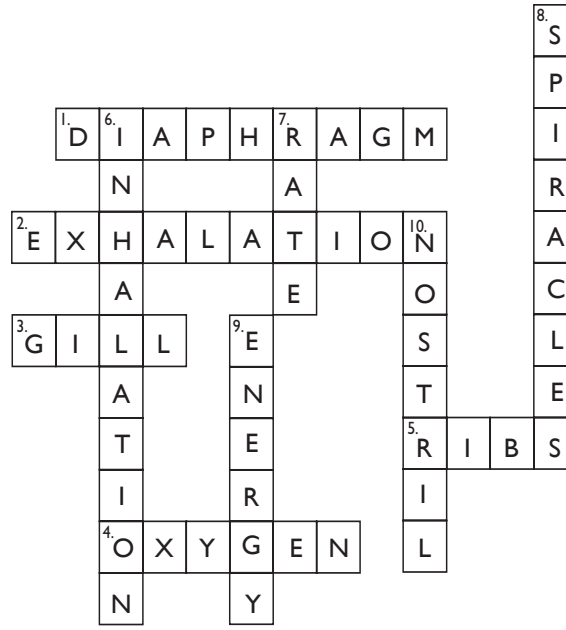
Breathing involves inhalation and exhalation. During inhalation, ribs move up and outwards and diaphragm moves down. This increases space in the chest cavity and air rushes into lungs which get filled with air. During exhalation, ribs move down and inwards while diaphragm moves up to its former position. This reduces the size of chest cavity and air is pushed out of the lungs.

b. A cockroach has small opening on its body called spiracles. It has a network of air tubes called tracheae for gas exchange. Oxygen rich air rushes through spiracles into tracheal

tubes, diffuses into body tissue and reaches every cell of the body. Similarly, carbon dioxide from the cells goes into tracheal tubes and moves out through spiracles.

9. In the cells, oxygen in the air we breathe helps in the break down of food. The process of break down of food in the cell with the release of energy is called cellular respiration.

ACTIVITY ZONE

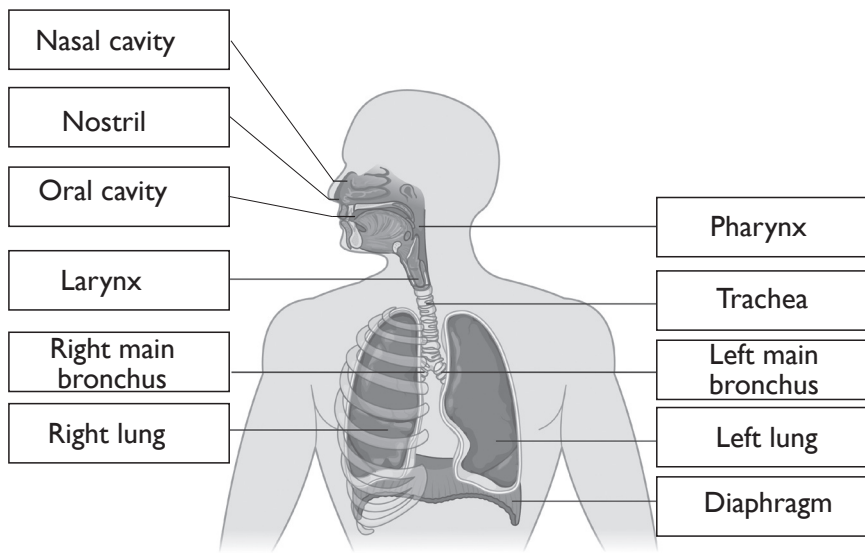


WORKSHEET–2

1. a. anaerobically b. oxygen c. Mucus d. bronchi
e. heamoglobin

2. a. True b. True c. False d. True
e. False

3.



4. a. Carbohydrate b. 15-18 times c. Diaphragm d. Anaerobic
e. Tracheae

5. a. iv) b. vi) c. v) d. ii)
e. i) f. iii)

6. a. Because it traps bacteria, other germs and debris and prevent them from entering lungs.

b. We respire to get energy from food.

c. Nose, pharynx, larynx, trachea, bronchi, lungs.

d. Yes, we should cover our nose while sneezing so that the foreign particles we expel are not inhaled by other persons.

e. They take in oxygen dissolved in water.

7. a. The atmospheric pressure goes on decreasing as we go above the sea level. So, the amount of oxygen also decreases at higher altitudes. Therefore, mountaineers carry oxygen cylinders with them.

b. Aerobic respiration occurs in presence of oxygen while anaerobic respiration takes place in absence of oxygen. More energy is released during aerobic respiration as compared to that in anaerobic respiration.

c. Because during daytime, carbon dioxide released during respiration is utilised by the plants for photosynthesis.

d. i) Curve A denotes aerobic respiration because more energy is released. Curve B denotes anaerobic respiration due to release of less energy.

ii) **A:** Glucose $\xrightarrow{\text{in presence of oxygen}}$ Carbon dioxide + Water + Energy

B: Glucose $\xrightarrow{\text{in absence of energy}}$ Alcohol + Carbon dioxide + Energy

e. i) Both are pigments.

ii) Both are respiratory organs.

iii) Both are conducting passage ways of the respiratory system.

8. a. i) The activity suggests that the air we breathe out contains carbon dioxide gas.

ii) In test tube B, lime water turns milky.

iii) $Ca(OH)_2 + CO_2 \rightarrow CaCO_3 + H_2O$

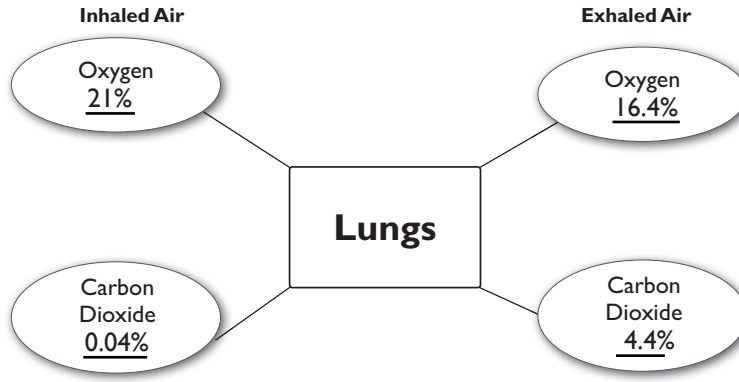
b. i) A person needs artificial respiration at the time of acute breathing problems. It is an artificial method of breathing required when the person is unable to breath normally.

ii) During artificial respiration, a cylinder filled with oxygen is attached to a machine which provides oxygen for artificial respiration.

iii) It is not provided permanently to every person. It is given temporarily to person suffering from breething problems. But it can be given permanently to those who are in coma or are unable to breathe on their own.

9. Thin skin in frogs allows respiratory gases to readily diffuse directly down their gradients between the blood vessels and surroundings. Its moist skin helps to absorb oxygen from the air.

ACTIVITY ZONE



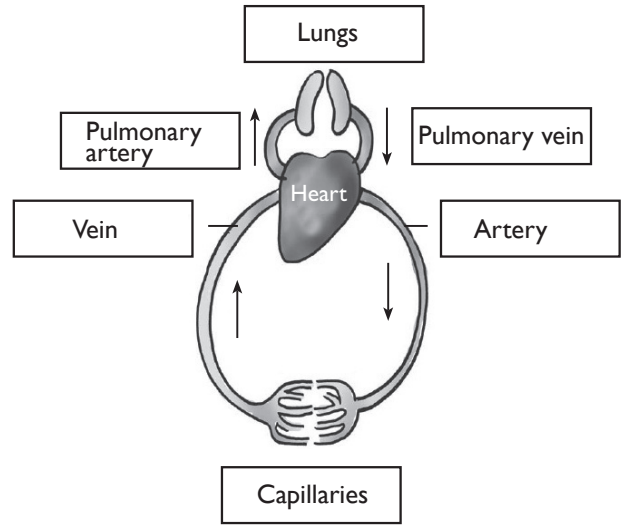
Chapter – 7. Transportation in Animals and Plants

WORKSHEET–1

1. a. plasma b. Arteries, veins c. xylem d. excretion
e. haemoglobin

2. a. False b. True c. False d. False
e. True

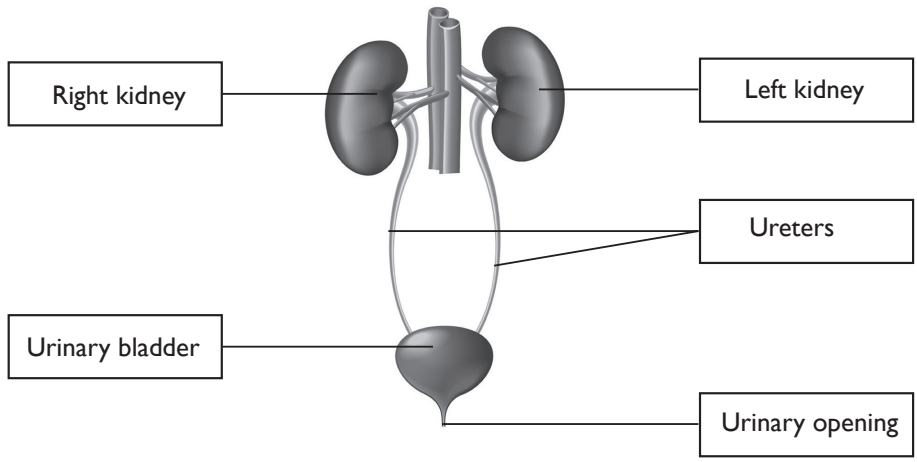
3.



4. a. iv) b. v) c. i) d. ii)
e. iii)

5. a. iv) b. i) c. iv) d. iii)
e. ii)

6.



7. a. A doctor uses a stethoscope to hear the heartbeat.

b. The pulse rate per minute indicates the rate of heartbeat.

c. 1-1.8 L per day.

d. Phloem transports food to all parts of the plant.

e. Platelets

8. a. Stomata are tiny pores present on the surface of leaves. Through stomata, water evaporates by the process of transpiration. They help in photosynthesis.

b. The root hair increase the surface area of the root for absorption of water and mineral nutrients dissolved in water. The root hair is in contact with the water present between the soil particles.

c. The pigment is haemoglobin which binds with oxygen and transports it to all parts of body and ultimately to all the cells.

d. The water evaporates through stomata present on the surface of leaves by a process called transpiration. Stomata are triggered to open in light so plants transpire more rapidly during the day.

e. i) A, B and C are veins, arteries and heart, respectively.

ii) Because blood flows is rapid and at a high pressure, arteries have thick elastic walls.

