Nutrition in Plants

EXERCISES

A. Tick (3) the correct option.

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

B. Fill in the blanks with correct words.

1. Cactus 2. Nitrogeneous 3. Pitcher
4. Saprophytes 5. symbiosis 6. higustoria

C. Match the Following.

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

D. Short Answer Type Questions.

1. The process of taking food and utilizing it for various activities by body is called nutrition.
2. Rhizobium
3. Sun is the ultimate source of all the energy needs of our body.
4. Cuscuta is a parasitic plant.
5. Saprophtes
6. The reaction that takes place can be written as :

$$\text{Carbon dioxide + Water} \xrightarrow[\text{and chlorophyll}]{\text{In the presence of sunlight}} \text{Starch + Oxygen}$$

7. Sundew plants have sticky hairs on their leaves because insects get stuck in this substance and become entangled. This helps plant to digest the insect.

E. Long Answer Type Questions.

1. The process of taking food and utilizing it for various activities by body is called nutrition.

   Nutrition is divided into two main types in plants:

   (i) Autotrophic Nutrition (ii) Heterotrophic Nutrition

   Autotrophic nutrition : Autotrophic nutrition is found in green plants. They make their own food and hence green plants are called autotrophs (auto-self, troph-food). They have the unique ability of trapping solar

energy and covering it into chemical energy which is stored in the food. The process is called photosynthesis (photo-light, synthesis-to make). This mode of nutrition is called autotrophic nutrition.

Heterotrophic Nutrition : All non-green plants do not have the green pigment chlorophyll in their leaves. Such plants cannot make their own food as they are not capable of doing photosynthesis. These plants are called heterotrophic plants. The mode of nutrition of these plants is called heterotrophic nutrition. Animals too have heterotrophic mode of nutrition.

2. Some non-green plants live on dead and decaying plants and animals and derive their food from them. Examples are mushrooms and other fungi and bacteria. They secrete digestive juices on the dead and decaying matter. This converts the solid matter into a liquid. They then absorb the nutrients from this liquid. This method of getting nutrients from dead and decaying matter in the form of a liquid is known as saprophytic nutrition.
3. The general conditions necessary for photosynthesis are :
   - the presence of a green pigment called chlorophyll.
   - the presence of sunlight.
   - the availability of carbon dioxide.

   Chlorophyll : It is a green pigment and is usually present in the leaves in structures called chloroplasts.

   Sunlight : It is the source of light energy. Chlorophyll traps the light energy to make energy carrying particles.

   Carbon dioxide : It is obtained from the atmosphere through small openings called stomata (singular–stoma) in the underside of the leaves.

   Water : This is another important requirement for photosynthesis. The root system of plants enables them to obtain water from the soil. The root system consists of a main or primary root, rootless or secondary roots, and root hair. Root hair increase the surface area of roots and are found in great numbers near the tips of roots. Water and soluble nutrients enter the root hair, pass through the secondary roots and travels through the main root into the stems and reaches the leaves through xylem. Once photosynthesis taken place, starch is formed. This starch is carried to various parts of the plants through phloem.
4. **Autotrophic nutrition** : Autotrophic nutrition is found in green plants. They make their own food and hence green plants are called autotrophs (auto-self, troph-food). They have the unique ability of trapping solar energy and covering it into chemical energy which is stored in the food. The process is called photosynthesis (photo-light, synthesis-to make). This mode of nutrition is called autotrophic nutrition.

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5. **Aim :** To show that sunlight is necessary for photosynthesis.

   Materials Required : A potted plant, black paper, paper clip, iodine solution, dropper

   Method :

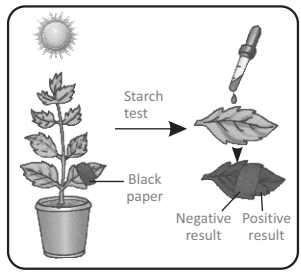
   (i) Take a potted plant and destarch its leaves by keeping it in dark for 2 days.

   (ii) Take a black paper and cut a simple 'L' shape in it by using a stencil.

   (iii) Cover one leaf with this paper.

   (iv) Leave the setup in sunlight for 4-6 hours.

   (v) Test the leaf for formation of starch in both the covered and uncovered portions by using the iodine solution.



Sunlight is necessary for photosynthesis.

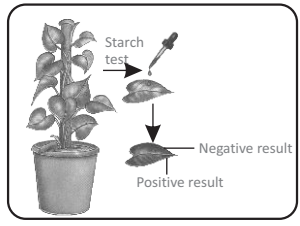
   Observation : Detach the leaf and test if for presence of starch. You will observe that only the part of the leaf that could get sunlight through the cut out design as well as the other exposed parts of the leaf turns blue-black showing the presence of starch.

6. **Aim :** To show that green pigment (chlorophyll) is necessary for photosynthesis.

   This activity can be performed using a variegated leaf of coleus or money plant. Perform steps 2 and 3 given in previous activity.

   Observations : The green portion of the leaf develops blue-black colour, when tested with iodine for the presence of starch. The non-green portion turns brown in colour.

   Inference : Only those portions of the leaf that contained chlorophyll could perform photosynthesis. This shows that chlorophyll is necessary for photosynthesis.



Chlorophyll is necessary for photosynthesis.

Learn by Doing

PUZZLE

[1]C	H	L	O	R	O	[2]P	H	Y	L	[3]L
						H				E
					[4]S	T	O	M	E	T	A
						T				V
					[6]I		O			E
					N		S			S
		[5]W			S		Y			
		A		[7]G	R	E	E	N		
		T				C		T		
		E				T		H		
[8]C	A	R	B	O	N	D	I	[9]O	X	I	D	E
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Nutrition in Animals

A. Tick (✓) the correct option.

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

B. Fill in the blanks with correct words.

1. amylase 2. mouth 3. Long sticky 4. vacuole
5. salivary 6. bile juice 7. proboscis 8. small

C. Match the Following.

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

D. Short Answer Type Questions.

1. (a) **Saliva :** It helps in digestion chewing and swallowing.

   (b) **Tongue**

   (i) It helps in the process of chewing by pushing the food towards the teeth.

   (ii) It helps to mix the food with saliva and make a ball out of it and finally to swallow it.

   (iii) Tongue helps us to speak.

   (c) **Liver**

   (i) It secrets bile juice which is stored in the gall bladder.

   (ii) The bile juice secreted by gall bladder breakes up fats into tiny droplets that can be digested and absorbed more easily.

   (d) **Pancreas :** It secretes the pancreatic juice that changes starch into simple sugars and proteins into simpler compounds called amino acids.

   (e) **Pseudo podia :** when ameoba comes in contact with its food, the pseudopodia completely enclose the food forming. small cavities called food vacuoles.

2. The process of breaking down of food into simpler form is called digestion.
3. The first set of only 20 teeth appear in children by the age of 2 years. These are called milk teeth. milk teeth start getting replaced by permanent teeth at around the age of 7 years and are replaced by set of 32 permanent teeth.
4. Saliva is the a mixture that helps in digestion. It is produced by salivary glands in mouth.
5. Molars are large back teeth having a wide grinding surface and core used primarily to chew food.
6. The semi-digested food that is chewed again by ruminants is called cud.
7. Water is absorbed from undigested food in small intestine.
8. The rumen is a part of the stomach of the herbivores e.g., cud.

E. Long Answer Type Questions.

1. The food eaten by animals undergoes five steps :

   (i) Ingestion : It is the process of taking in food into the body through an opening.

   (ii) Digestion : It is the process of the breaking down of food-physically and chemically into simple and soluble form.

(iii) Absorption : It is the process of absorption of simple food in the blood.

(iv) Assimilation : It is the process of utilization of simple food by the body.

(v) Egestion : It is the process of throwing undigested food out of the body.

2. There are four distinct type of teeth in our mouth. These are:

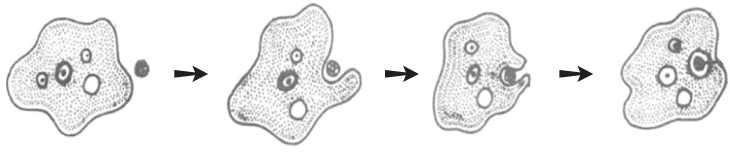
   Incisors : They are also called biting teeth. They are flat, blade like teeth. The incisors are the front teeth and are so called because they help to incise (cut) food.

   Canines : They are also called tearing teeth. They have very sharp edges and help in tearing the food.

   Premolars : They have broader grinding surfaces and therefore help in chewing and grinding of food.

   Molars : Molars are large back teeth having a wide grinding surface and are used primarily to chew food.

3. When amoeba comes in contact with its food, it throws out finger-like projections from its body. These projections are called pseudopodia (pseudo–false, podium–feet). The pseudopodia completely enclose the food forming small cavities called food vacuoles. The food is digested in the food vacuole with the help of digestive juices which are secreted into the food vacuole. This digested food is now ready to be absorbed and assimilated. The undigested food is pushed out of the body.



An *Amoeba* Feeding

4. The tiny stomach glands in the walls of the stomach give out digestive juices also called gastric juices. These juices contain enzymes and hydrochloric acid.

   The enzyme pepsin acts on the complex molecules, proteins and digests most of them by turning them into simpler molecules, peptides. Renin is an enzyme secreted by the stomach wall in infants. It helps in the digestion of milk.

   Hydrochloric acid kills bacteria present in food and also helps in activation of enzymes.

   The gastric juices pour over the food and the food is throughly mixed by

the action of muscular walls of the stomach which contract and relax slowly and repeatedly. The food gets completely crushed in the stomach and gets converted into a semi fluid called chyme. It then passes into the small intestine.

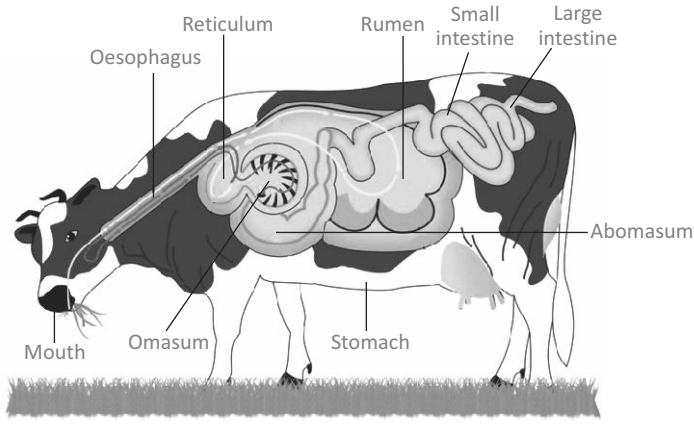
5. The simple and soluble molecules formed after digestion are transported to the blood vessels and assimilated in the blood. The absorbed substances are then transported to the various parts of the body through the blood. When the simple food reaches each cells of the body it is called assimilation.
6. After the initial chewing the food passes down the 2 to 3 feet long oesophagus. The oesophagus leads into the stomach which in ruminants in four chambered. Thus you see that ruminants have a unique stomach.

   Rumen : The rumen helps in storing the large quantities of food that has been quickly consumed. The food is partially digested here and is now called the cud. The cud is then brought back into the mouth, re-chewed and re-swallowed in a process called cud-chewing. The rumen also has billions of bacteria and protozoa which breakdown the fibre called cellulose found in hay and grass.

