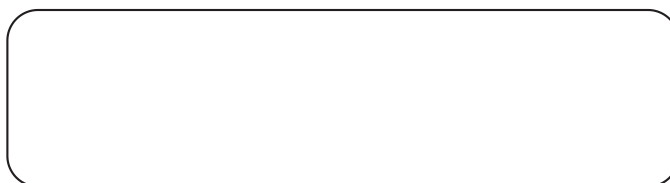
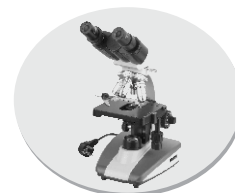


Fundamentals of Science



Help-Kit





A. Answer the following questions in not more than 30 words :

- Ans.**
1. We need oxygen for respiration which we get from wind.
 2. A very strong wind is called storm. It is sometimes very dangerous.
 3. Wind is a flow of air. Generally it is the flow of certain gases mixed in the wind that compose an atmosphere. Wind is caused by air flow from high pressure to low pressure.
 4. Wind are commonly classified by their spatial scale, their speed the types of forces that cause them. There are upper level winds called jet stream. Meso scale winds are those which act on a local scale such as gust front. At the smallest scale are the micro scale winds.
 5. Wind is caused by air flowing from high pressure to low pressure.

B. Answer the following questions in not more than 60 words :

- Ans.**
1. The closer the high and the low pressure areas together, the stronger the 'pressure gradient' and the stronger are the winds. On weather maps, lines of constant pressure are drawn which are called isobars.

2. Wind is caused by air flowing from high pressure to low pressure. Since the Earth is rotating, however, the air does not flow directly from high to low pressure, but it is deflected to the right (in the Northern Hemisphere; to the left in the Southern Hemisphere), so that the wind flows around the high and low areas.

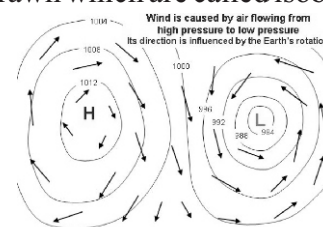


Fig. 1.2 : Air pressure

3. There are global winds, such as the wind belts which exist between the atmospheric circulation cells. There are upper level winds which typically include narrow belts of concentrated flow called jet streams.
4. (a) Geostrophic wind : Wind that is a result of the balance between Coriolis force and pressure gradient force; flows parallel to isobars and approximates the flow above the atmospheric boundary layer in the mid latitudes if frictional effects are low.
(b) Thermal wind : Not actually a wind but a wind difference between two levels, only exists in an atmosphere with horizontal temperature gradients.
(c) Ageostrophic wind : Difference between actual and geostrophic wind, the wind component which is responsible for "filling up" cyclones over time.
5. Names for specific winds in certain regions : In ancient Greek mythology, the four winds were personified as gods, called Anemoi. These included Boreas, Notos, Euros and Zephyros. The ancient Greeks also observed the seasonal change of winds, as evidenced by the Tower of Winds in Athens. In modern usage, many local wind systems have their own names.
6. Safety measures during a storm : Following measures should be taken to make yourself and your family safe from the effects of storm.
 - (1) Fuel and service family vehicles.
 - (2) Prepare to cover all windows and door openings with boards, shelters or other shielding materials.
 - (3) Check food and water supply. Have clean, air tight containers on hand to store at least two weeks of drinking water. Keep a small cooler with frozen gel packs handy for packing refrigerated items.
 - (4) Check prescription medicines obtain at least 10 days to 2 weeks supply.
 - (5) Stock up extra batteries for radios, flashlights, and lanterns.
 - (6) Check the replenish first aid supplies.
7. Rain is a type of precipitation, a product of the condensation of atmospheric water vapour that is deposited on the Earth's surface. It forms when separate drops of water fall to the Earth from cloud. Not all rain reaches the surface, some evaporates while falling through dry air.