9. a. Blood is a fluid which flows in blood vessels. It transports substances like digested food from small intestine to other parts of body. It has various components such as:

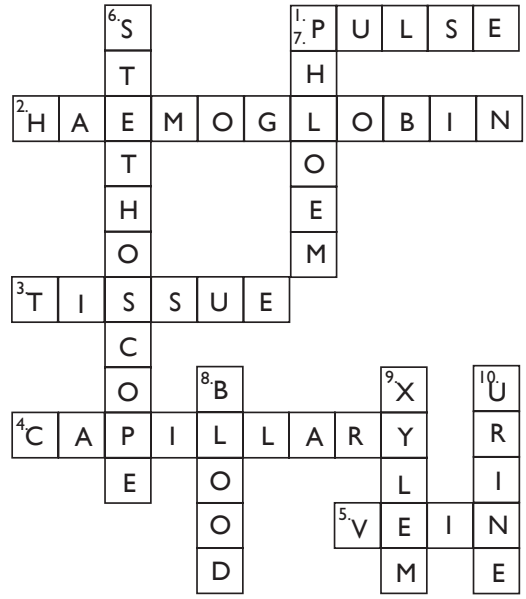
- **Plasma:** It transports nutrients, hormones and proteins to different parts of the body.
- **Red blood cells:** These contain haemoglobin which binds with oxygen and transports to other parts.
- **White blood cells:** These fight against germs that may enter our body.
- **Platelets:** These help in blood clotting.

b. When the blood reaches the two kidneys, the useful substances are absorbed back into

blood and wastes dissolved in water are removed as urine. From kidneys, urine goes into urinary bladder through tube like ureters. It is stored in bladder and is passed out through the urinary opening at the end of a muscular tube called urethra. The kidneys, ureters, bladder and urethra form the excretory system.

10. If there is no platelets in the blood, the blood would not be able to clot at the wound.

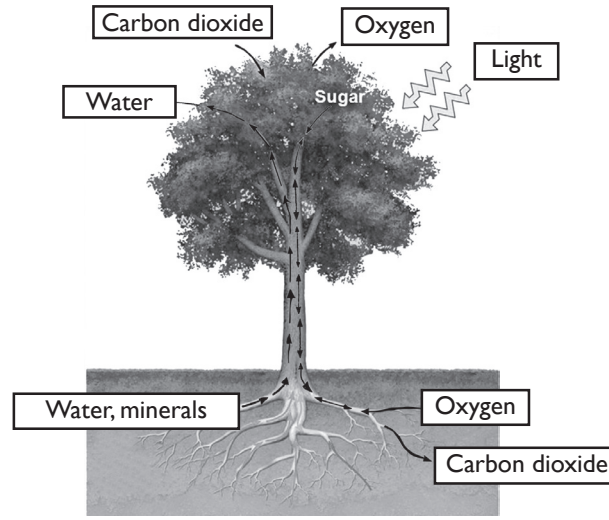
ACTIVITY ZONE



WORKSHEET–2

1. a. ii) b. ii) c. iv) d. iii)
e. i)

2.



3. a. Xylem b. sunny c. away from d. increases
e. WBCs

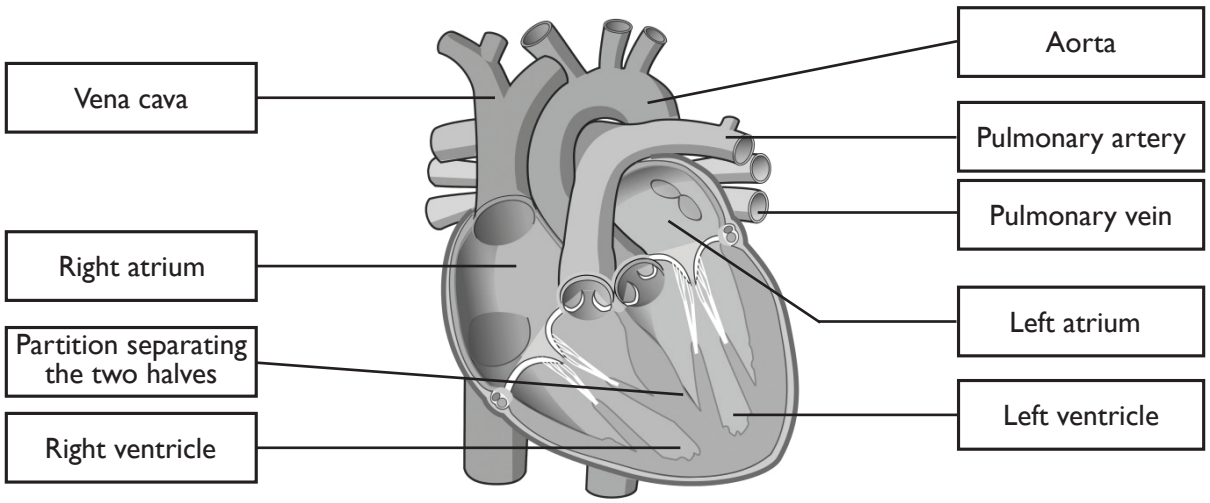
4. a.

Red blood cells	White blood cells
• They are celled erythrocytes. • They carry respiratory gases mainly oxygen. • Their number is much more than WBC.	• They are called leucocytes. • They fight against germs. • Their number is much less than RBC.

b.

Pulmonary artery	Pulmonary vein
• Pulmonary artery carries carbon dioxide-rich blood from the heart to the lungs. • These are one pair in number.	• Pulmonary vein carries oxygen-rich blood from the lungs to the heart. • These are two pairs in number.

5.



6. a. To transport blood and oxygen from the lungs to various tissues of the body.

b. Red blood cells (RBCs), white blood calls (WBCs), platelets

c. Right atrium, right ventricle, left atrium, left ventricle.

d. Pulse is the throbbing movement felt on the wrist which is due to the blood flowing in arteries.

e. Urine contains 95% of water and compounds like urea, creatinine, uric acid, salts of sodium, potassium, calcium, ammonia and magnesium.

7. a. In plants, the vascular tissue xylem forms a continuous network of channels that connects roots to the leaves through the stem and branches and thus transports water to the entire plant.

b. When our body temperature increases, our sweat glands produce sweat. It absorbs our body heat and evaporates into atmosphere. Sweat contains water and salts.

c. All cells of our body produce waste products. These waste products are toxic to the body and therefore need to be excreted out.

d. i) Upper chambers of heart are called atria. Blood enters the heart through atria.

ii) Lower chamber of heart are called ventricles. Blood exits from heart through ventricles.

iii) These chambers are separated to avoid mixing up of blood rich in oxygen with the blood rich in carbon dioxide.

e. Two factors that affect the rate of transpiration are as follows:

– **Light:** Plants transpire more rapidly in the light than in dark.

– **Temperature:** Plants transpire more rapidly at higher temperatures because water evaporates more rapidly as the temperature rises.

f. i) Stethoscope

ii) It is used to feel the heartbeats.

iii) A - Earpiece B - Tube C - Chest piece

8. a. In human heart, blood passes through the heart twice in one cardiac cycle which is called double circulation. In double circulation, blood flows in two pathways: pulmonary and systemic. Pulmonary pathway carries deoxygenated blood from the right side of heart to lungs. Systemic pathway carries oxygenated blood from the left side of the heart to the other areas of body.

b. In plants, oxygen—a waste product of photosynthesis, and carbon dioxide—a waste product of respiration, diffuse out through the stomata in leaves and lenticles in stems. Excess of water in plants is discarded through stomata by transpiration.

9. Doctors inject medicines in veins, because in veins, medicine is carried through the heart and diluted in the blood before reaching a person's extremities and tissues.

ACTIVITY ZONE

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

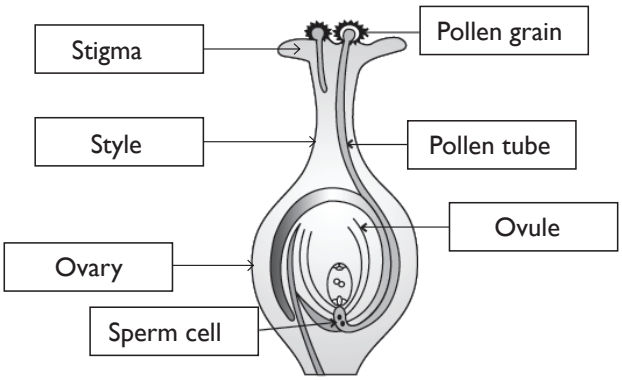
Chapter – 8. Reproduction in Plants

WORKSHEET–1

1. a. Flower b. Fertilisation c. *Spirogyra* d. Fern

e. Leaves

2.



3. a. embryo b. spores c. eyes d. Maple
e. *Xanthium*

4. a.

Asexual reproduction	Sexual reproduction
• In sexual reproduction, plant can give rise to new plants without seeds.	• In sexual reproduction, new plants are obtained from seeds.
• Only a single parent is involved.	• Both parents (male and female) are involved.

b.

Embryo	Zygote
An embryo is the later stage of zygote. Zygote develops and forms an embryo.	In sexual reproduction, male and female gametes fuse and a zygote is formed.

5. Binary fission Multiple fission Spore formation Budding
Budding Fragmentation Regeneration Binary fission

6. a. iii) b. iv) c. iv) d. iii) e. ii)

7. a. A flower which contains either only pistil or only stamens is called unisexual flower.

b. Sexual reproduction and asexual reproduction.

c. A zygote is the primary cell which is formed after fusion of male and female gametes.

d. They are transferred by means of wind, water, insects or animals.

e. Coconut and water lily.