   Reticulum : The reticulum helps in moving the swallowed food back into the mouth for through chewing. The reticulum opens into the omasum.

   Omasum : Its main function is to absorb excess water and reduce the particle size further.

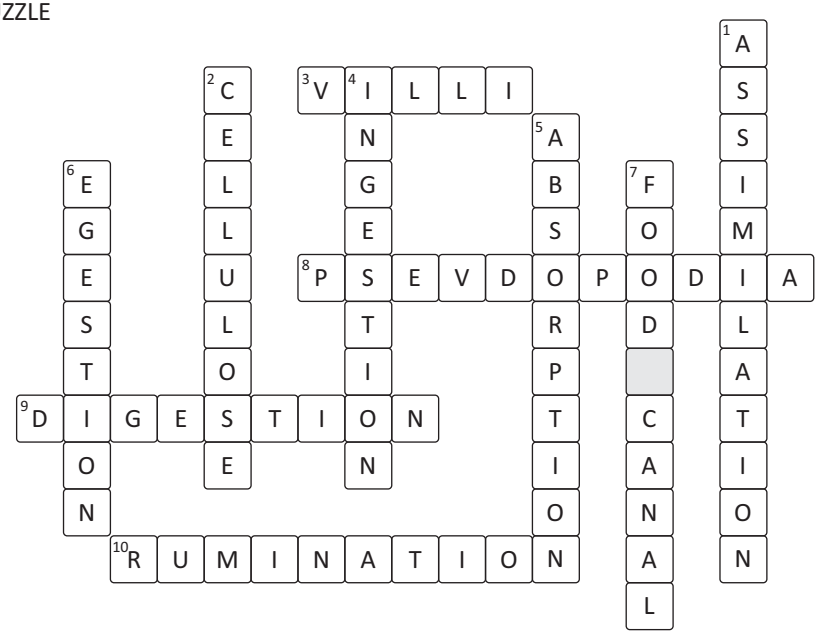
   Abomasum : The walls of the abomasum secrete digestive juices that help in digestion.



Digestive System in Ruminants

Learn by Doing

PUZZLE



Changes Around Us

EXERCISES

A. Tick (3) the correct option.

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

B. Fill in the blanks with correct words.

1. chemical 2. physical 3. zinc
4. chemical 5. iron, water, oxygen 6. CO_2

C. Match the Following.

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

D. Complete the following equations :

1. $CaO + H_2O \longrightarrow Ca(OH)_2 + Heat$
2. $CaSO_4 + Fe \longrightarrow FeSO_4 + Ca$
3. $CO_2 + Ca(OH)_2 \longrightarrow CaCO_3 + H_2O$
4. $MgO + H_2O \longrightarrow Mg(OH)_2$

E. Short Answer Type Questions.

1. Those changes in which a substance undergoes a total change and transforms into new substance are called chemical changes.

   For example: burning of paper, germination of seeds, digestion of food etc.

2. The process of obtaining from hot super saturated solution is called crystallization.

3. Irreversible change.

4.

S.No.	Physical Change	Chemical Change
1.	A physical change is temporary.	A chemical change is permanent.
2.	A physical change is reversible.	A chemical change is irreversible.

5. $2Mg + O_2 \longrightarrow 2MgO$

   magnesium oxygen magnesium oxide cash

6. Salt and alum

7. When carbon dioxide is passed through lime water, calcium carbonate and water are obtained.

8. A common example of physical change, and chemical change happening together is the burning of a candle. The melting of wax and the solidification of molten wax are physical changes while burning of molten wax is a chemical change.

F. Long Answer Type Questions.

1. **Crystallization :** Crystallization is the process of separating solid compounds from the solution in the form of crystals.

   Obtaining Sugar Crystals : The sugar is dissolved in minimum amount of a solvent, preferably water at a high temperature. Then the impurities are removed by filtration and the solution is concentrated by vaporising the solvent. When the concentrated solution is cooled, it foams crystals of the pure substance, that is sugar.

2. **Absorption or Evolution of Heat, Light or any other Radiation :** Nearly all chemical reactions are accompanied by change in energy, usually in the form of heat or light. The heat may be released (evolved) or absorbed. Accordingly, the reactions are classified into exothermic reactions and endothermic reactions.

   Exothermic Reaction : A reaction during which the heat is released or evolved is known as exothermic reaction. Let's perform an activity to understand evolution of heat.

   Exothermic Reaction : A reaction during which the heat is absorbed is known as an endothermic reaction. Let's perform an activity to understand this.

Change in Colour and Formation of Precipitate : During a chemical reaction, the product formation may be accompanied by a change in colour. Also, there is a possibility of deposition or settling down of certain insoluble substances known as precipitates which are formed as a result of chemical reaction. Precipitate is denoted by a downward (↓) arrow.

Evolution of Gas and Production of Sound : Generally, gas is evolved when one of the reactants is already in a solution form. The gas bubbles (effervescence) are mostly accompanied by a bubbling sound. The evolution of gas is denoted by an upward (↑) arrow next to the formula in a reaction.

3. In tearing of a paper, no new substance is formed. So, it is a physical Change. Whereas in burning of a paper, a new substance i.e., ash is formed, So it is also a chemical change,

4. When Iron reacts with oxygen of the air in the presence of moisture to form a substance called iron guide which we call rust.

   The chemical equation for this reaction can be represented as :

   Iron + Oxygen + Water $\longrightarrow$ Iron oxide

   Oxygen and water are two essential conditions for rusting of iron, absence of either or both of them can prevent rusting.

   This is a chemical change because this change is permanent. You cannot get back the iron from iron oxide.

   Prevention of Rusting : Rusting can be prevented by not allowing the surface of the iron to come in direct contact with moisture/water and air. This can be done in the following ways.

   Painting : A layer of paint prevents iron articles from coming in direct contact with the moisture and air, hence preventing rusting.

   Oiling/Greasing : When oil or grease is applied, iron does not come in direct contact with moisture, as water and oil do not mix.

   Galvanisation : Iron can be coated with another metal like chromium or zinc. This process of coating iron with zinc is called galvanisation. Galvanisation protects iron and other metals from rusting.

   Electroplating : This is the process of coating iron objects with shiny metals like chromium electrically.

   Alloying : In this process, iron is mixed with other corrosion-resistant metals or non-metals. For example, stainless steel is an alloy of iron, nickel and chromium. It does not rust at all.

5. **Aim :** To observe chemical change in magnesium.

   [Perform this activity only under the supervision of the teacher.]

   Materials Required : Magnesium, ribbon, sand paper, a pair of tongs and burner

Method :


Burning of magnesium

(i) Take a small piece of a magnesium ribbon. Clean its tip with sandpaper.

(ii) Hold it with a pair of tongs over the flame of a burner.

(iii) It burns with a brilliant white light and a powdery ash [magnesium oxide (MgO)] is formed. It is different from magnesium ribbon.

(iv) Dissolve this ash in water in a test tube. Stir it properly.

(v) Test its chemical nature with the help of blue an red litmus paper.

(vi) Discuss your results in the class.

The reactions can be represented as follows.

$$\underset{(2Mg)}{\text{Magnesium}} + \underset{(O_2)}{\text{Oxygen}} \longrightarrow \underset{(2MgO)}{\text{Magnesium oxide (ash)}}$$

$$\underset{(MgO)}{\text{Magnesium oxide}} + \underset{(H_2O)}{\text{Water}} \longrightarrow \underset{[Mg(OH)_2]}{\text{Magnesium oxide (ash)}}$$

Caution : Do not stare at the burning ribbon for long. It is harmful to the eyes. Use glasses to look at it.

Observation : On burning magnesium ribbon, a new substance MgO is formed. MgO when mixed with water forms another new substance $Mg(OH)_2$. This is a chemical change.

6. **Aim :** To demonstrate a chemical reaction during which a change in colour is accompanied by the formation of precipitate.

Materials Required : Crystals of copper sulphate, dilute sulphuric acid, beaker, iron nail and water.

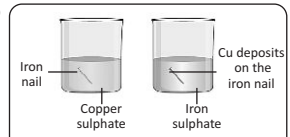
Method:

(i) Dissolve a few crystals of copper sulphate in water in a beaker.

(ii) Add a few drops of dilute sulphuric acid to it. You will get a blue-coloured solution.

(iii) Divide this solution into two equal parts. Drop a clean iron nail in one part.

(iv) Leave it for half an hour and observe.



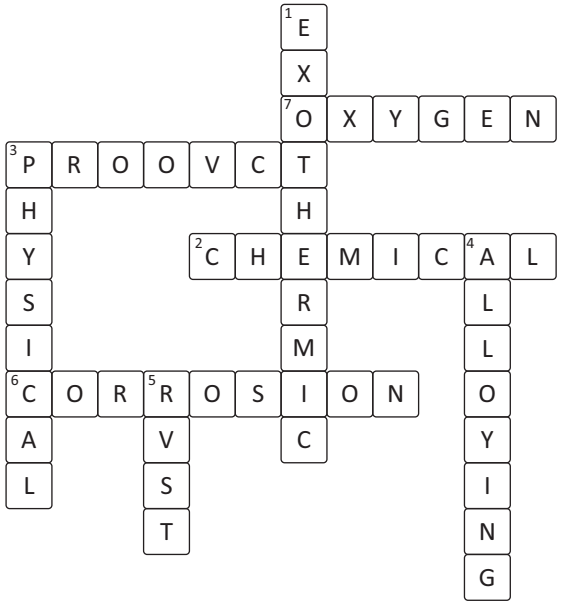
Reaction between copper sulphate and iron

Observation : You will notice that the solution turns green and there is a brownish deposit or precipitate on the iron nail. This is due to the formation of new substances—iron sulphate and copper crystals. This is a chemical change. The change is represented as following :

$$\underset{(CuSO_4)}{\underset{\text{(Blue)}}{\text{Copper sulphate}}} + \underset{(Fe)}{\underset{\text{(Grey)}}{\text{Iron}}} \longrightarrow \underset{(FeSO_4)}{\underset{\text{(Green)}}{\text{Iron sulphate}}} + \underset{(Cu)}{\underset{\text{(Brown)}}{\text{Copper}}} (\downarrow)$$

Learn by Doing

PUZZLE



Acids, Bases and Salts

EXERCISES

A. Tick (3) the correct option.

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

B. Fill in the blanks with correct words.

1. Cactus 2. acetic 3. magnesia 4. alkalis
5. acidic 6. Base 7. acidity 8. salt + water

C. Match the Following.

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

D. Give one or few word of the following:

1. Tartaric acid
2. Litmus
3. Sodium chloride (NaCl)
4. formic acid
5. Calcium hydroxide
6. water, table salt
7. Red litmus turn into blue.

E. Short Answer Type Questions.

1. (a) **Acid :** The chemical substances which are sour in taste.
   (b) **Base :** The chemical substances bitter in taste and soapy to touch.
   (c) **Salt :** A salt is a neutral compound formed when an acid reach with a base.
   (d) **Indicator :** Substance that helps to find out a substance is acidic, basic or neutral.
2. **Litmus and Turmeric.**
3. **Strong acid :** Hydrochloric acid, nitric acid
   Weak acid : Formic acid, acetic acid.
4. **Acidic substance :** Lemon juice
   Basic substance : Lime water
   Neutral substance : Water
5. Bases are bitter in taste. A bitter taste is characteristic of all bases.
   Solutions of the bases are soapy to touch. If you rub a drop or two of a very dilute solution of sodium hydroxide or potassium hydroxide between your fingers, they will feel slippery.
6. Sodium hydroxide, Potassium hydroxide
7. Hydrochloric acid.
8. Antacids in your are medicine that counteract (neutralise) the acid in your stomach to relive indigestion and heartburn.
9. Baking soda.