C. Answer the following questions in not more than 120 words :

- Ans.**
1. Winds are classified as under :
 - (a) Geostrophic wind : Wind that is a result of the balance between Coriolis force and pressure gradient force; flows parallel to isobars and approximates the flow above the atmospheric boundary layer in the mid latitudes if frictional effects are low.
 - (b) Thermal wind : Not actually a wind but a wind difference between two levels, only exists in an atmosphere with horizontal temperature gradients.
 - (c) Ageostrophic wind : Difference between actual and geostrophic wind, the wind component which is responsible for “filling up” cyclones over time.
 - (d) Gradient wind : Like geostrophic wind but also includes centrifugal force.
 2. Wind direction is reported by the direction from which it originates.
Local Sensing Techniques :
 - (i) Anemometer : measures wind speed directly either, e.g., with rotating cups, or indirectly, e.g. via pressure differences or the propagation speed of ultrasound signals.
 - (ii) Rawinsonde : GPS based wind measurement is performed by the probe.
 - (iii) Weather balloon : Passive measurement, balloon position is tracked from the ground visually or via radar, wind profile is computed from drift rate and the theoretical speed of ascent.
 - (iv) Windsock : Primarily used to indicate wind direction, may also be used to estimate wind speed by its angle.
 - (v) Pitot tubes : Generally speed of wind is measured with the anemometer. There are two types of anemometers commonly used :
 - (vi) Cup anemometer : It consists of three or four cups mounted symmetrically at right angles to a vertical axis.
 3. Storms and Its Formation
A storm is any disturbed state of astronomical body's atmosphere, especially affecting its surface, and strongly implying severe weather. It may be marked by strong wind, thunder and lightning (a thunder storm), heavy precipitation, such as ice (ice storm), or wind transporting some substance through the atmosphere (as in a dust storm, snow storm, hailstorm, etc.)
Storms are created when a centre of low pressure develops, with a system of high pressure surrounding it. This combination of opposing forces can create winds and result in the formation of storm clouds, such as the cumulonimbus. Small, localized area of low pressure can form from hot air rising off hot ground, resulting in smaller disturbances such as dust devils and whirwinds.
 4. Formation of Cyclone
Cold-core cyclones form due to the nearby presence of an upper level through, which increases divergence over an area that induces upwards motion and surface low pressure. Warm-core cyclones can have their initial start due to a nearby upper through but after formation of the initial disturbance, depend upon a storm relative upper level high to maintain or increase their strength.
 5.
 - (i) A tornado is a violently rotating column of air which is in contact with both a cumulonimbus cloud or, in rare cases, a cumulus cloud base and the surface of the earth.
 - (ii) As the mesocyclone approaches the ground, a visible condensation funnel appears to descend from the base of the storm, often from a rotating wall cloud. As the funnel descends, the RFD also reaches the ground, creating a gust front that can cause damage a good distance from the tornado. Usually the funnel cloud becomes a tornado within minutes of the RFD reaching the ground.
 - (iii) Damages caused by tornado : Tornado also causes the same damages as by the cyclones. Strong funnel shaped wind can make a damage to vegetation, building and even can cause death.

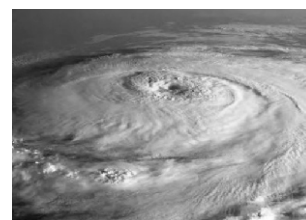


Fig. 1.5 : A cyclone

D. Fill in the blanks :

- Ans.**
1. A very strong wind is called **storm**.
 2. Wind is the flow of **air** which compose in **atmosphere**.
 3. Wind is caused by air flowing from **high pressure** to **low pressure**.
 4. Narrow belts of concentrated flow are called **jet stream**.

5. **Gradient wind** is like geostrophic wind but also includes centrifugal force.
6. **Anemometer** is a local sensing technique to measure a storm.
7. **Sodar** is a remote sensing technique to measure a storm.
8. Storms are created when a centre of **low pressure** is developed.
9. **Ice storm** occurs when surface temperature is below freezing.
10. **Thunder storm** is a type of storm that generates lightning and the attendant thunder.

E. Write 'T' for True and 'F' for False for the following statements :

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

F. Tick the appropriate option in the following :

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

2

Water



A. Answer the following questions in one word only :

Ans. 1. Solid, liquid, gas 2. Renewable 3. Groundwater 4. Water
5. 90% 6. Rainwater 7. aquifer 8. $H_2 + O = H_2O$

B. Answer the following questions in not more than 30 words :

Ans. 1. Water is a renewable natural resource which is unexhaustible. However our earth is abundant in water but still there is shortage of water in our land.
2. Take about 500 g of potatoes and weigh them in the kitchen scale. Cut them into small pieces and leave them to dry in sun light. The evaporation will take place and the water present in potatoes will evaporates slowly. After a few days when the potatoes will completely dry, weigh them again. Now do you find out any change in the weight of the potatoes ? Why ? Find the percentage of water in potatoes by using the following formula

$$P = \frac{xy}{x} 100$$

where, x = original weight of potatoes

y = weight of dried potatoes

P = percentage of water in potatoes

In the same way you can also find out the percentage of water in other food items.