8. a. It is a type of asexual reproduction, in which new plants are produced from vegetative parts like roots, stems, leaves and buds.

b. Male – Stamen (anther and filament)

Female – Pistil (stigma, style and ovary)

c. A – Plumule, B – Radicle
C – Cotyledon, D – Wing

d. Natural methods of vegetative propagation in plants are as follows:
   - **Through stem:** When the node on a stem comes is contact of soil, it produces roots and new plant.
   - **Through root:** Roots of guava, sweet potato, etc., have adventitious buds which can give rise to new plants.
   - **Through leaves:** *Bryophyllum* has adventitious buds in its leaf margins, which in moist soil, can give rise to new plant.

e. If the pollen lands on the stigma of the same flower, it is called self-pollination. On the other hand, if the pollen of a flower lands on the stigma of another flower of the same plant, or that of different plant of the same kind, it is called cross-pollination.

9. a. i) **Insects:** Many insects feed on seeds and in this process disperse them. Bees inadvertantly carry away sticky seeds. These bees discard the seeds as soon as they can.

ii) **Wind:** Wind carries wing seeds like those of drumstick and maple, light seeds of grasses or hairy seeds of aak and hair fruit of sunflower to far away places.

iii) **Water:** Water disperse fruits or seeds that usually develop floating ability in the form of spongy or fibrous outer coat as in coconut.

b. A – **Cutting:** A small piece of vegetatively propagative part of a plant is cut and buried under moist soil, which gives rise to a new plant.

B – **Layering:** A branch of a plant is bent and burried into the ground, leaving the tip exposed, which produces a new plant.

C – **Grafting:** A shoot (scion) of one plant is cut and attached to the root (stock) to produce new plant. Scion and stock are cut in slanting manner.

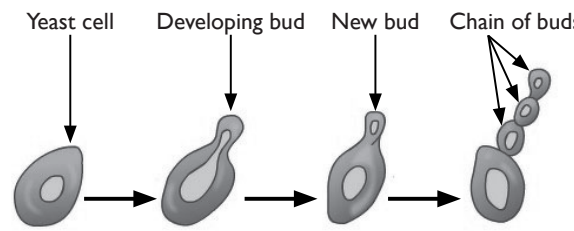
10. Three advantages of vegetative propagation are as follows:
- It can be used to reproduce plants that do not have viable seeds.
- This preserves the characteristics of food and flower crops.
- New individuals produced have exactly identical qualities as their parents.

ACTIVITY ZONE

a. We observe the formation of new yeast cells.

b. Budding mode of reproduction is observed. It is asexual.

c.



Budding in yeast

WORKSHEET–2

1. a. iii) b. iii) c. i) d. i) e. iii)

2. a. gametes b. stamen c. vegetative d. Pistil e. zygote

3.

Water	Animal	Animal	Wind
Wind	Wind	Insects	Wind

4. a.

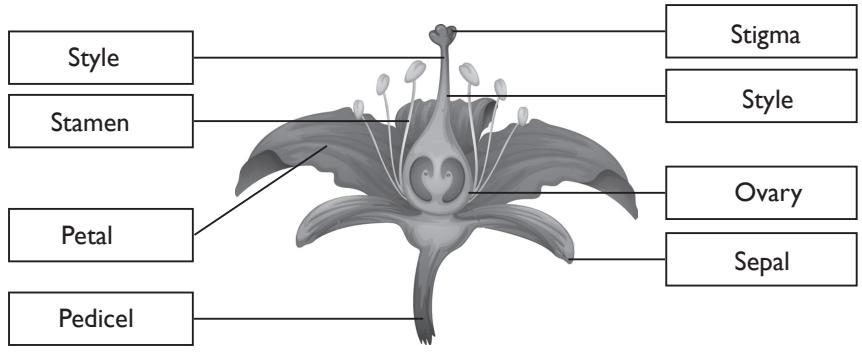
Unisexual flower	Bisexual flower
The flower which contains either only the pistil or only the stamens is called unisexual flower. For example, corn, papaya, cucumber.	The flower which contains both stamens and pistil is called bisexual flower. For example, mustard, rose, petunia.

b.

Budding	Fragmentation
Budding occurs when parent forms buds and each bud forms new organism, for example, yeast.	Fragmentation occurs when a parant organism breaks into fragments or pieces and each fragment develops into a new organism, for example, *Spirogyra*.

5. a. True b. False c. False d. True e. True

6.



7. a. When water, correct temperature (warmth) and good location (like in soil) are available.

b. It is a long, branching filamentous structure of a fungus and is the main mode of vegetative growth.

c. Cutting, layering and grafting.

d. Reproductive part – flower, Vegetative part – stem

e. Stamen is a male reproductive organ of flower, consisting of anther and filament.

8. a. These types of plants are reproduced through vegetative propagation. Their stems are capable of vegetative propagation.

b. Planaria detaches its tail end and each half regrows the lost parts by regeneration, allowing neoblasts (adult stem cells) to divide and differentiate, thus resulting in two worms.

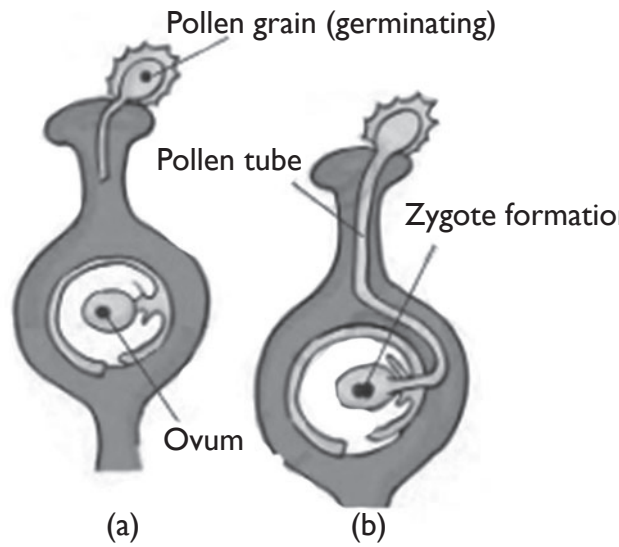
c. Zygote is a diploid cell resulting from the fusion of two haploid gametes. In plants, pollen grain produces male gamete and ovule produces female gamete. These two fuse and form zygote.

d. After fertilisation, the ovary grows into a fruit. The other parts of the flower dry up and fall off. The seeds develop from the ovules. The seed contains an embryo enclosed in a protective seed coat.

e. When nodes on a stem come in contact of soil, it produces roots and new plant, e.g., potato. Some plants have roots that have adventitious buds which produce new plants, e.g., guava. Some plants have adventitious buds on their leaves' margins, which in moist soil, can give rise to new plant, e.g., *Bryophyllum.*

9. a. i) The process of fusion of male and female gametes to form a zygote is called fertilisation.

ii)



Fertilisation in flowers

The pollen grain falls on the stigma and grows a pollen tube downwards through style towards female gamete in ovary. A male gamete moves down the tube. The pollen tube enters the ovule in ovary. The tip of pollen tube bursts open and male gamete comes out of pollen tube. In ovary, male gamete of pollen fuses with the female gamete present in ovule to form fertilised egg cell called zygote. Thus, the process of fertilisation takes place.

b. i) The transfer of pollen from the anther to stigma of a flower is called pollination.

ii) Pollination is necessary because it leads to the production of fruits that we eat, and seeds that are essential to create more plants.

iii) Self pollination and cross pollination.

iv) Agents of pollination are animals such as insects, birds and bats, butterflies, wind, water and plants themselves. Since pollen grains are light, they can be carried by wind or water. Many insects visit flowers and carry away pollens on their bodies.

10. After fertilisation in plants, ovules develop into seeds whereas ovary grows into a fruit.

ACTIVITY ZONE

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

Chapter – 9. Motion and Time

WORKSHEET–1

1. a. periodic b. inversely c. second d. m/s
e. independent

2. Straight line Straight line Circular Circular
Oscillatory Oscillatory Circular Straight line

3. a. iv) b. iii) c. iv) d. ii) e. i)

4.

Time (AM)	Odometer reading	Distance from starting point	Speed (Km/h)
8:00	36540 km	0 km	0 km/h
8:30	36560 km	20 km	40 km/h
9:00	36580 km	40 km	40 km/h
9:30	36600 km	60 km	40 km/h
10:00	36620 km	80 km	40 km/h

5. Sundial Sand clock Water clock

6. a. The to and fro motion of a simple pendulum is called oscillatory motion.
b. This graph is straight line parallel to X-axis.

c. Circular motion

d. Oscillatory motion

7. a. i) (a) 250/50 = 5 m/s (b) $\frac{250 \times 60 \times 60}{1000 \times 50}$ = 18 km/h

ii) (a) 60 b. 60 c. 24 d. 365

b. Distance covered in 20 minutes with speed 30 km/h = 10 km

Then distance covered in 30 minutes with speed 90 km/h = 45 km

Total distance travelled by the car = 10 + 45 = 55 km

c. **Uniform motion:** Car moving with constant speed on a straight road, motion of soldiers during army march

Non-uniform motion: A person jogging and walking, motion of a train

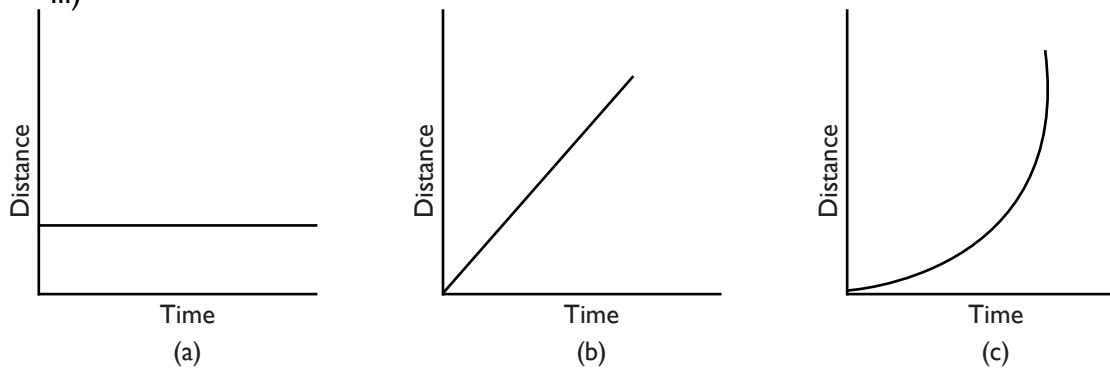
d. Time period = 56/20 = 2.8 second

e. Vehicle B is moving faster because the distance covered by vehicle B is more on axis which shows distance, as compared to that of vehicle A.