F. Long Answer Type Questions.

1.

S.No.	Acids	Bases
1.	Sour in taste.	Bitter in taste
2.	Turn blue litmus red.	Turn red litmus blue
	Acids do not give soapy touch.	Soapy touch

2. Soaking china rose petals into hot water for half an hour it creates a solution that can be used as an acid-base indicator and this is how we make china rose indicator.
3. The rain that contains unusually higher levels of acid than is normal is called acid rain. The fumes of harmful gases like sulphur dioxide, nitrogen dioxide and carbon dioxide released from the industries mix with rainwater and form sulphuric acid, nitric acid and carbonic acid, respectively. The presence of these acids make rainwater acidic and causes great damage to aquatic life, crops, stone buildings and historical monuments. Acid rain is one of the reasons for the Tajmahal to turn yellow.

4. Some food particles get stuck among the teeth. Bacteria grow on these food particles. These bacteria decompose the food particles and release acids in the process. This acid causes the corrosion of tooth enamel and decay of tooth.
5. When acid and base react with each other to produce salt and water then such section is known as neutralisation reaction.

   Example : When Sodium hydroxide is added to hydrochloric acid. Sodium chloride and water are formed.

   $NaOH + HCl \rightarrow NaCl + H_2O$
6. Indicators are those substance that show change in colour when brought in contact with acids and bases.

   Indicators substances used to text acid and bases.

   Example :

   Neutral indicators : Turmeric, grape juice.

   Synthetic indicators : Phenolphthalein, litmus paper.
7. **Properties of Acids :** Some of the characteristic properties of acids are :
   - Acids have a sour taste and are corrosive in nature.
   - Acids also have the ability to corrode metals such as iron and aluminium. For this reason, acid are generally stored in glassware.
   - Mineral acids such as nitric acid and sulphuric acid can destroy human tissues, clothes, paper etc. Thus, one should handle acids with care as they can cause burns upon contact with skin.
   - Acids are soluble in water. Most acids dissolve in water either at room temperature or on heating to form a clear solution.

     For example : Vinegar is 3-5% solution of acetic acid in water.
   - Depending on the amount of water, acids can be either diluted or concentrated. If the amount of water is more in an acid, it is called dilute acid and if the amount of water is less, it is called concentrated acid.
   - Acids can be strong or weak. A strong acid can cause severe burns. Nitric acid and sulphuric acids are a few examples of strong acids. Weak acids on the other hand are not as destructive as strong acids. Organic acids are generally weak acids.
   - Acids conduct electricity.

   Properties of Bases

   Some of the characteristic properties of bases are :
   - Bases are bitter in taste. A bitter taste is characteristic of all bases.
   - Solutions of the bases are soapy to touch. If you rub a drop or two of a

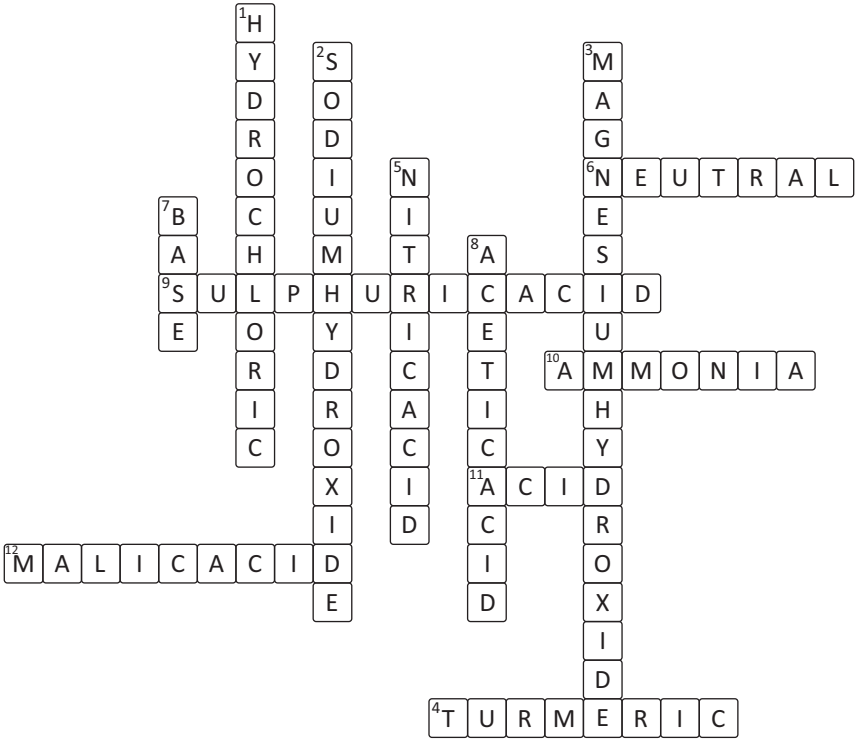
very dilute solution of sodium hydroxide or potassium hydroxide between your fingers, they will feel slippery.

- Bases may or may not be soluble in water. Bases that can dissolve in water are called alkalis.

8. Neutralization is used in the manufacturing of antacid tablets. Neutralization reaction helps in the prevention of tooth decay, neutralizing soil, in the treatment of ants and bee & bite etc.

Learn by Doing

PUZZLE



Heat

A. Tick (3) the correct option.

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

B. Fill in the blanks with correct words.

1. energy 2. 98.6° F, 36.9° C 3. 95° F, 110° F
4. Clincal 5. radiation 6. bitter
7. convection 8. vaceum 9. steel, good

C. Match the Following.

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

D. Short Answer Type Questions.

1. Celcius scale Fahrenheit scale
2. The form of energy that flows from a hot body to acold body is called heat energy. Temperature is the measurement of hotness or coldness of an object.
3.

S.No.	Celcius Scale	Fahrenheit Scale
1.	Temperature on this scale is measured in °C	Temperature on this scale is measured in ° F
2.	Lower fixed point is 0° C	Lower fixed point is 32° F.
3.	Upper fixed point is 100° C	Upper fixed point is 212° F

4. Heat travels from soup to spoon with the process of conduction. Heat is conducted to spoon, as metal is a very good conductor of heat.
5. Substances that do not allow heat energy to flow through them easily are bad conductors of heat or insulators. Glass, plastic, wood, ebonite, cotton, wool are bad conductors of heat. Air is also a very bad conductor of heat.
6. Black
7. Plastic is an insulator of heat. Plastic mat is used to insulate and prevent damage to the table.
8. The conduction and convection of heat requires medium, while radiation of heat requires no medium.

E. Long Answer Types Questions.

1. (a) We know that $F = (C \times \frac{9}{5}) + 32$

$= (35 \times \frac{9}{5}) + 32$ (given $C = 35\,^{\circ}C$)

$= (7 \times 9) + 32$

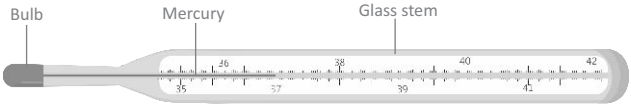
$= 63 + 32 = 95^{\circ}F$

(b) We know that $F = (C \times \frac{9}{5}) + 32$

$= (15 \times \frac{9}{5}) + 32$ (given $C = 15\,^{\circ}C$)

$= (3 \times 9) + 32$

$= 27 + 32 = 59^{\circ}F$

2. 

Laboratory thermometer

3. The three main effects of heat are :

(i) Heat causes temperature to rise.

(ii) Heat causes temperature to rise.

(iii) Heat causes expansion.

Heat Causes Temperature to rise : When a body absorbs heat, its molecules gain energy. As a result the temperature of the body rises and the body becomes hot.

4. **Land Breeze :** After sunset the land cools much faster. The air above the sea is warmer than that above the land. It rises and the cooler air above the land moves out towards the sea. We call this land breeze.

Sea Breeze : The sea takes longer to get heated than does the land. So the land is hotter than the sea during the day. The air in contact with the land becomes hot and rises and the cooler air above the sea rushes in towards the land to take its place. This sets up the convection current which we call a sea breeze.

5. (i) We need two metal pans, one should be painted black from outside and another should be shiny from outside. Fill both containers with equal amount of water. Keep them in the sun for about half an hour. After that take the temperature of water in both the pan. You will notice that the temperature of water, kept in black pan is hotter than that of water, kept in the shiny or light coloured pan.

This shows that a black body absorbs more heat compared to a light coloured body.

(ii) **Aim :** To observe conduction of heat in solids. You need a metal rod, some nails, wax and candle.

Fix some nails at equal distances on the rod with the help of wax. Fix one end on the metal rod with clamp keeping metal rod in horizontal position. Start heating another tip of the metal rod with a gas burner of a candle.

You will observe that nail which is nearest to the flame falls down first because of melting of wax. Then the second nail falls down, which is followed by other nails one by one.

This happens because heat travels gradually from the hot end of the metallic rod to its colder end. If heat is supplied continuously then conduction will continue until the temperature of whole body of the solid object becomes uniform.

Conditions for the conduction of heat –

- Two objects should be in direct contact.
- Temperature of the two objects should be unequal.

6. When the bulb of the thermometer is placed beneath the tongue or under the arm of the patient, the mercury inside the bulb expands due to heat of the body and rises in the capillary tube. The marking up to which the mercury rises is the reading of the temperature.

7. **Applications of Conductors**

(i) Both good and bad conductors are useful to us, depending on our needs we use good conductors (metals) for making cooking utensils and heat-resistant plastic for making the handles for these vessels.

(ii) We wear woollen clothes in winter because wool is a bad conductor of heat. Thus it helps in retaining body warmth. The wool fibre has series of curls and these are called 'crimps'. These crimps create small air pockets. The greater the number of crimps, the greater is the number of air pockets which can hold and trap air. Thus, a thin layer of air is created which insulates us from the cold weather and also prevents body heat from escaping into the surroundings.

- Animals and birds keep their bodies warm due to the trapped air in their fur or feathers.
- Aluminium, being a good conductor, is used in solar panels, solar heaters, etc.
- The heating pad of an electric ion is made up of iron or steel as it is a good conductor of heat, whereas the handle is made up of plastic (bakelite).
- Using two thin blankets together provides more warmth as the air trapped in between does not allow heat to escape.

- The inner walls of a thermos flask, which keeps hot liquids hot and cold liquids cold, are made up of poor conductors so that heat does not escape.

8. (i) Solar panels used in households for heating water are designed to maximize the absorptions of heat from the sun. A black metal sheet is used to increase heat absorption.