3. Water is very important for the sustenance of life. A human being can live without food for several weeks but without water he can't survive more than few days.
4. Temperature of our body is also maintained by water. As we all know that in the summers, when the days are very hot we drink a lot of water. This water is used to control the body temperatures in the form of sweats.
5. Pattern of rainfall : Though in India we get a lot of rainfall but it is mostly based on the concentration of the rainy season. This major reason leads to a water shortage after the monsoon.
6. Rainwater harvesting system : Instead of letting the rainwater run off, we can do the measures to save and collect this rainwater by the rainwater harvesting system.

C. Answer the following questions in not more than 60 words :

Ans. 1. Water is found in the oceans, seas, lakes, ponds, rivers and puddles. Water exists in three forms : solid, liquid and gas. All these three forms exist in the nature as vapour in the air, as water in the lakes, rivers, pond, oceans and sea and under the ground too, as solid in the polar regions as glaciers, etc. Water is a renewable natural resource which is unexhaustible. However our earth is abundant in water but still there is shortage of water in our land.
2. A human being can live without food for several weeks but without water he can't survive more than few days. This happens same with the plants. The animals, plants and human beings have a large amount of

water in their bodies. Most of the activities of human beings like digestion, absorption of the nutrients, distribution of nutrients in the different parts of the body, excretion (eliminating out the waste products) need water for their completion.

3. There are three states of matter and only water is a single substance which exists in all the three states, i.e., solid, liquid and gas and interestingly these all three states are interchangeable or reversible.

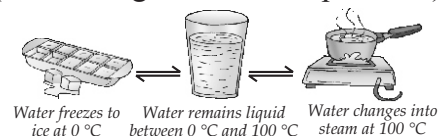


Fig. 2.4 : The three states of water

4. Rain Water : As we all know that the purest form of water is rain water. It is because when the rain occurs, the water vapour in the air condenses, also as the water gets evaporated from the sea due to the heat of sun. It leaves behind all the impurities.
5. (i) We know that water is one volume of oxygen and two volumes of Hydrogen. Water is said to be a complex compound. Whether it is made up of two types of atoms still it is very difficult to break down the molecules of water into oxygen and hydrogen. If we want to break it then we have to heat it up to 500°C. However, there is an other easier way to break up, i.e., by passing an
 - (ii) electrical current through water. The process is called electrolysis.
6. (i) The continuous circulation of water in the nature is termed as water cycle and is also known as the hydrological cycle.
 - (ii) The water present in sea, oceans, rivers and lakes gets evaporated by the heat of sun. In the higher region of the atmosphere it is cold so when the vapour rises up it is cooled and condense in the form of tiny droplets on small dust particles. These drops of water together form clouds. When these clouds are further cooled, these droplets become bigger. And when they become very much heavy they fall down on the earth as rain.

D. Answer the following questions in not more than 120 words :

- Ans.**
1. (i) We all know very well that we need water for our survival but besides this, we need water for so many other uses such as irrigation, industries, washing, cooking, cleaning, bathing and so on. Just think that from where we get this water. That means what are the sources of water on the earth?
 - (ii) Fresh water is provided to our earth by means of precipitation in the form of rain or snow. This rain water goes into the river and then it returns to the oceans through these rivers flowing across the globe.
 2. Thus there are various sources of water which can be divided into surface water and underground water:
 - (i) Surface Water : The water that is present in the surface of water is called the surface water. This surface water can be sub-divided (on the basis of the purity) into three types :
 - (a) Rain Water : As we all know that the purest form of water is rain water. It is because when the rain occurs, the water vapour in the air condenses, also as the water gets evaporated from the sea due to the heat of sun. It leaves behind all the impurities.
 - (ii) Underground water or Subsoil water : The water that is present under the ground and where the soil is completely filled or saturated with water is known as the underground water.
 3. Scarcity of water is defined as A situation where there is insufficient water to satisfy normal requirement. In our country there is about 18% of land which is drought prone. However, lack of rainfall is not alone responsible for the scarcity of water but there are many more reasons for the scarcity of water.
 4. (i) Conservation of Water
 Conservation is the judicious and wise use of resource.
 Misuse or wastage of this resource should be avoided.
 'Save water' campaigns are needed to make people aware of the danger of water scarcity.
 - (ii) (i) Households can save water by promptly fixing leaks or dripping taps Quite a lot of water has been wasted in the general uses in house although the water goes from leaks may not seem like much. A loss of up to 72 liters of water everyday can be seen by resulting of a dripping tap.
 - (ii) Recycling of water is very important We can start the recycling process at our home only. Like when we wash the utensils, instead of draining out this water we can use this water in plants in the garden by watering them.
 - (iii) By improving the methods of irrigating the fields Farmers use to fill up the entire field with water.