8. a. i) Motion is the change in position of an object with respect to its surroundings in a given interval of time.

ii) Speed = $\frac{\text{Distance travelled}}{\text{Time taken}}$

iii)



b. i) The states of rest and motion are relative because without any reference object to relate with, it is not possible to mention whether an object is at rest or in motion. Example: Suppose you are travelling in a bus, so to you, all other passengers are at rest. But for a person who is outside the bus, everyone inside the bus is moving.

ii) A sundial consists of a flat plate (dial) and a gnomon, which casts a shadow onto the dial, while sand clock has two bulbs connected by a nerrow neck that allows trickle of sand from upper lobe to the lower lobe.

iii) These watches are based on quartz. Quartz crystal is electronically driven. As the crystal vibrates, the watch works in that way.

9. a. Accurate measurement of time became possible much later because time measurement was done in terms of length as distance and mass. For example, positions of sun, moon and stars give idea of days, months and years.

b. The working principle of all clocks is same, i.e., periodic motion. A sundial measures periodic position of shadow on a dial. A pendulum clock measures number of oscillations of the bob. A spring clock measures back and forth motion of the spring. A quartz clock measures the number of vibrations or oscillations of the quartz crystal.

ACTIVITY ZONE

a. Speed = Distance covered/Time taken

b. Do it yourself.

c. Do it yourself.

d. Do it yourself.

e. Speed is one time measurement of velocity while average speed is the median measurement of different speeds.

WORKSHEET–2

1. a. Non-uniform b. Circular c. Straight line d. Circular
e. Oscillatory

2. Pendulum clock Quartz watch Stop watch Atomic clock
Mechanical clock

3. a. National Physical Laboratory b. Second c. Non-uniform
d. Distance e. Speed

4. a. iv) b. v) c. i) d. ii) e. iii)

5. a. ii) b. iii) c. iii) d. i) e. i)

6. a. Distance time graph shows the speed.

b. Speed = $\frac{18 \times 60 \times 60}{1000}$ = 64.8 km/h

c. Periodic motion is the motion that is repeated after fixed intervals of time.

d. Quartz crystals maintain a precise frequency standards which helps to regulate the movement of a clock.

e. Average speed = Total distance covered/Total time taken

7. a. (a) Tortoise = metre/hour (b) Horse = kilometre/hour
(c) Aeroplane = kilometre/hour (d) Ant = Metre/hour

b. We calculate the average speed of a body when the speed is not constant.

c. The speed is the total distance covered divided by the total time taken. Its unit is m/s. It can be expressed in km/h also.

d. i) The basic unit of time is second.

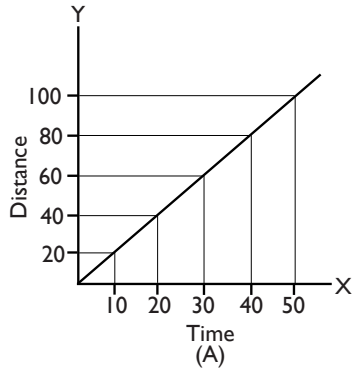
ii) Larger units = Year and month, Smaller units = Second and minute.

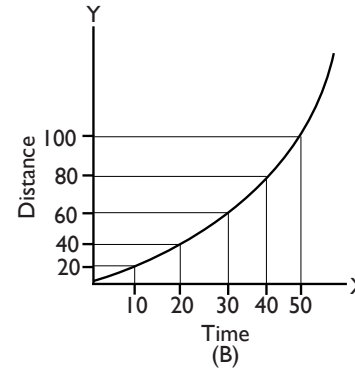
e. Distance covered in 20 min = 52415 – 52400 = 15 km,

So speed = 15 × 3 = 45 km/h

Speed in m/s = 45 × 1000/60 × 60 = 12.5 m/s

8.





i) Object A represents uniform motion.

ii) Object A is travelling faster.

b. i) The tangent of angle between the line of graph and X-axis.

ii) Slope represents speed. Speed is the total distance covered divided by the total time taken.

iii) Less steep slope indicates slower speed.

iv) More steep slope indicates faster speed.

v) The one with more steep slope is faster.

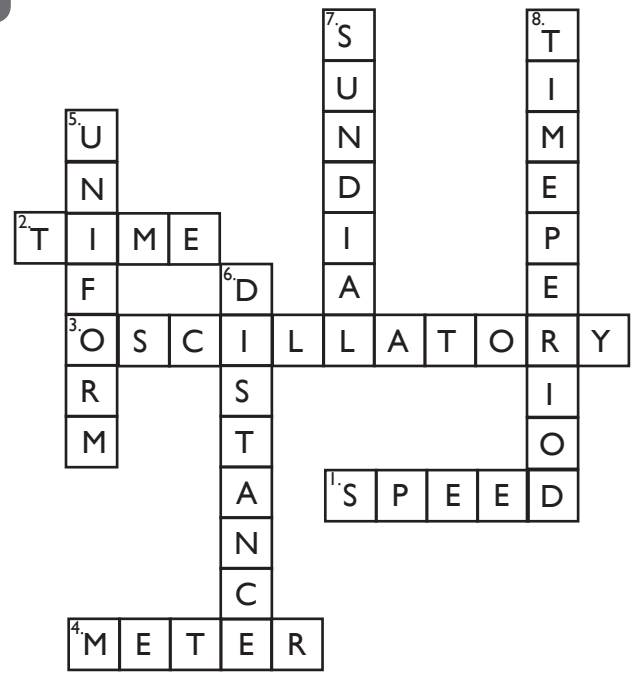
9. i) Graph (i) represents constant speed of the object.

ii) Graph (ii) represents object at rest.

iii) Graph (iii) represents object with variable speed.

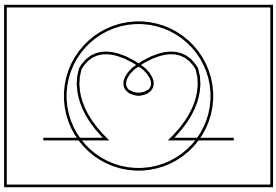
iv) Graph (iv) represents object with constant speed.

ACTIVITY ZONE

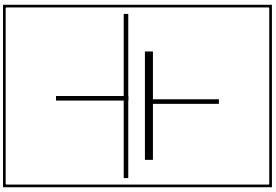


WORKSHEET–I

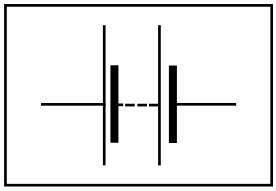
1. a. Bulb



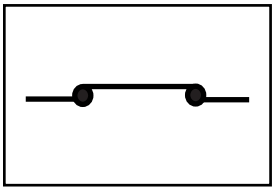
b. Cell



c. Battery



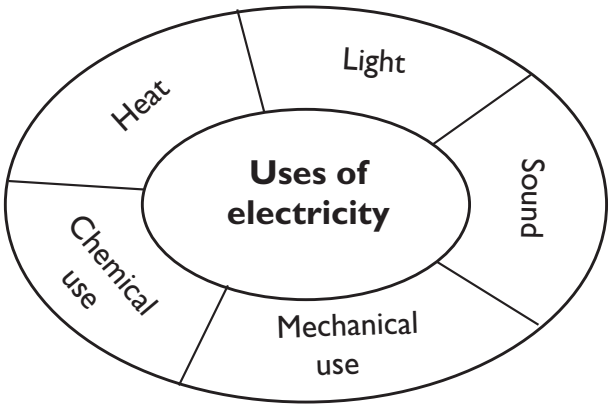
d. Switch in 'ON' position



2. a. low b. can't c. ferromagnet d. battery e. cells

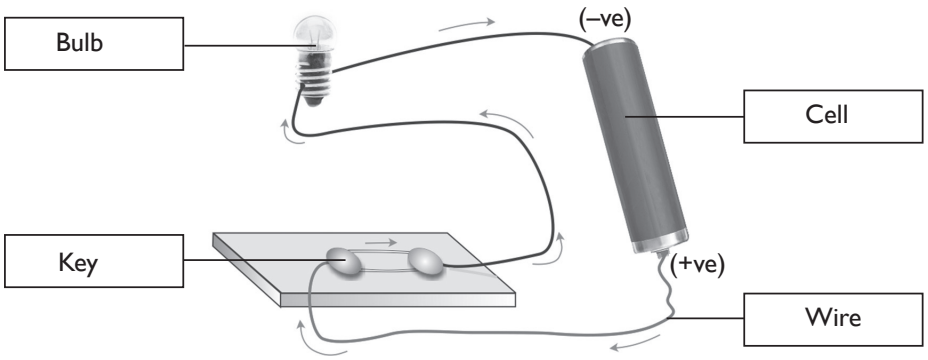
3. a. True b. True c. False d. True e. True

4.



5. a. i) b. iii) c. iii) d. iii) e. iv)

6.



7. a. A combination of two or more cells is called a battery.

b. Tungsten.

c. A closed circuit means that switch is 'on', circuit is complete and current is flowing through it.

d. MCB is a switch which automatically turns off when current in the circuit exceeds the safe limit.

e. A glowing electric bulb may be very hot and our hand may get burnt badly.

8. a. If we place a compass needle near a current carrying wire, it gets deflected. It shows that there is a magnetic field around the wire carrying current.

b. The device shown is miniature circuit breaker (MCB). It is a switch which automatically turns off when current in the circuit exceeds the safe limit. When it is turned on, the circuit is once again complete.

c. When electric current passes through a wire, it behaves like a magnet. This is magnetic effect of electric current. In fact, an electric current can be used to make magnets. Electric bell, electric motor and television set are based on magnetic effect.

d. i) An electromagnet is a magnet in which magnetic field is produced by an electric current.

ii) Three uses of electromagnets are as follows:

– Electromagnets are used in motors and generators.

– These are used in electric bells.