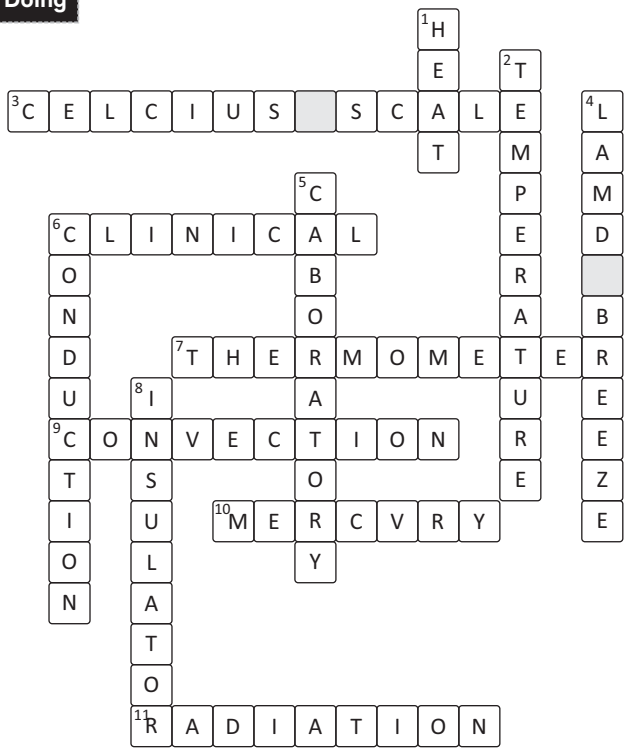
   (ii) Electric room heater is fitted with a curved and polished metal reflector behind the heating element. This polished metal radiates more heat falling on it towards the person sitting infront of it.

   (iii) People wear white or light-coloured clothes in summer to reflect the heat of the sun and stay cool. On the other hand, in winter dark or black coloured clothes are preferred. They absorb heat and radiate it to the body, thus keeping the body warm.

   (iv) Base of some cooking utensils are painted in black colour while side of utensils are kept bright. The black colour of the bottom helps in transfer of heats after absorbing it from the flame and radiates it towards the food kept in the utensils more efficiently. The bright coloured side prevents the radiation of heat.

Learn by Doing

PUZZLE



Respiration

EXERCISES

A. Tick (3) the correct option.

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

B. Fill in the blanks with correct words.

1. energy 2. stomata 3. breathing, cellular respiration
4. guard 5. respiration 6. anaerobic 7. Stomata

C. Short Answer Type Questions.

1. (i) **Cellular respiration :** It is the process of releasing energy form the breakdown of food
   (ii) **Breathing :** It is a physical process of exchange of gases.
   (iii) Stomata : These are the small pores present on the leaves through which oxygen and carbon dioxide take place.
   (iv) **Aerobic respiration :** The process of respiration that takes place in the presence of oxygen is called aerobic respiration.
   (v) **Anaerobic Respiration :** The process of respiration that takes place in the absence of oxygen is called anaerobic respiration.
2. Earthworms breathe through their moist skin.
3. Breathing and cellular respiration.
4. During cellular respiration the sugar molecules in food are oxidised to form carbon dioxide and water and energy is given out.
5. Respiratory system in composed of following organs :
   - Nasal Cavity,
   - Pharynx,
   - Larynx,
   - Trachea,
   - Bronchi and
   - Lungs.
6.

S.No.	Physical Change	Chemical Change
1.	Energy is given out gradually.	Energy is given out suddenly.
2.	Energy is given out in the form that can be used by the organism.	Energy si given out in the form of heat or light.

7. The exchange of oxygen and carbon dioxide takes place through small pores called stomata (singular–stoma) present in the leaves and stem.
8. Fishes use gills for exchange of gases. Gills are made up of a large number of filaments, richly supplied with them blood veins called capillaries. As

water enters through the mouth it flows over the gills. The blood in the capillaries absorbs oxygen and gives out carbon dioxide through its walls.

D. Long Answer Type Questions.

1. All living organisms need energy to do work. Energy is required to perform various functions of life such as nutrition, excretion, growth, movement, transportation and reproduction. Without energy, organisms cannot do any work. Even when you are reading this book, you need energy. You require energy even when you are sleeping, eating, running or doing physical activities. Energy comes from food that we eat.

2. **Aim :** To show that carbon dioxide is given out during breathing.

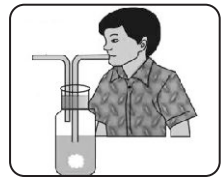
   Materials Required : Test tube, lime water (which is made by dissolving slaked lime in water)

   Method :

   (i) Take a drinking straw in your mouth.

   (ii) Through this straw, blow air in the lime water.

   Observation : The lime water turns milky.



Effect if exhaled air on lime water

   Conclusion : This proves that carbon dioxide is exhaled when we breathe out air. Carbon dioxide reacts with lime water to make calcium carbonate. Lime water is calcium hydroxide.

3. In humans, anaerobic respiration can be carried on only for a short time. It occurs in our muscles cells when there is not enough oxygen supply. This happens when we are doing heavy work or exercise, running fast etc. Muscular cramps may develop as a result of heavy exercise or fast running. In fact, when muscle cells respire anaerobically, there is a partial breakdown of glucose and lactic acid is produced. Accumulation of lactic acid causes muscle cramps.

$$\text{Food (glucose)} \xrightarrow[\text{In the absence of oxygen}]{\text{In muscle cells}} \text{Lactic acid + Energy}$$

4.

S.No.	Breathing	Cellular Respiration
1.	It is a physical process of exchange of gases. No chemical reaction takes place.	Chemical reaction of oxidation of food takes place.
2.	It takes place outside the cell.	It takes place within the cell.
	There is no relase of energy.	There is release of energy.

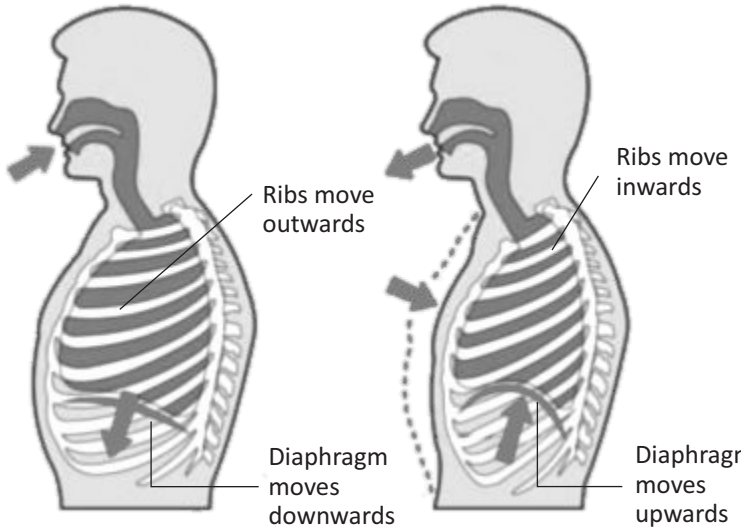
5. (a) Fishes use gills for exchange of gases. Gills are made up of a large number of filaments, richly supplied with them blood veins called capillaries. As water enters through the mouth it flows over the gills. The blood in the capillaries absorbs oxygen and gives out carbon

dioxide through its walls.

(b) Cockroaches, grasshoppers etc. have openings called spiracles on their bodies. Air enters through these openings and reaches all parts of the body through respiratory tubes called trachea and their branches called tracheoles.

6. Muscular cramps may develop as a result of heavy exerrcise or fast running. Relief from muscle cramp can be obtained by a hot water both or a massage. Circulation of blood in the body is improved by these acts.

7. The movement of diaphragm facilitates breathing. When the diaphragm expands the rib cage also expands, it creates a low pressure inside lungs. As a result the air goes inside the lungs. When the diaphragm contracts and the rib cage also contracts, it creates high pressure in lungs. As a result the air goes outside the lungs.

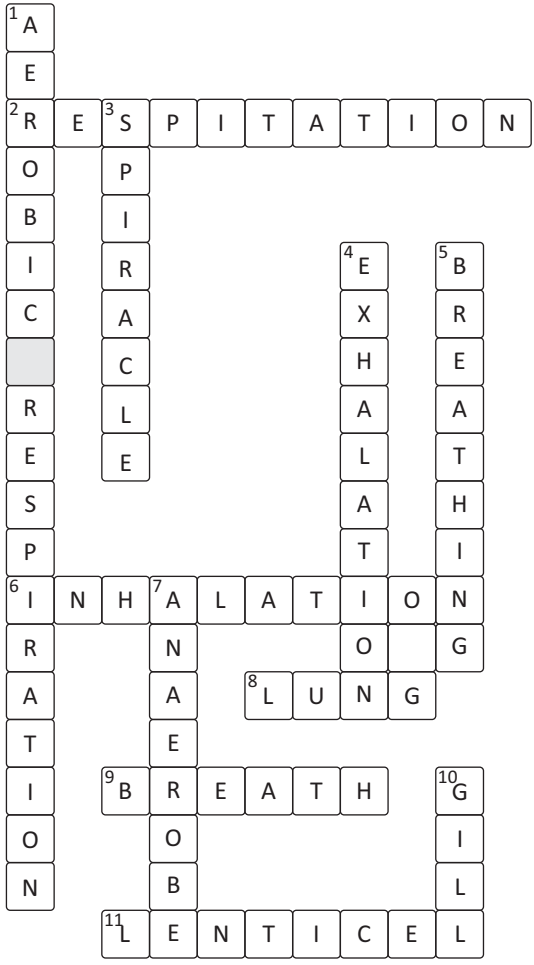


Process of breathing

8. Plents respire by taking in oxygen and giving out carbon dioxide. Plants do not have any organs for breathing. The exchange of oxygen and carbon dioxide takes place through small pores called stomata (singular–stoma) present in the leaves and stem. Stomata along with its nearby guard cells and other cells are called the stomatal apparatus. The expansion and contraction of guard cells, which occurs due to the supply of moisture and light results in opening and closing of the stomata. The rate of exchange of gases in plants is much slower than in animals.

Learn by Doing

PUZZLE



Transport and Excretion

A. Tick (3) the correct option.

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

B. Fill in the blanks with correct words.

1. capillaries 2. hemoglobin 3. auricles 4. plasma
5. heart beat 6. guard 7. deoxygenated 8. excretion
9. sweat glands 10. xylem, phloem

C. Match the following.

1. c 2. d 3. e 4. b 5. a

D. Short Answer Type Questions.

1. The transport of materials is necessary in an organism as every cell needs a regular supply of nutrients and oxygen for releasing energy through respiration.
2. Carbon dioxide
3. Heart, blood vessels, blood
4. Plasma, RBCs, QBCs, Platelets
5. Nephron
6. If a person's kidneys are damaged, doctors remove body wastes by a medical process known as dialysis. A more permanent solution is kidney transplantation in which the damaged kidney is replaced by a healthy kidney donated by someone.
7. Food in plants is manufactured by the leaves. Once the food is prepared it needs to be sent to all parts of the plant body. The process by which this takes place is called translocation.
8. It is the artificial process of filtering blood, which is done to remove the nitrogenous waste products that can result in toxicity inside the system.
9. (i) **Heart Beat :** The action of the heart includes contraction and relaxation of the auricles and the ventricles. This rhythmic contraction and relaxation is called heartbeat.
   (ii) **Excretion :** The process of removal of wastes from the cells of living organisms is called excretion.
   (iii) **Transpiration :** The process by which plants lose water in the form of vapour through their leaves is called transpiration.

E. Long Answer Type Questions.

1. **Excretion in Animals :** In lower animals such as amoeba, paramecium, Hydra and sponges, there are no special excretory organs. Waste products such as ammonia are excreted by the process of diffusion through the body surface.

   Excretion in Humans : Excretion in humans is carried out mainly by the urinary system. The urinary system is responsible for removing most of the wastes from the body in the form of urine. Urine consists of 95% water, 2.5% urea and 2.5% other waste products. The main organ of this system are the kidneys.

   The kidneys consists of a large number of coiled tubes called nephrons. Each kidney contains about one million nephrons. Nephrons are the tiny filtering units of the kidney. They filter out excess water, salts and urea from the blood as it passes through them. The clean blood leaves the kidneys and continues its circulation in the body. The waste removed by the kidneys from a liquid called urine.

2. **Transpiration :** The process by which plants lose water in the form of vapour through their leaves is called transpiration. Some of the water absorbed by the roots is lost by evaporation through the stomata present on the surface of leaves.

   Advantages of Transpiration

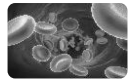
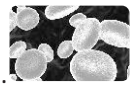
   - Transpiration, i.e., evaporation of water from the leaves creates a force called suction pull which helps to pull water up to great heights in tall trees. As water is given out by transpiration more water is absorbed. This helps in the continuous transport of water and minerals from the soil to the leaves.
   - It protects the delicate cells of plants from the heat of the sun by producing a cooling effect. Otherwise, the leaves and flowers will droop.
   - It provides rigidity to the soft parts of the plant body.

3. Humans have a very well-developed and efficient circulatory system. It consists of :

   (a) blood (b) blood vessels and (c) heart

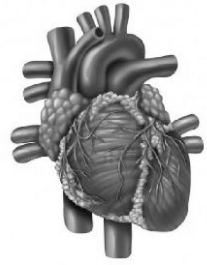
   (a) **Blood :** It is the fluid connective tissue. Blood comprises plasma and blood corpuscles (or cells).

   Plasma : It is the fluid part of the blood 90% of which is water. It is pale yellow in colour. Rest of it consists of simple food molecules, enzymes, minerals, wastes and some proteins. Proteins enable the blood to clot and fight infection.

Blood Cell	Function
Red blood cells (RBC) round, without a nucleus. 	Contain haemoglobin (an iron cont-aining pigment) that gives blood the red colour. Haemoglo-bin binds with oxygen and tran-sports it to all parts of the body.
White blood cells (WBC) different shapes has a nucleus. 	Help in flighting disease causing organisms.
Blood platelets irregular without a nucleus. 	Help in blood clothing.

(b) **Blood Vessels :** The blood vessels, which are arteries, veins and the capillaries form a network and carry the blood throughout the body. Arteries carry oxygenated blood or blood containing oxygen from the heart to the various parts of the body and the veins carry deoxygented or blood containing carbon dioxide from the various parts of the body to the heart. Arteries divide to form thin tubes called capillaries. Capillaries are very thin blood vessels and join to form veins.

4. **Human Heart :**It is a conical, muscular organ, located in the chest cavity. It is slightly tilted towards the left.

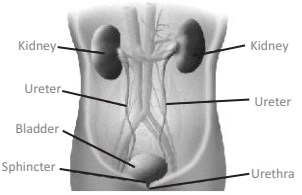

Structure of human heart

Structure : The heart is a two sided, four chambered pump. The upper two chambers are called atria or auricles and the lower chambers are called ventricles. The right and the left side of the heart are completely separated by a muscular partition called septum.

Working of the Heart : De-oxygenated blood is collected from all parts of the body and enters the right chamber of the heart called the right atrium or auricle. The right auricle then contracts and the blood is poured into the right ventricle through a valve. The right ventricle then contracts and the blood reaches the lungs through the pulmonary artery. The blood gets oxygenated here as we breathe in air. The oxygenated blood comes back to the left auricle through the pulmonary veins. The left auricle then contracts and the blood enters the left ventricle. Then the left ventricle contracts and the blood enters the dorsal aorta (an artery). Valves allow the movement of blood in one direction only i.e., from the auricles to the ventricles. The dorsal aorta then distributes the oxygenated blood to various parts of the body. The pulmonary artery is

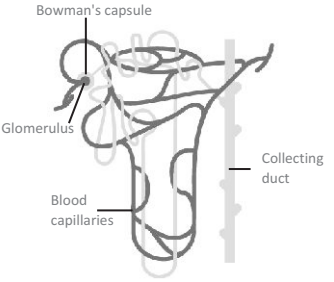
the only artery which transports de-oxygenated blood and the pulmonary vein is the only vein which transports oxygenated blood.

5. Excretion in humans is carried out mainly by the urinary system. The urinary system is responsible for removing most of the wastes from the body in the form of urine. Urine consists of 95% water, 2.5% urea and 2.5% other waste products. The main organ of this system are the kidneys. They



Human urinary system

are located on each side of the backbone, just above the waist. This main function is to filter wastes from the blood. You use a filter paper to separate solid impurities from a solution. The kidney work in the same way. The kidneys consists of a large number of coiled tubes called nephrons. Each kidney contains about one million nephrons. Nephrons are the tiny filtering units of the kidney. They filter out excess water, salts and urea from the blood as it passes through them. The clean blood leaves the kidneys and continues its circulation in the body. The waste removed by the kidneys from a

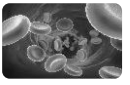
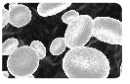


Nephron of kidney

liquid called urine. It passes from the kidneys through two tubes called ureters into an elastic sac called the urinary bladder. The bladder stores the urine until it is excreted from the body through the urethra. A healthy human being passes out about 1.5 to 2.5 litres of urine everyday. The kidneys must function properly to keep the body healthy.

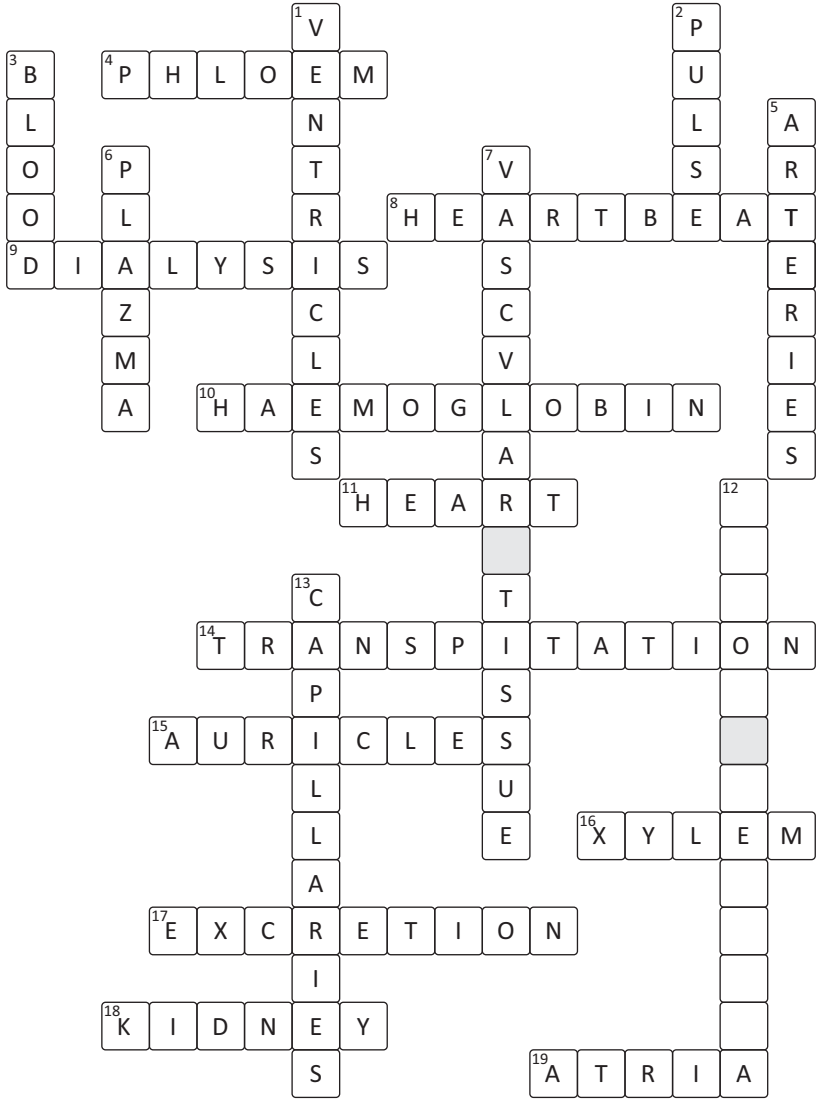
6. (i) Arteries carry oxygenated blood or blood containing oxygen from the heart to the various parts of the body and the veins carry deoxygented or blood containing carbon dioxide from the various parts of the body to the heart.

(ii)

Blood Cell	Function
Red blood cells (RBC) round, without a nucleus. 	Contain haemoglobin (an iron cont-aining pigment) that gives blood the red colour. Haemoglo-bin binds with oxygen and tran-sports it to all parts of the body.
White blood cells (WBC) different shapes has a nucleus. 	Help in flighting disease causing organisms.

Learn by Doing

PUZZLE



Reproduction in Plants

EXERCISES

A. Tick (3) the correct option.

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

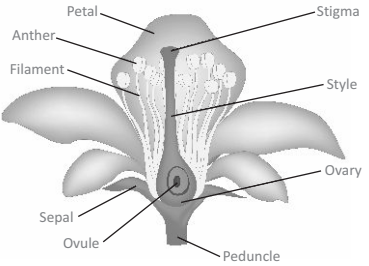
B. Fill in the blanks with correct words.

1. Spores, Fern 2. rhizome 3. spore 4. fertilization
5. zygote 6. wind 7. abiotic 8. fruit
9. ovary 10. budding

C. Give two examples for the following :

1. Sugarcane, Rose 2. Grapes, Jasmine 3. Sweet Potato, Dahlia
4. Mosses 5. Wind, Water 6. Rose, lily
7. Pumpkin, Papaya

D. Short Answer Type Questions.

1. **Sexual reproduction :** The formation of new plants through the fusion of male and female gametes is known as sexual reproduction.
2. Sugarcane, rose
3. 

Parts of a flower
4. Gladiolus, crocus
5. The process of transfer of pollen grains from the anthers to the stigma is called pollination.
6. **Layering :** This is a method most commonly used in grapes, jasmine and Bougainvillea.
   - In this process, a young branch is lowered down and bent towards the ground and covered by moist soil forming a layer.
   - After sometime, roots arise from the branch and grow downwards.

- The branch can then be cut off from the parent plant and allowed to grow into a new plant.

7. Balsam
8. The process of growing new plants by artificial methods is known as artificial propagation. Some of these methods are as follows. Tissue culture, cutting, Layering and grafting.
9. (i) **Fertilization :** The process of fusion of male and female gametes is called fertilization.

   (ii) **Pollination :** The process of transfer of pollen grains from the anthers to the stigma is called pollination.

   (iii) **Zygote :** The result of fusion of male and female gamete is called zygote.

   (iv) **Cross-pollination :** The process where pollen grains are transferred from the anther of one flower to the stigma of another flower is known as cross-pollination.

   (v) **Dispersal of seeds:** Nature has arranged some agents of dispersal by which the seeds of a plant get scattered over a large area. This is called dispersal of seeds.

E. Long Answer Type Questions.

1. **Advantages of Vegetative Propagation :** Vegetative propagation has the following advantages :

   (i) Seedless plants can reproduce by this method.

   (ii) The new plant is identical to the parent plant. This helps to conserve the characteristic features of the parent plant.