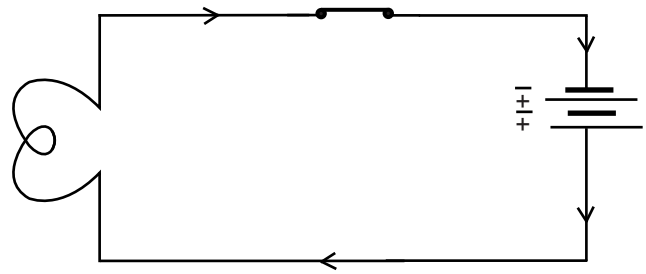
– Loudspeaker and headphones also use electromagnets.

e. i) Length and material of resistor, temperature

ii) Transformation of electric energy into light energy and then into heat energy.

f. i) A circuit is a path that electricity flows along. It shows various components.

ii)



9. a. i) It is heating element used in heater.

ii) It works on heating effect of electricity.

iii) The heating element is used in cooking heater. Because of heating effect of electric current, when current is passed through the element, it becomes so hot and produces so much heat that it is able to cook food placed in utensils made of metals which are put over it.

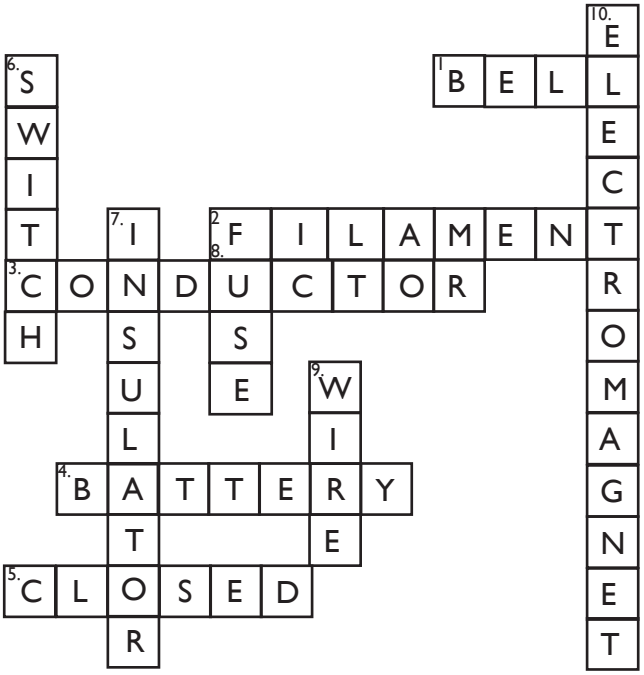
b. i) It is electric bell.

ii) It is based on magnetic effect of electric current.

iii) An electric bell contains an electromagnet, consisting of coils of insulated wire wound around iron rods. When an electric current flows through the coils, the rods become magnetic and attract a piece of iron attached to clapper. The clapper hits the bell and makes it ring.

10. CFLs use less energy, produce very less amount of heat and last longer as compared to ordinary bulbs.

ACTIVITY ZONE



WORKSHEET–2

1. a. It becomes hot due to the heating effect of electric current.

b. Because copper is a good conductor of electricity that allows the electricity to flow through it easily.

c. So that when current in the circuit exceeds the safe limit, it can melt and break the circuit.

d. The filament of electric bulb gets heated to such a high temperature that it starts glowing.

2.

Sound	Heat	Light	Sound
Mechanical	Chemical	Heat	Mechanical

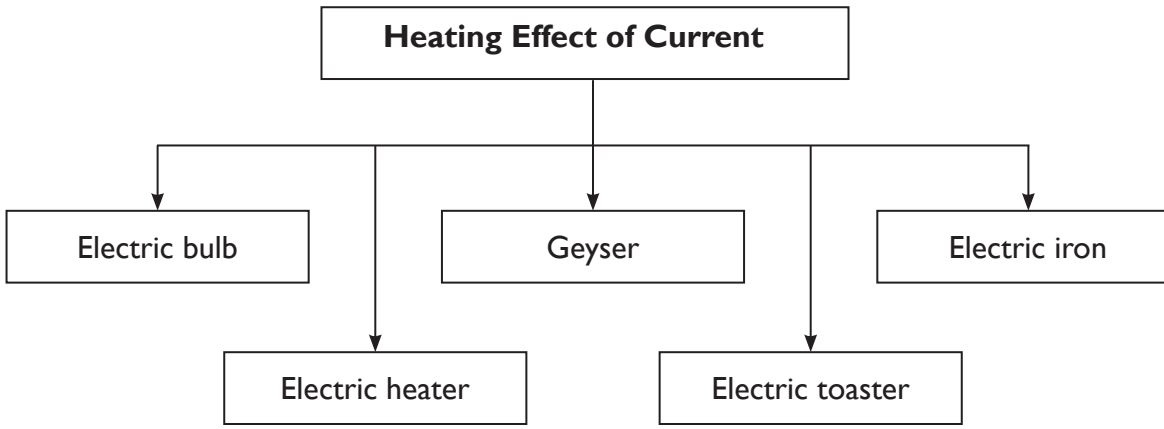
3. a. Compact Fluorescent Lamps

b. Indian Standard Institute

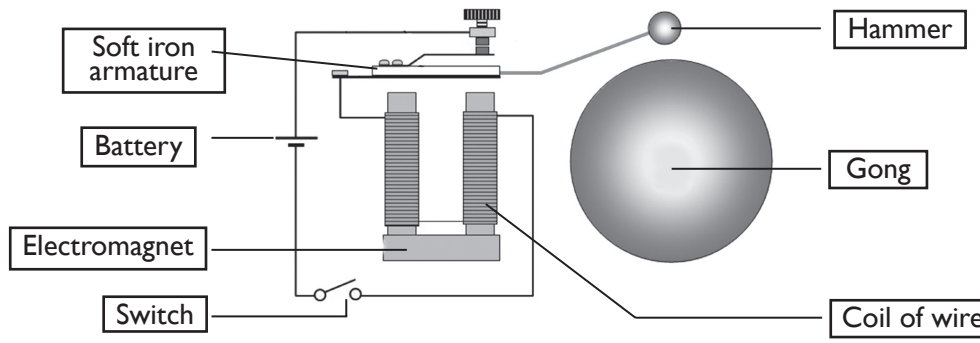
c. Miniature Circuit Breakers

4. a. i) b. ii) c. ii) d. ii) e. i)

5.



6.



7. a. It is the opposition to the flow of electric current through the conductor.

b. The high resistance wire gets heated when an electric current is passed through it.

c. From positive terminal to negative terminal of battery.

d. Low melting point.

e. Heating effect and magnetic effect.

8. a. It is required in all electrical appliances to protect them in the event of excessive current which may be due to overloading or short circuit.

b. No, we cannot use the same fuse in a geyser and a television set since the electricity rate required by them is different. A geyser needs much more electricity than a television set.

c. i) On switching 'ON' the circuit, compass needle shows deflection due to the magnetic effect of electric current. On passing current, wire behaves like a magnet.

ii) On switching 'OFF' the circuit, needle comes back to its normal north-south direction, because there is no electric current and hence no magnetic effect.

d. Cell Wire Battery

Bulb Key

e. Heating effect of electric current is used in electric bulb, electric iron and electric fuse.

9. a. i) The activity shows that when electric current is passed through a wire, and a compass is placed near it, the needle of compass deflects from its normal north-south direction.

ii) It proves that electric current produces magnetic effect.

iii) The two factors are strength of the current and the distance from the conductor/ wire.

b. i) Fuse used in electrical appliances.

ii) It is used for protecting the electrical appliances from excessive current which is beyond the safe limit.

iii) The fuse wire, having low melting point, melts and breaks the circuit when the electric current through the fuse exceeds the safe limit due to overloading or short circuit. Thus, it protects the electrical appliances.

10. ISI mark is a certification mark scheme, which is operated by the Bureau of Indian Standards (BIS). The ISI mark ensures that the appliance is safe and the wastage of energy is minimum.