   (iii) Plants reproduced by vegetative reproduction take less time to grow, and bear flowers and fruits faster than those produced from seeds.

2. **Asexual Reproduction** : Asexual reproduction involves the simple division of the plant body into two or more parts of spore formation. New plant body is formed from a single parent. This happens under favourable conditions. Vegetative reproduction is also a type of asexual reproduction in which a cell, tissue, or part of an organ of a plant develops into a new organism.

   Sexual Reproduction : Sexual reproduction takes place by the formation of seeds. It involves two parents and the fusion of male and female reproductive cells called gametes to form a single cell called a zygote.

3. A plant produces a large number of seeds. If all these fall below the plant and start growing, they will not get enough space, water, minerals and the sunlight. They will not develop into healthy plants. Many of them may even die. Nature has arranged some agents of dispersal by which the

seeds of a plant get scattered over a large area. This is called dispersal of seeds.

S.No.	Agents of Dispersal	Seed
1.	Wind	Cotton
2.	Water	Coconut
3.	Animals	Xanthium
4.	Explosion	Balsam

4. **Agents of Pollination :** Pollination takes place with the help of external agents such as wind, water and insects. They are called the agents of pollination.

   Pollination by Wind : In some plants pollen grains are transferred from male flowers to female flowers by wind. The male flower is on a greater height than female flowers in such cases. Corn shows very good example of pollination by wind. In a corn plant, the flower at the top is the male flower and the flower below it is the female flower.

   Pollination by Animals : When an insect sits on a flower to feed on nectar, pollen grains stick to its legs. Thus pollen grains get transferred to another flower. Colourful flowers attract birds and thus birds facilitate cross-pollination in them. Some foul smelling flowers attract bats and bats become the agent of pollination.

   Pollination by Water : Pollen grains of aquatic plants like lily and lotus are very light and are carried by water currents.

5. Sepals are green in colour. They form the first and the outermost whorl of the flower. Sepals help to protect the petals which form the second whorl and the other internal parts of the flower. Petals are brightly coloured and attract insects.

   The female reproductive organ of the flower consists of the carpels. A collection of carpels is called the pistil. It includes an ovary, a style and a stigma. The ovary contains ovules. Ovules contain the female reproductive cells.

6. **Fertilization :** The process of fusion of male and female gametes is called fertilization. Once pollen grain reach at the top of stigma they start germinating. A pollen tube is formed in the pollen grain.

   This pollen tube goes to the ovule. The male gamete is carried inside the pollen tube. Once the pollen tube reaches the ovule, the male gamete is released and it fuses with the female gamete (eggs) present there. This process is called fertilization. A zygote is formed after fertilization takes place.

Learn by Doing

PUZZLE

					[1]A	S	E	X	U	A	L
					[2]R	A	D	I	C	L	[3]E
											M
				[5]L	I	L	Y				B
		[4]Z									R
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		E					K				

O

Electric Current and Its Effects

EXERCISES

A. Tick (3) the correct option.

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

B. Fill in the blanks with correct words.

1. circuit 2. coil 3. charge 4. clectronagnet
5. Fuse 6. iron 7. heating 8. low

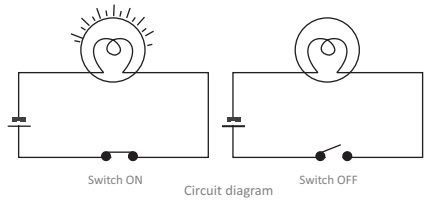
C. Match the following.

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

D. Short Answer Type Questions.

1. (i) **Electricity :** The flow of electric charge is called electricity.
   (ii) **Electromagnet :** An electro magnet is a temporary magnet in which a current carrying wire behaves like a magnet.

(iii) **Circuit Diagram :**



Circuit diagram

(iv) **Electric cell :** An electric cell is the simplest unit for generating electric current.

2. Electric iron, room, heaters, geysers, oven.
3. Resistance.
4. Electric fuse.
5. Human body is a good conductor of electricity and current can easily pass through the body to the ground leading to electric shocks. Hence , it is advised to wear rubber footwear when dealing, with electrical appliances as rubber acts as an insulator.
6. When we place an iron nail in a current carrying coil, the iron nail gets magnetized.
7. This is because it offers large resistance and gets heated when current flows through it.
8. The difference between a MCB and a fuse :

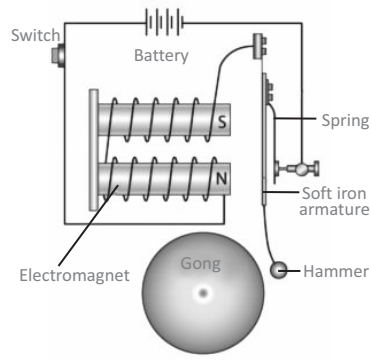
   MCB : A miniature circuit breaker is an automatically operated electric switch that protects an electric circuit during an overload or short circuit. They can be reset (manually or automatically) to restore normal operation, whereas fuses need to be replaced after single operation.

   Electric Fuse : A fuse is a safety device used in an electric circuit. An electric fuse prevents a large amount of current from flowing into any appliance or device as it cuts off the supply of electric current, thus preventing further damage.

E. Long Answer Type Questions.

1. The electric bell consists of an electromagnet an armature, a contact adjusting, screw, a gong and a hammer. The armature consists of a soft iron rod mounted on a spring. One end of the iron rood passes against the top of the contact adjusting screw.

   Working : When the switch is passed on, current flows in the electromagnet. It then attracts the



Electric bell

iron rod towards itself, causing the hammer to strike the gong. At the same time the armature loses contact with the screw and the current is switched off. This causes the electromagnet to lose its magnetism and the armature springs back to its original position to close the circuit once again. Current flows again and the cycle repeats itself till, the current is switched off.

2. Electromagnets : A length of wire wound closely together is called a coil. A current carrying coil also behaves like a magnet. An electromagnet is a temporary magnet in which a current carrying wire behaves like a magnet. It is a temporary magnet because it behaves like a magnet only when an electric current is passing through it.

   Uses of Electromagnets

   Electromagnets have numerous uses. Some common ones are as below :

   - Cranes with strong electromagnets are used to pick up the iron objects. To put them down, the current through the electromagnet is switched off. Electromagnets are also used for separating object made of magnetic materials from others.
   - A thin iron strip attracted by an electromagnet produces a sound as it strikes against the electromagnet or a gong placed in its path. Electric doorbells, buzzers and telegraph sounders work on this basis. Telephones also have electro magnets. In the earpiece of a telephone, a thin iron disc placed close to an electromagnet vibrates to produce sound when a varying current passes through the electromagnet's coil.
   - Electromagnets are used in motors that drive fans, mixers, washing machines and so on. They are also used in different types of machines in factories and in large generators.

3. (i) Spread some steel pins on a wooden board and bring an iron nail near them.
   (ii) Now, make one of the magnetic poles of the bar magnet touch one end of the iron nail.
   (iii) Slid it along its length in one direction slowly till the other end is reached.
   (iv) Repeat the process 20 to 30 times.
   (v) The magnet has to be moved in one direction only.
   (vi) Avoid the swiping of the magnet back and forth.
   (vii) Now, bring the iron nail hear the steel pins.
   (viii) The steel pins stick to the iron because nail has become a temporary magnet.

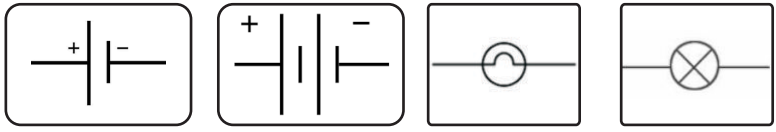
4. The electric fuse works on the principal of heating effect of current. The

amount of heating caused depends on the amount of current flowing through the wire. The greater the current the more is the heating caused.

An electric fuse consists of a thin wire usually placed inside a glass or ceramic cartridge. The wire is made of a material that melts easily when heated. It is designed such that only a certain maximum amount of current can flow through it. If the current excesses this maximum amount, the heating in the wire causes it to melt. We say that the fuse 'blows'. This brakes the circuit and stops the flow of current in the circuit.

5. **MCB :** A miniature circuit breaker is an automatically operated electric switch that protects an electric circuit during an overload or short circuit. They can be reset (manually or automatically) to restore normal operation, whereas fuses need to be replaced after single operation.

6. The filament of a bulb is made of a very thin, long tungsten wire which, offers a high resistance. It gets heated to such a high temperature that it starts slowing.

7. 

Cell Battery Bulb (ON) Bulb (OFF)

8. **Uses of Electromagnets**

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9. (i) When we connect a bulb to a cell with conducting wires, we make a circuit. A circuit has to be continuous to make the current flow. When the switch is in the ON position and the circuit is said to be a closed circuit. If we want to turn off the bulb, we have to break the circuit. We can do this by simply disconnecting the wires. When the circuit is broken, it is said to be an open circuit.

(ii)

S.No.	Maghet	Electromagnet
1.	Magnetic properties exist when the material is magnetised.	The magnetic properties are displayed when current is passed through it.
2.	The strength icon be adjusted depending upon the amount of flow of the current.	The strength depends upon the nature of the material used in its creation.
3.	It requires a continuos supply of electricity of maintain its magnetic field.	If does not require a cotinuous supply.
4.	The poles of this magnet con be altered with the flow of current.	The poles of this kind of magnet con not be changed.

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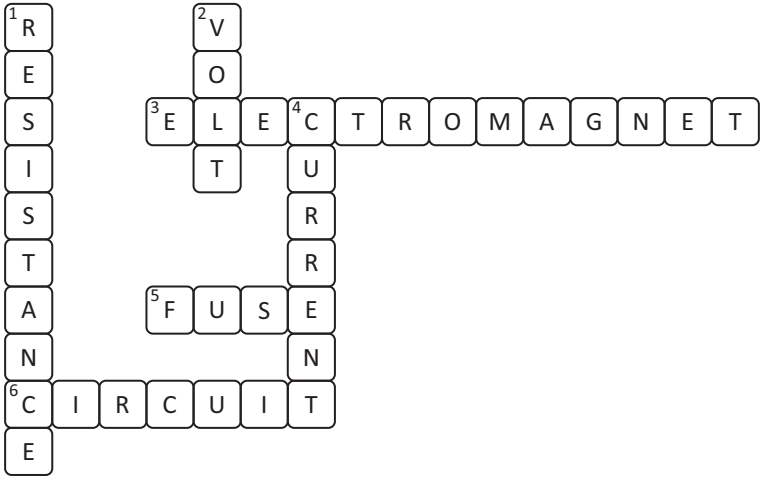

Light

A. Tick (3) the correct option.

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

B. Fill in the blanks with correct words.

1. convex	2. convex lens	3. energy
4. concave	5. convex mirror	6. thick, thin
7. real	8. spectrum	9. prizm

C. Match the following.

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

D. Short Answer Type Questions.

1. (i) **Image :** The appearance or picture of a real object, formed by the light that passes through a lens or is reflected from a mirror.

   (ii) **Virtual image :**An image that cannot be formed on a screen.

   (iii) **Converging lens :**Convex lens is thicker in the middle than at the edges, whereas the concave lens is thinner in the middle than at the edges. The convex lens is also called converging lens as it converges (bends inside) the rays of light passing through it.

   (iv) **Diverging lens :** The concave lens on the other hand is called diverging lens as it diverges the rays of light passing through it.

   (v) **Prism :** A triangular piece of glass that can disperse light.

   (vi) **Spectrum :** The set of colours formed on splitting of white light.

   (vii) **Dispersion of light :** The phenomenon of splitting of white light into component colours.

2. Concave mirrors are useful in the following ways :

   (i) They are used in make-up and shaving mirrors.

   (ii) They are used as reflectors in the torches and headlights of automobiles.

   Convex mirrors are used as rear view or side view mirrors in cars and scooters as they can view a much larger area than would be possible with a plane mirror.

3. Characteristics of Image formed by Different Types of Mirrors.

Type of mirror	Characterstics		
	Real/Virtual	Erect/Inverted	Size
1. Cancave	Virtual when the object is very closed to the mirror and real for all other positions	Erect when virtual and inverted when real.	Magnified or diminished
2. Convex	Virtual	Erect	Diminished

4. Both a convex lens and a concave mirror converge paraller ray of light to

focal point an they both create real a virtual images depending on the position of the object relative to the focal point.

5. The side mirrors of the car and the rear view mirror of a car are made up of convex mirror. This is because the image formed by a convex mirror is diminished and erect image, thus it provides a larger field of view.
6. The convex lens is also called converging deux as it converges the rays of light passing through it.
7. The concave lens on the other hand is called diverging lens as it diverges the rays of light passing through it.
8. A rainbow is made of seven colours – violet, indigo, blue, green, yellow, orange and red.
9. When sunlight passes through the water droplets present in air, it splits into different colours, which together form a rainbow.

E. Long Answer Type Questions.

1. (a) The image formed by a concave mirror can be larger or smaller than the object. It can be real or virtual. As the distance of the object from the mirror increases, the size of the image decreases.

   The image formed by a convex mirror is virtual, erect and smaller in size than the object.

   (b) The image formed by a concave mirror can be larger or smaller than the object. It can be real or virtual. As the distance of the object from the mirror increases, the size of the image decreases.

   When the reflecting surface is plane, the mirror is called a plane mirror. When light falls on a plane mirror it is reflected.

   (c) Any smooth or polished surface which reflects light to form images.

   A piece of transparent material (plastic or glass) which has one or both surfaces spherical.

   (d)

Convex Lens	Concave Lens
It is thicker in the middle and taper-ing at the edges.	It is thicker at the edges and thinner in the middle.
It converges the rays of light.	It diverges the rays of light.
It generally forms real and inverted image. However, when the object is placed very close to the lens, then it forms a virtual, erect and magnified image.	It always forms virtual and erect image, smaller in size than the object.

2. Mirrors having a curved surface are called spherical mirrors. Spherical mirrors are called so as they are a part of complete sphere. The two type of spherical mirrors.

- If the reflecting surface of the mirror is on the inner side of the sphere, it is called a concave mirrors.
- If the reflecting surface of the mirror is on the outer side, it is called a convex a mirror.

3. The image formed by the plane mirror has the following characteristics :
   - It is erect (upright) and virtual.
   - It is of the same size as the object.
   - The image formed is at the same distance as the object from the mirror.
   - The image is laterally inverted.
4. This is because when the driver of a vehicle in front of the ambulance looks in the rear view mirror, it appears as AMBULANCE and he can make way for it.
5. **Aim :** To show that convex lens converges whereas concave lens diverges the rays of light.

   Take a convex lens and place it in the path of sunlight. Adjust its position so that a bright spot can be formed on a piece of white paper placed on the other side of the lens. The bright spot is the real image of the sun. Hold the lens in this position for sometime. What do you observe?

   The paper starts burning at this point.

   Now repeat the activity using a concave lens. Are you able to get a bright spot on the paper this time also? No. This shows that convex lens converges the rays of light and concave lens diverges the rays of light.
6. **Aim :** To observe the dispersion of light by a prism.

   Material Required : A source of narrow beam of light (a small hole in the window), a prism and a white screen or white wall

   Method:

   1. Place a prism in a dark room such that a narrow beam of light through a small hole in the window falls on it.
   2. Observe the characteristics of the image formed.
   3. The beam of light passes through the prism and falls on the white screen.
   4. Observe the pattern of the light coming out of the prism.

   Observation

   The prism splits the light forming a spectrum which can be seen on the white screen.

Learn by Doing

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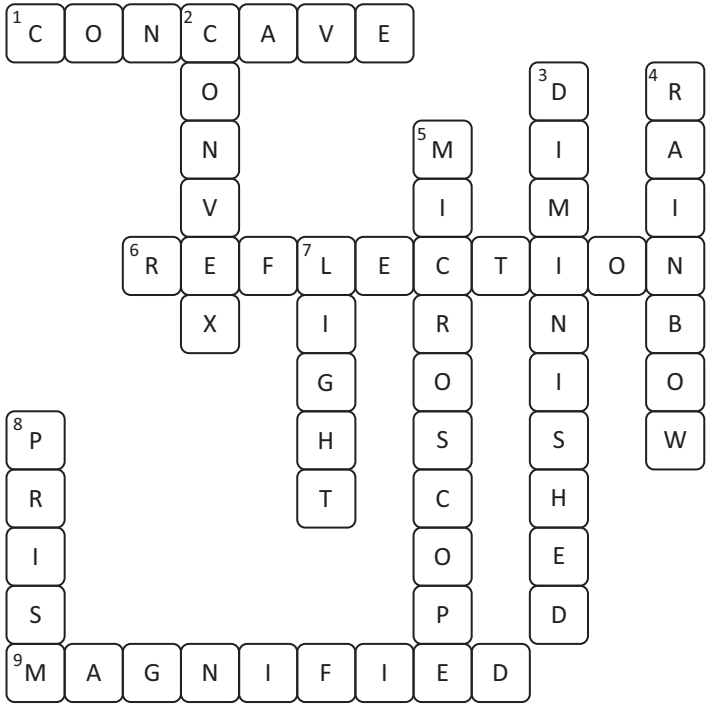


Time And Motion

A. Tick (3) the correct option.

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

B. Fill in the blanks with correct words.

1. Second 2. m/s 3. uniform 4. string
5. speed 6. kilometer 7. duration

C. Match the following.

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

D. Short Answer Type Questions.

1. (i) **Simple pendulum** : A small heavy metallic ball known as bob, hung from a fixed support by a thin inextensible string.
   (ii) **Motion :** A change in the position of a body with respect to time is called motion.
   (iii) **Speed :** Distance travelled by a body in unit time.
   (iv) **Slow motion :** An object which takes longer time to cover a cortain distance is called slow motion.
2. A motion where a body covers equal distance in equal intervals of time is called uniform motion.
3. Sundial, Hourglass
4. A small heavy metallic ball known as bob, hung from a fixed support by a thin inextensible string. The time taken by the pendulum in one second is called its frequency. The time period of a pendulum is given by the equation $T = 2\pi\sqrt{l/g}$
5. The movement of the pendulum will not differ at all because the mas of he bob has no effect on the motion of a simple pendulum. The pendulum are only affected by the period (which is related to the pendulum's length) and by the acceleration due to gravity.
6. Non-uniform motion.

E. Long Answer Type Questions.

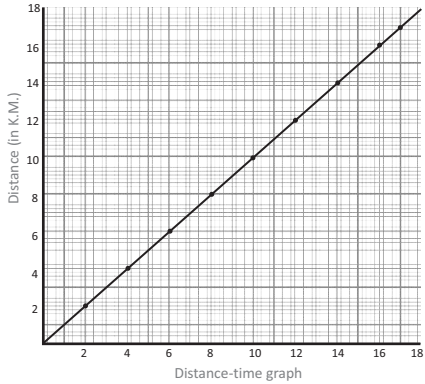
1. Suppose you and your family plan to go out for vacations. You choose to travel by train. Now, if you are to get the reservation done for travelling by trains, how will you proceed? Surely you will first decide the dates on which you wish to travel and then you will consult the railway time-table to look for the trains, the days on which they run and their departure and

arrival time. Can you plan your journey without this information? Certainly not. We cannot plan and do things in a systematic way if we are not aware of time. Perhaps this is the reason that man felt the need to measure time.

2. The motion can be categorised into uniform and non-uniform motion.

   (i) **Uniform Motion :** A motion that can be represented by a straight line on the graph paper is called uniform motion. In other words a body is said to be in uniform motion if it covers equal distances in equal intervals of times. The motion of a body as shown in graph paper below is uniform as the speed remains constant.

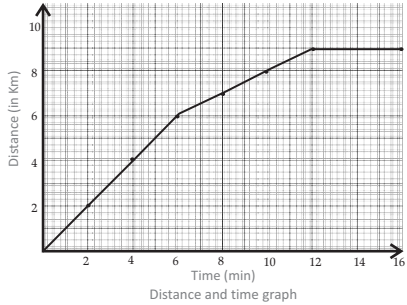
Time (min.)	Distance (k.m.)
2	2
4	4
6	6
8	8
10	10
12	12
14	14
16	16
18	18



Distance-time graph

   (ii) **Non-Uniform Motion :** A motion that cannot be represented by a strength line on the graph is called non-uniform motion. In other word, a body is said to be in non-uniform motion, if it covers different distances in equation.

Time (min.)	Distance (k.m.)
2	2
4	4
6	6
8	7
10	8
12	9
14	9
16	9



Distance and time graph

3.

Time (120km/h)	Distance (k.m.)
1	120
2	240
3	360
4	480

4.

S.No.	Uniform Motion	Non-
1.	It involves covering equal distance in equal interval of time.	It involves covering unequal distance in equal interval of time.
2.	It is maintains a constant speed.	It is not maintains a constant speed.

5. Speed of bike at 8:00 hours = 52 km/h

Speed of bike at 8:25 hours = 66 km/h

Time take = (8:25 – 8:00) hour

= 25 minutes

= $\frac{25}{60}$ hours = $\frac{5}{12}$ hours.

Average speed = $\frac{52 + 66}{2}$ km/h

= $\frac{5}{12}$ km/h = 59 km/h

Them, Distance covered by bike = speed x Time taken

= $(59 \times \frac{5}{12})$ km

= $\frac{295}{12}$ km

= 24.58 km

Forest-Our Lifeline

A. Tick (3) the correct option.

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

B. Fill in the blanks with correct words.

1. natural 2. Food web 3. Roots
4. deforestation 5. erosion 6. Afforestation

C. Match the following.

1. b 2. e 3. d 4. c 5. a

D. Short Answer Type Questions.

1. (a) **Forest :** A large area of land where various plants animals and microorganisms exist in their natural homes.

   (b) **Food chain :** Simple representation of energy flow in nature is called food chain.

(c) **Deforestation :** Large-scale felling of trees is called deforestation.

(d) **Afforestation :** Large-scale planting of trees in deforested areas or for commercial purposes in called afforestation.

(e) **Food chain** : Simple representation of energy flow in nature is called food chain.

2. The crown, canopy, undestoreys, forest floor and emergent layer are the layers of a forest.
3. **Global warming :** Increase in the temperature of the earth with the increase in CO2 concentration.
4. Humus is the organic component of the soil which is formed by disposition of leaves and other plant materials. Humus give good fertility to the soil.
5. Decomposes play a crucial role in ecosystem nutrient cycling by breaking down dead organisms and waste materials.
6. Afforestation is the process of growing trees to in creaswe plant cover. Roots of tree bind the soil together strongly.