ACTIVITY ZONE

1. It is used for ironing clothes.

   Appliance – Electric iron
   Effect – Heating effect

2. It is used for baking cakes.
   Appliance – Electric oven
   Effect – Heating effect

3. It is used for warming the room.
   Appliance – Room heater
   Effect – Heating effect

4. It is used for watching movies.
   Appliance – Television
   Effect – Magnetic effect

5. It is used for pumping water.
   Appliance – Electric motor
   Effect – Magnetic effect

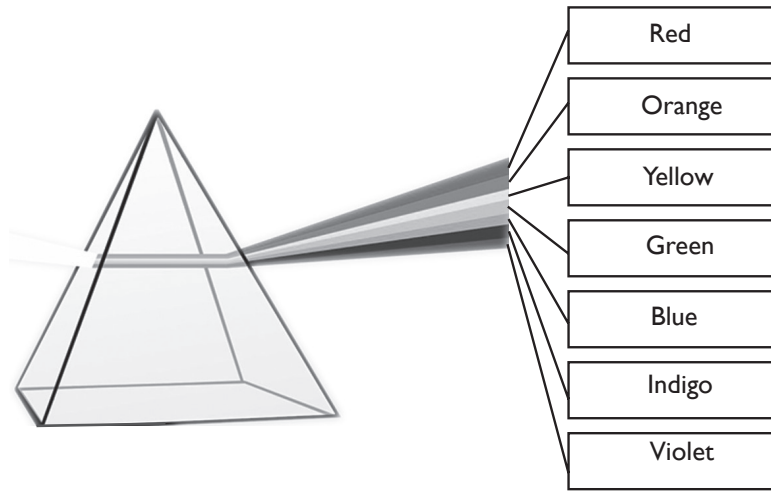
Chapter – 11. Light

WORKSHEET–1

1. a. straight b. concave c. real d. convex e. dispersion

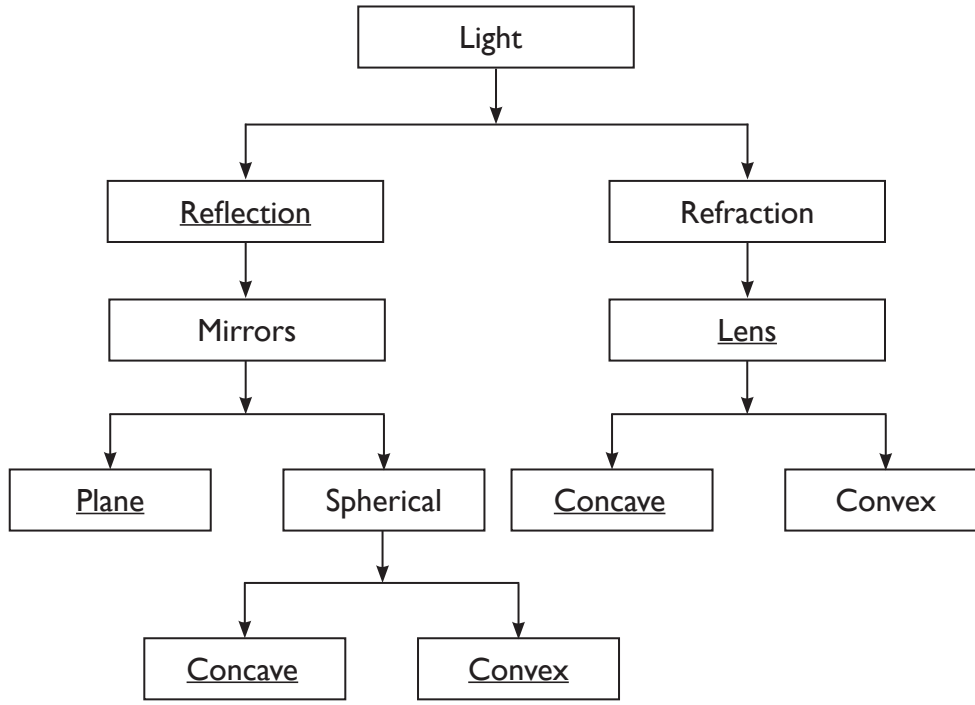
2. a. True b. False c. True d. True e. False

3.



4. a. iii) b. ii) c. i) d. ii) e. iii)

5.



6.

S.No.	Property	Nature of Image
1.	Size	Same size
2.	Virtual/Real	Virtual
3.	Erect/Inverted	Erect
4.	Diminished/Magnified	None

S.No.	Property	Nature of Image
5.	Position	Behind the mirror at he same distance as that of object
6.	Laterally inverted or not	Laterally inverted
7.	Obtained on screen or not	Not

7. a. Reflection of light takes place.

b. To see an enlarged image of the teeth.

c. Violet, indigo, blue, green, yellow, orange, red.

d. Concave mirror

e. Concave lens

8. a. A real image is always inverted while a virtual image is always erect. Real image is formed when light rays actually meet at some point while virtual image is formed when light rays appear to meet at some point.

b. Reflecting surface of concave mirror is buldged inwards while that of convex mirror is buldged outwards. Concave mirror generally produces real, inverted image but convex mirror always produces virtual, erect image.

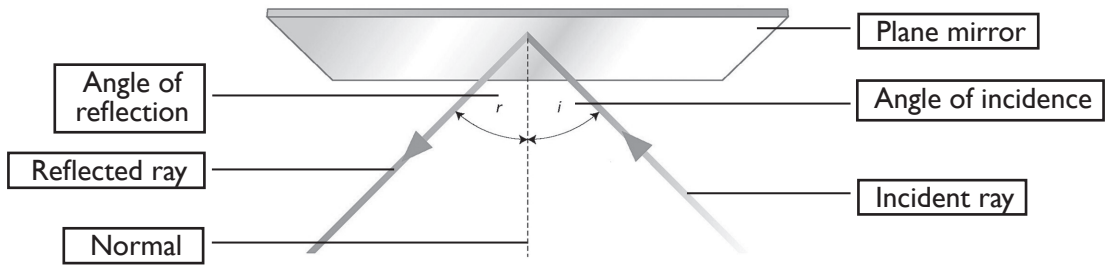
c. Because convex mirrors give an erect, virtual, full size diminished image of distant objects with a wider field of view. Thus, they enable the driver to view much larger area than would be possible with a plane mirror.

d. i) Two laws of reflection of light are as follows:

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

– The incident ray, reflected ray and the normal to the reflecting surface at the point of incidence lie in the same plane.

ii)



e. i) It is the apparent reversal of the mirror image's left and right when compared with the object.

ii) A, H, O, T

iii) B, P, D, F

9. a. i) Newton's disc

ii) It is based on dispersion of light which shows that white light is made of seven colours.

iii) When the Newton's disc is rotated very fast in the daylight, different colours get mixed together and the disc appears to be whitish. This shows that white light is composed of seven colours, i.e., violet, indigo, blue, green, yellow, orange and red.

iv. Rainbow formation in the sky after rain.

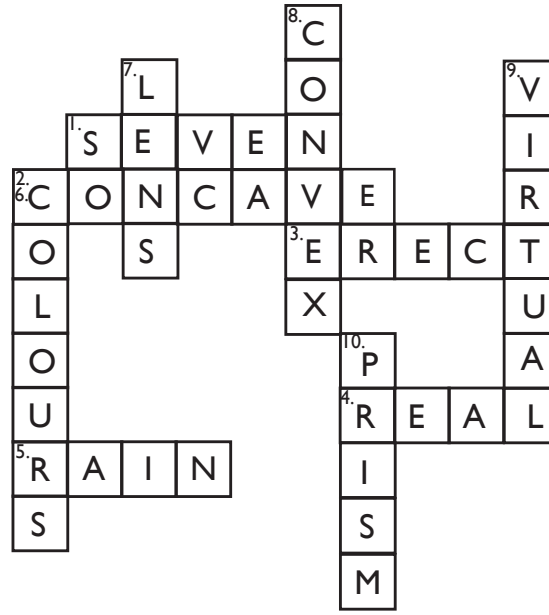
b. A – Concave mirror: As dentist's head mirror, as reflector in torch

B – Convex mirror: As rear-view mirror in vehicles, as reflector in street lamps

C – Convex lens: As magnifying glass, as camera lens

10. By looking into the mirrors, we can distinguish between them. In plane mirror, the size of the image is same as that of object. In concave mirror, an enlarged image is formed when placed close and an inverted image is formed when kept away. In convex mirror, always a small and erect image is formed.

ACTIVITY ZONE



WORKSHEET–2

1. a. i) b. iii) c. i) d. ii) e. ii)

2. a.

Plane mirrors	Spherical mirrors
• Plane mirrors have flat surface. • Plane mirrors always form virtual image, which is of the same size and at the same distance as that of the object.	• Spherical mirrors have curved surfaces. • Spherical mirrors form both real and virtual images and the size and distance of the image vary.

b.

Lens	Mirrors
• Lens work by refracting light passing through them. • A lens is typically a bent piece of glass or plastic.	• Mirrors work by reflecting light incident on them. • A mirror typically consists of a highly polished surface of a metal placed behind a glass.

3. Biconvex Planoconvex Convex meniscus

Biconcave Planoconcave Concave meniscus

4. a. diverging b. white c. convex d. prism e. Converging

5. a. iv) b. v) c. i) d. ii) e. iii)

6. a. Refraction of light

b. Virtual, upright, laterally inverted, same size and distance from mirror as the object.

c. Because when bulb is placed at focus of concave mirror, it allows light to spread out to infinity (longer distances).

d. Angle of incidence is equal to the angle of reflection in a plane mirror.

e. So that when the driver of a vehicle ahead of an ambulance looks in his/her rear-view mirror, he/she can read 'AMBULANCE' written on it properly and give way to it.

7. a. It is a band of colours produced by separation of components of light by their different degrees of refraction according to wavelength. VIBGYOR stands for Violet, Indigo, Blue, Green, Yellow, Orange and Red.

b. Because a convex mirror converges (bends inwards) the light generally falling on it whereas a concave mirror diverges (bends outwards) the light falling on it, they are called converging mirror and diverging mirror, respectively.

c. The image formed at the backside of the spoon is a virtual image. It is erect and smaller in size. It covers a larger area.

d. i) It means that light travels in a straight line as a wave. It can be seen in well-defined shadows formed when an object blocks a light source and through the use of pinhole camera.

ii) We can change the direction of light by passing it across the boundary between two substances with a different density like air and glass (refraction) and by making it fall on smooth surface like mirror (reflection).

e. When sunrays are passed through a convex lens and then made to fall on a paper, the paper starts burning at a point which shows converging nature of convex lens.

f. Convex mirror Concave mirror Concave mirror

Concave mirror Concave mirror Concave mirror

8. a. i) The figure shows a rainbow.

ii) The sunlight passes through water particles which act like prisms. When light passes through them, it gets spread out into a bunch of different colours.

iii) It is associated with dispersion of light.

iv) A rather low source of light and a layer of water droplets in sky are required for rainbow formation.

b. i) In case A will the candle be visible.

ii) It suggests that light travels in a straight line.

iii) Direction and energy change upon reflection of light.

9. Image in cinema hall projector is real while image in mirror is virtual. Image in cinema hall is inverted while in mirror it is erect.

ACTIVITY ZONE

a. THE BAND OF SEVEN COLOURS IS KNOWN AS RAINBOW.

b. OUR EACH EYE CONSISTS OF CONVEX LENS.

c. SKY APPEARS BLUE DUE TO REFLECTION.

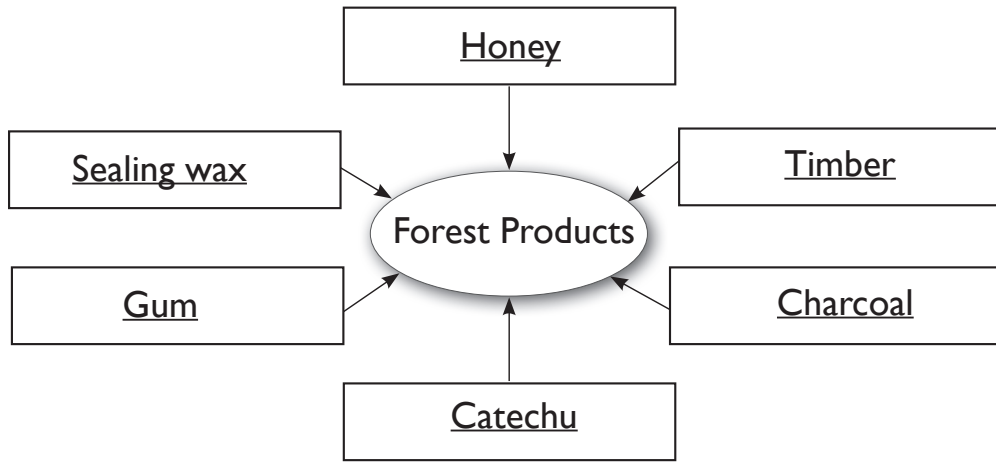
d. LIGHT IS A FORM OF ENERGY.