E. Long Answer Type Questions.

1. **Uses of Forest** : Forests are very important renewable resource. They are useful in the following ways.

(i) **Timber and Paper :** The timber (wood) we use to make houses, furniture, boats, bridges, sports goods, chests or even matchsticks, comes from forests. Paper is made from bamboo, grasses and coniferous trees like fir and spruce. All these come from forests.

(ii) **Rubber, Resin, Gum, Oil** : Rubber comes from rubber trees. Resins from coniferous trees are used to make paints and varnishes. Gum trees (babool, Kikar) yield gum. And oils from eucalyptus, sandalwood and so on, are used to make perfumes, inscense and medicines.

(iii) **Medicinal Plants :** Quinine used to cure malaria, is made from the bark of cinchona trees. Morphine, used to relieve pain, comes from poppy plants. Neem, amla, tulsi and eucalyptus are some other medicinal plants.

(iv) **Balance of Gases** : Forests maintain the natural balance of carbon dioxide and oxygen by using up carbon dioxide and releasing oxygen. The can help check the rise in the proportion of carbon dioxide in the air due to human activities like burning fuels.

2. **Dependence of Plants on Animals :**

Plants depend on animals for the following :

- Carbon dioxide
- Pollination
- Dispersal of seeds

Dependence of Animals on Plants

Animals depend on plants for the following :

- Food
- Oxygen
- Shelter

3. Large-scale felling of trees is called deforestation. Deforestation is the permanent destruction of forests and wood lands.

   If forests get destroyed, global climate and local weather may change drastically. This will result in the lose of many species of animals and plants and biological diversity.

   Large amounts of greenhouse gases such as carbon dioxide are released into the atmosphere due to deforestation. Natural resources such as timber, medicinal plants, fruits and nuts are depleted due to deforestation. Deforestation can cause severe flossing , soil erosion, landslide etc.

4. A good chain outlines who eats whom. A food web is all fo the food chain in an ecosystem. Each organism in an ecosystem occupies a specific tropic level or position in food chain or web.

5. **Forest Conservation :** Forests need to be protect from indiscriminant felling of trees. Some ways to prevent deforestation are :

   (i) **Planned Harvesting** : An efficient way to get wood from forests for our requirement is to cut only some of the trees in an area. The uncut trees prevent erosion. Fruits of these trees produce seeds so that new trees can grow. This way the forest cover is maintained.

   (ii) **Afforestation :** This is the practice of renewing a forest by planting seedlings or small trees. These days in our country, planned afforestation is being done not only by the government but also by private organization for commercial purposes. Selective cutting of trees in these plantations provides wood for construction and also keeps the forest cover intact.

   (iii) **Protection From Fire :** Huge forest areas are destroyed by fire every year. Fire may occur due to the carelessness of people, or due to the lighting during a storm on by friction between dry stems and dry branches of trees.

   Forest fires are controlled by spraying fire extinguishing solutions from aircrafts or by changing the direction of wind using strong blowers.

   (iv) **Protection from Insects and Pests :** Other important causes of forest destruction are insects and pests. Methods of controlling diseases in forest include removing infected trees and using insecticides and fungicides. Insects and pests can be efficiently controlled by natural insect predators. They kill insects in large numbers.

5. Protection from Overgrazing : Overgrazing by cattle, sheep, horses, etc., not only destroys grasslands but also trees in forests. They young trees are either eaten up or trampled. The lower leaves are eaten up and roots and trunks are injured. Overgrazing must therefore be prevented to save forests.

Learn by Doing

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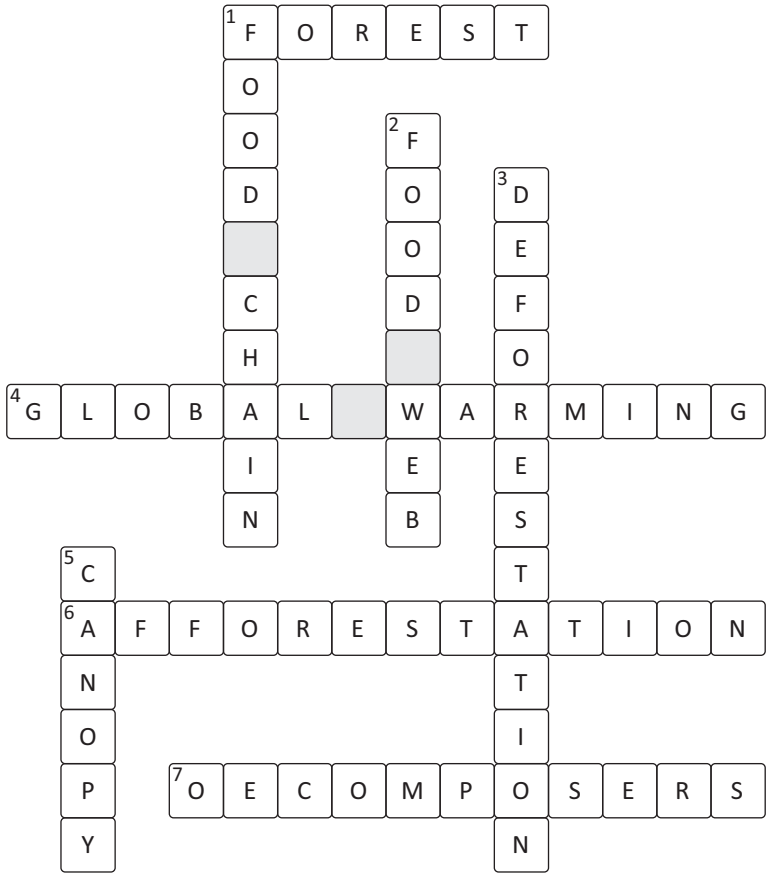


Waste Water Management

A. Tick (3) the correct option.

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

B. Fill in the blanks with correct words.

1. chlorine 2. manure 3. sewage
4. purification 5. oils, grease 6. sludge

C. Match the following.

1. c 2. e 3. b 4. a 5. d

D. Short Answer Type Questions.

1. Network of sewers used to carry sewage.
2. Proper disposal of human waster and the protection of water sources.
3. Yes.
4. Sewer
5. The contaminated water carrying human faeces, urine and other substances is called sewage.
6. The sludge is used to obtain methane, carbon dioxide and humus like material. Dried studge can be used as a fertilize.
7. Sewage treatment consists of removing the solid material from the sewage and also to make the liquid part of the sewage less harmful to humans and fish when it is allowed to flow into water bodies. It involves physical, chemical and biological processes that remove the physical, chemical and biological contaminants present in waste water.
8. The sewer system is a channel of pipelines which carries out sewage from our houses.
9. Railways have big army of sanitation workers which cleans platforms, railway lines and train compartments. Now many private operators have been given contracts to do the cleaning job at major railway stations.

E. Long Answer Type Questions.

1. Primary Treatment :

Step-1 : The wastewater is first passed through screens of vertical bars, which remove large solid materials such as plastic bags, cans and sticks.

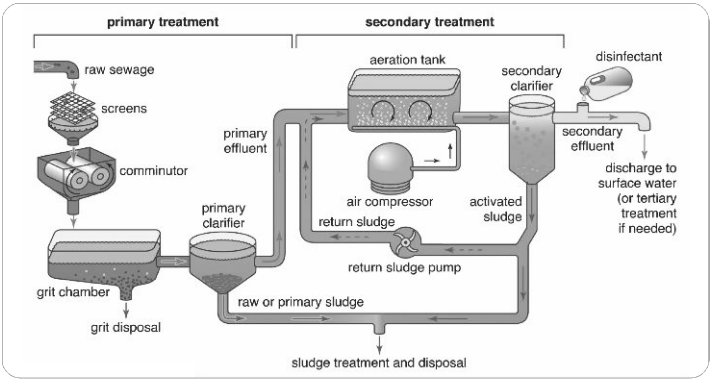
Step-2 : The water is then passed through settling tanks known as grit

chambers. Its speed is reduced so that solids such as sand, slit and gravel settle down and are removed.

Step-3 : After this, the waste water passes into a sedimentation tank called a clarifier, in which organic materials settle down and are removed with a scraper. This is called sludge. Floating materials like oil and grease are removed with the help of skimmer. The water that emerges from the settling tank is called clarified water.

Secondary Treatment

Step-4 : This sludge is then used to obtain methane, carbon dioxide and humus like material by a process called digestion. It consists of decomposing the sludge with the help of anaerobic bacteria. Dried sludge can be used as a fertilizer. The methane formed can be used as a fuel.



Sewage treatment plant

Step-5 : Next air is pumped through the clarified water is an aeration tank. This allows aerobic bacteria to grow and consume organic contaminants. Such as faeces, food waste and soap still left in the water. The bacteria ultimately settle down at the bottom as activated sludge, and the water is removed from the top. The dried sludge is used as manure.

Step-6 : The treated water now contains low enough levels of organic matter and suspended impurities to be discharged into a water body.

2. This sludge is then used to obtain methane, carbon dioxide and humus like material by a process called digestion. It consists of decomposing the sludge with the help of anaerobic bacteria. Dried sludge can be used as a fertilizer. The methane formed can be used as a fuel.
3. At places where there is no sewage system, low cost on-site sewage

disposal systems such as septic tanks, chemical toilets and composting pits should be encouraged.

Septic Tanks : Septic tanks are suitable for hospitals, for groups of 4-5 houses and other isolated buildings. The household waste flows into the underground septic tank which acts as a sedimentation-cum-digestion tank. The sludge settles down and the lighter waste flows on top. Anaerobic bacteria present in the sludge help in decomposing the waste. The septic tank needs to be cleaned every 4-5 months.

Chemical Toilets : Chemical toilets are built in some organisations. The excreta from the toilet seats flows directly into a biogas plant through covered drains. The biogas produced can be used as a source of energy (fuel).

Vermicomposting Toilets : Vermicomposting toilets are a new technique being used nowadays. In these toilets, human excreta is converted into vermicakes by the action of redworms. Vermicakes or vermicompost can be used as manure in fields. The amount of water required for processing is little. The operation is simple, safe and hygienic.

Sanitation of Public Places : In India, public places are always overcrowded. Special attention on towards sanitation must be given as public places like bus stand, a railway station, airports, hospitals and markets as large amount of waste is generated daily in these places. These places are always teeming with people. Maintaining hygiene at such places is really a complex task. We should avoid littering at puplic places.

4. Sanitation is the hygienic means of promoting health through prevention of human control with the hazards of wastes. In other words, maintaining cleanliness all around us can be termed as sanitation. Our homes should be clean and should be free from germs. For maintaining sanitation in and around our homes we should follow certain basic principles.
   - Don't allow water to accumulate in kitchen or bathroom.
   - Wash your hands before energy meal. This would remove any germs which may be present on hands.
   - Wash your hands after coming from the toilet. Human waste contains lot of dangerous microorganisms.
   - While throwing waste water in kitchen drains, solid waste should be segregated and should be thrown in garbage bins.
   - Germicides should be used with water for mopping. Some people keep their homes clean but throw everything on the road. This makes your neighbourhood dirty which can be annoying and unhygienic for everyone.
   - Whenever you are eating or drinking something outside your home,

always throw used containers or fruit peels in garbage bins. You may have seen some people littering almost everywhere.

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