Chapter – 12. Forests: Our Lifeline

WORKSHEET–1

1. Neem Sheesham Bamboo Semal

2.

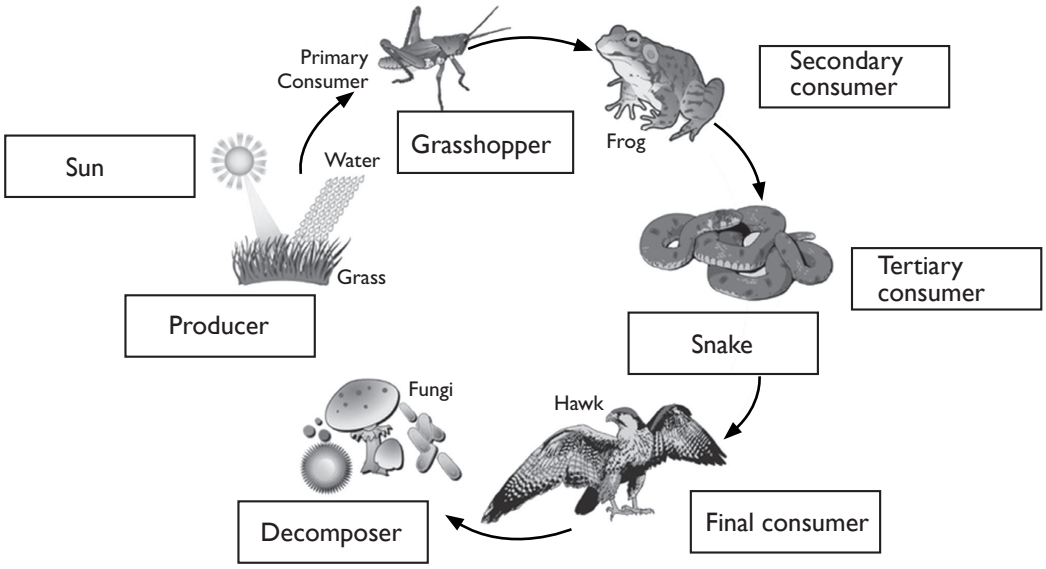


3. a. i) b. iii) c. ii) d. iii) e. i)

4. a. lungs b. food web c. food, shelter, oxygen d. crown
e. Decomposers

5. a. True b. False c. True d. True e. False

6.



7. a. Branches of the tall trees look like a roof over other plants in the forest. This is called canopy.

b. Because plants help to provide oxygen for animal respiration, and maintain the balance of oxygen and carbon dioxide in the atmosphere.

c. These are organisms that can produce their own food using materials from inorganic sources.

d. It is the establishment of a forest or stand of trees is an area where there was no previous tree cover.

e. These are micro-organisms which convert the dead plants and animals to humus.

8. a. Vulture and hyena are scavengers. They feed on dead and decaying matter so they keep the environment clean by eating out all the waste matter.

b. Trees extract water from soil, store it and then release it back into atmosphere by the process of transpiration. Deforestation eliminates the water released back into air, thus reduces cloud formation, and therefore reduces rainfall.

c. Decomposers recycle and convert the dead matter into humus which mixes with forest soil and provides necessary nutrients to plants. Thus, decomposers help in maintaining the necessary nutrient balance in the soil.

d. Food chain shows how each living thing gets food, and how nutrients and energy are passed from creature to creature. Food chains start with plant life and end with animal life. Example: Grass is eaten by grasshopper, grasshopper by frog, frog by snake, snake by hawk.

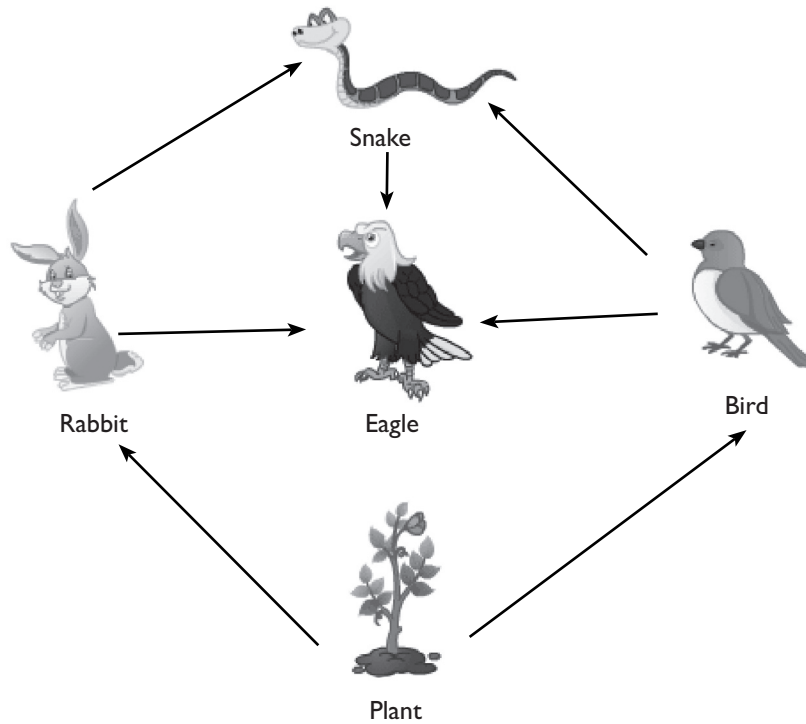
e. During heavy rains, forests act as a barrier to floodwater. Trees also prevent soil erosion, reducing sediment going into rivers and increasing water absorption into the ground.

9. a. We should conserve forests because forests act as a major source of oxygen and sink of carbon dioxide. Forests act as a catchment for soil and water conservation. Forests prevent flood and bring timely rainfall. We can protect forests by controlling over forest fire, regulated and planned cutting of trees, reforestation and afforestation, proper utilisation of forest and forest products, forest management and checking over forest clearance.

b. The first layer of forest is canopy which is made of tops of trees. The next layer is understorey which is made of smaller trees (about 65 feet tall). Third layer is shrub layer which is made up of young trees and mature shrubs. The next layer is herb layer which consists of tree seedlings, ferns, grasses. The last layer is forest floor which contains decaying leaves, twigs, fallen trees and other waste.

10. Plants and trees in forests release oxygen through the process of photosynthesis which is used by animals for respiration. Plants consume carbon dioxide released by the animals. Thus, they maintain balance of oxygen and carbon dioxide in nature.

ACTIVITY ZONE



WORKSHEET–2

1. a. Forest floor b. Food chain c. Canopy d. Humus
e. Trees

2. a. renewable b. dependent c. carbon dioxide d. humus
e. deforestation

3. a. Because roots of trees in forests help water to seep down in the ground.

b. Because green plants produce their own food by the process of photosynthesis.

c. Since it is covered with a layer of dead and decaying matter like leaves, fruits, seeds, twigs and herbs.

d. Because plants in forests release O_2 and consume CO_2 thus maintain their balance.

4.

Gum	Timber	Medicinal	Oil
Babool	Teak	Eucalyptus	Sandalwood
Semal	Sal	Neem	Sunflower
Neem	Sheesham	Dandelion	Palm tree

5.

a. Plants →  → Snake

b. Plants →  → Leopard → 

c. Grass →  → Bird →  → Hawk

6. a. It affects wildlife. It also affects weather patterns.

b. Producer – green grass, Consumer – rabbit

c. Mustard oil and gum.

d. The branchy part of a tree above the stem is known as crown of the tree.

7. a. Endemic species are plants and animals that exist only in one geographic region. Species can be endemic to large or small areas of the earth.

b. Agricultural expansion and overpopulation are the two major causes of deforestation.

c. Plants and trees consume carbon dioxide and release oxygen during the process of photosynthesis. Hence, decrease in number of forests will lead to increased CO_2 concentration.

d. Forests maintain water table by maintaining rainwater flow and by absorbing water via root system of plants. Porous forest soils and debris store the water allowing the slow release of water into surface water.

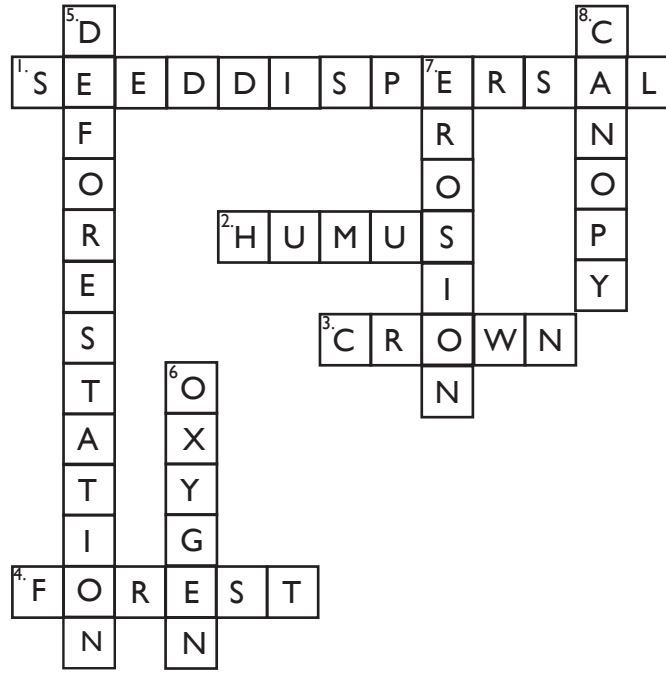
e. Silviculture is the practice of controlling growth, composition, health and quality of forests to meet diverse needs and values. Thus, silviculture helps in conserving forests by growing and cultivating more and more trees.

8. a. Deforestation results in extinction of flora and fauna. It also leads to loss of habitat of animals and their relocation to urban areas. It causes flooding since forests help in controlling floods. Due to deforestation, heavy soil erosion may take place. Moreover, deforestation is the second leading cause of global warming and produces about 24% of global greenhouse gas emissions.

b. Forest is called the dynamic living entity because of the presence of various plants, animals and microorganisms. The wide variety of animals helps the forest to regenerate and grow. Decomposers help in maintaining the supply of nutrients to the growing plants in the forest. In other words, forests are the lifeline of forest dwelling communities.

9. The dead plant and animal tissue is converted into humus by the micro organisms. Humus is rich in nutrients. It gets readily mixed with the soil, so that it could be absorbed by the roots of the plants. The dead animals are eaten by the eagles, hawks and vultures. Thus, nothing goes waste in a forest.

ACTIVITY ZONE



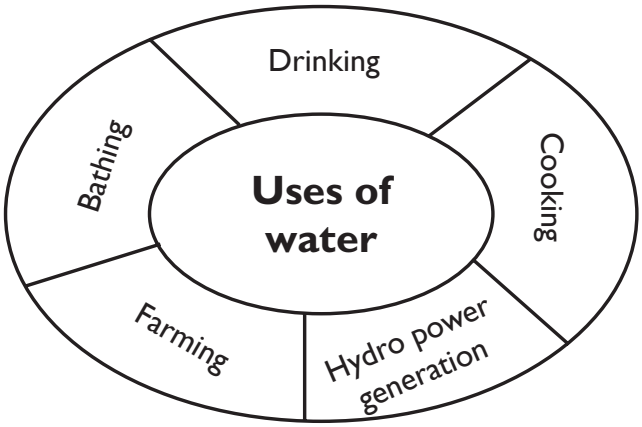
Chapter – 13. Wastewater Story

WORKSHEET–1

1. a. liquid b. raw c. Waste d. sanitation e. plants

2. a. True b. True c. True d. True e. True

3.



4. a. iii) b. iv) c. iii) d. iii) e. ii)

5.

S.No.	Type of waste	Examples
1.	Organic impurities	human faeces, pesticides
2.	Inorganic impurities	nitrates, metals
3.	Nutrients	phosphorus, nitrogen
4.	Microbes	protozoans, bacteria

6. a. It is the process of wastewater treatment in which pollutants are removed before it enters a water body or is reused.

b. Human faeces, pesticides and nitrates.

c. Human faeces, animal waste, oil, urea, pesticides, herbicides, fruit and vegetable waste.

d. Domestic households, faeces, industrial and agricultural practices produce sewage.

e. It is the process of adding chlorine to drinking water to disinfect it and kill germs.

7. a. Because of its excellent disinfection and oxidation qualities, ozone is widely used for drinking water treatment.

b. Semi-solids such as faeces that settle down during wastewater treatment are called sludge. This sludge is removed using a scraper and then transferred to a tank where it is decomposed by anaerobic bacteria to produce biogas.

c. It is colourless, odourless and tasteless liquid. Freezing point is 0°C and boiling point is 100°C. It is a stable substance which is broken into components H_2 and O_2 when we heat it beyond 500°C.

d. Sewage contains human pathogens like cholera, typhoid and dysentery. Other diseases include hepatitis A, intestinal nematode, schistosomiasis. It also leads to water pollution.

e. A skimmer removes the floatable solids like oil and grease. Water so cleared is called clarified water. This sludge is transferred to a separate tank where it is decomposed by the anaerobic bacteria. In this process, biogas is produced which can be used as a fuel or can be used to produce electricity.

8. a. A skimmer removes the floatable solids like oil and grease from sludge. Water so cleared as called clarified water. The sludge is transferred to a separate tank (digester tank) where it is decomposed by the **anaerobic bacteria.** The biogas produced in the process can be used as a fuel.

Air is pumped into clarified water in aeration tank to help **aerobic bacteria** to grow. Bacteria consume human waste, food waste, soap and other unwanted matter still remaining in clarified water. After several hours, the suspended matter settles at the bottom of tank as activated sludge.

b. Good sanitation practices help environment. Clean drinking water and good sanitation help us stay away from diseases. In the same way, eating fresh food and washing hands before eating help us stay away from diseases. Therefore, good sanitation practices yield good hygiene.

9. A manhole is the opening to a confined space such as a large vessel, a shaft or a utility vault. Manholes are provided at every 50 m to 60 m in the sewerage, at the junction of two or more sewers and points where there is a change in direction.

ACTIVITY ZONE

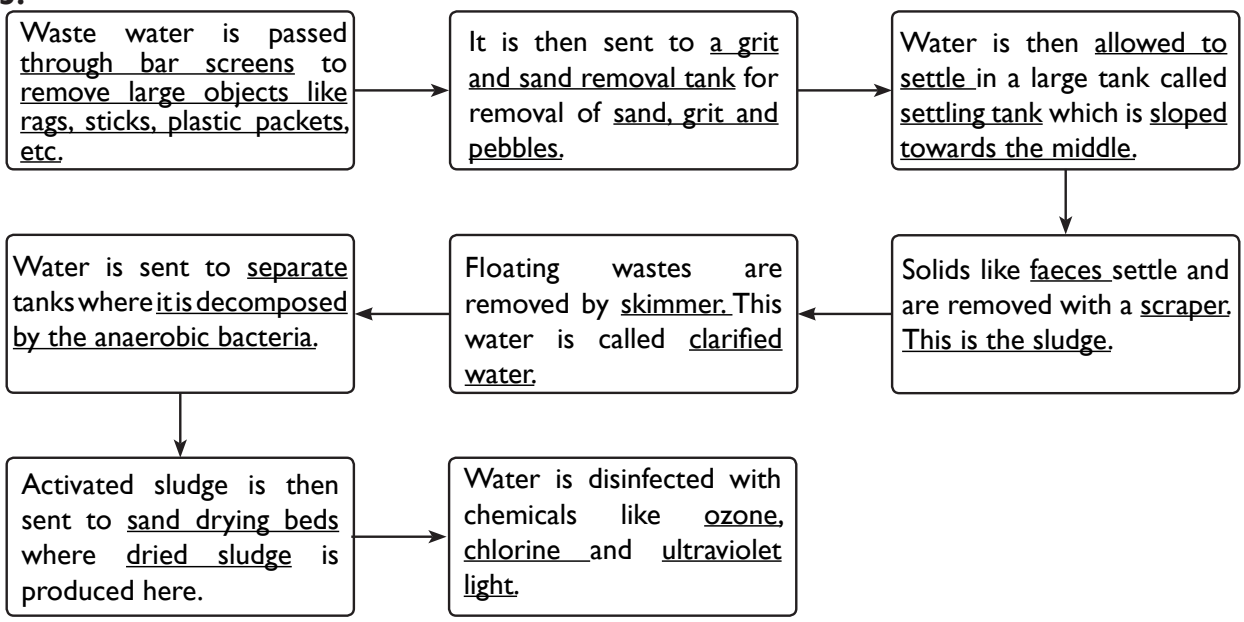
R	A	E	R	A	T	I	O	N	J	B	I
K	N	C	K	B	A	C	T	E	R	I	A
S	A	E	R	O	B	I	C	S	I	S	F
C	E	A	D	J	F	P	H	A	B	L	I
U	R	E	A	S	L	A	O	N	Q	U	L
Z	O	R	O	G	P	B	L	I	H	D	T
D	B	L	T	M	E	I	E	T	T	G	R
G	I	Q	C	H	L	O	R	I	N	E	A
X	C	A	F	W	M	G	A	O	W	H	T
E	M	O	U	X	O	A	Y	N	N	U	I
S	Y	N	Z	P	E	S	T	I	C	B	O
D	Y	S	E	N	T	R	Y	V	A	V	N

WORKSHEET–2

1. a. iii) b. iii) c. iii) d. iii) e. i)

2. a. sewer b. water pollution c. manhole d. Ozone
e. bacteria

3.



4. a. True b. True c. True d. False e. True

5. a. iii) b. iv) c. i) d. ii) e. v)

6. a. Wastewater is used water from any combination of domestic, industrial, commercial or agricultural activities.

b. Sewage is wastewater generated in homes, industries, agricultural fields and in other human activities.

c. It is a rapid increase or accumulation in the population of algae in freshwater or marine water systems.

d. It is a network of big and small pipes which is like a transport system that carries sewage from the point of production to the point of disposal.

e. Never pour household products like cleansers, paint, etc., down the drain.

7. a. Because eucalyptus trees absorb all surplus wastewater rapidly and release pure water vapour into the atmosphere.

b. Because they can harden and block the pipes. In an open drain, the fats clog the soil pores reducing its effectiveness in filtering water.

c. WWTP stands for wastewater treatment plant. Bar screens remove large objects like rags, sticks, cans, plastic packets and napkins.

d. Aerobic bacteria are used in treatment plants in an aerated environment. They use free oxygen in water to degrade the pollutants in incoming wastewater into energy they can use for growth and reproduction. Anaerobic bacteria are used to decompose sludge in a separate tank which produces biogas.

e. It may cause water pollution and soil pollution. Both surface water and groundwater get polluted. Thus, polluted groundwater becomes the most common route for water-borne diseases. They include cholera, typhoid, polio, meningitis, hepatitis and dysentery.

8. a. Wastewater is passed through bar screens to remove large objects like rags, plastic packets. It is then sent to a grit and sand removal tank for removal of sand, grit and pebbles. Water is then allowed to settle in a large tank which is sloped towards the middle. Solids like faeces settle and are removed with a scrapper. This is the sludge. Floating wastes are removed by skimmer. This water is called clarified water. This water is sent to separate tanks where it is decomposed by the anaerobic bacteria. Activated sludge is then sent to sand drying beds where dried sludge is produced. Water is then disinfected with chemicals like ozone and chlorine.

b. Sources of water pollution are domestic effluents and sewage, industrial effluents, agricultural effluents, radioactive wastes, thermal pollutants, oil and fat pollutants, pesticides and some others.

9. Two alternate arrangements for sewage disposal are as follows:

i) In absence of sewerage system, arrangements for onsite sewage disposal can be made. For example, septic tanks are built in which human excreta are collected

ii) Composting pits can be made to dump waste and to make manure from them.

ACTIVITY ZONE