Instead of this they must be taught the techniques like the methods of watering the roots of plants drop by drop

E. Fill in the blanks :

- Ans.**
1. Water is an **renewable, non-exhaustible** natural resources.
 2. **Rainwater** is the purest form of water.
 3. The water present on the surface is called **surface water**.
 4. The water gets evaporated in **sunshine**.
 5. Water is not an element but it is a **compound**.
 6. The molecular formula of water is **H₂O**.
 7. Water is **tasteless**, colourless and **odourless**.
 8. Water is said to be a **neutral** oxide.
 9. Water has maximum density at **4°C**.
 10. Water has the greatest **surface tension** of all common liquids.

F. Write 'T' for True and 'F' for False for the following statements :

- Ans.**
- | | | | | |
|----------|----------|----------|----------|----------|
| 1. False | 2. False | 3. False | 4. False | 5. False |
| 6. True | 7. False | 8. True | 9. False | 10. True |

G. Tick (3) the appropriate option in the following :

- Ans.**
- | | | | | |
|--------|--------|--------|--------|--------|
| 1. (d) | 2. (d) | 3. (d) | 4. (a) | 5. (d) |
|--------|--------|--------|--------|--------|

3 Clothes



A. Answer the following questions in not more than 30 words :

- Ans.**
1. The sheep is the main source of wool. Another animals like goat, rabbit and camel also give the wool.
 2. The finest wool is obtained from Merino sheep which is a breed from Spain. Merino wool is very soft and light.
 3. The local breeds do not produce fine wool. They are used to weave tweeds (rough, thick woollen fabric) and carpets.
 4. The alpaca and llama also belong to the camel family and are found in Peru, Bolivia and Argentina at altitudes of around 4000 m.
 5. Cashmere Goat : It gives us the Cashmere fibre. The goats are found in the high plateaus of Asia and the main producers of Cashmere wool are China, Mongolia and Tibet.
 6. Extracting of wool takes place in the two ways.
(i) Shearing (ii) Picking
(i) Shearing : The process of removal of fur from the body of an animal is called “Shearing”. The clippers are used for the removal of fur from animal's body. The shearer tries, as far as possible to remove the fur in one-piece.
 7. The best wool comes from the International Wool Secretariat (IWS) member countries, i.e., Australia, New Zealand, South Africa and Uruguay.
 8. Silk is an animal fibre produced by the silkworm. It eats only mulberry leaves.
 9. Under natural conditions, the eggs hatch only once a year in spring when the mulberry trees began to leaf.
 10. The female silkworm deposits 300 to 400 eggs at a time and dies immediately after the cocoon that is spun by the silkworm is made up of the single thread ranging between 600 m to 1500 m in length.

B. Answer the following questions in not more than 60 words :

- Ans.**
1. Fabrics cloth refers to a material (that is woven from fibres. Fibres are obtained from the wool, silk which are obtained from animals like camel, goat, rabbit and sheep.

- The best quality wool is obtained from Merino sheep which is a breed from Spain. Merino wool is considered very soft and light.
- The hair of cashmere goats are separated in spring when the goat sheds its winter coat. The fine hair is separated from the coarse by running a comb over the skin. The fibre is luxuriously soft providing great warmth without bulk. Its colour ranges from deep brown to grey to white.
Sheep are usually shaven in the summer. Shearing is done with a manual razor and a blade or by an automatic machine. Shearing does not harm the sheep. In fact it helps them to get rid of the insulating material, which they do not need in summers. Through shearing an adult sheep can give up to 8 kg of wool. Professionally the sheep should be sheared in one piece, without any cuts.
- There are many varieties of sheep and they provide different types of wool differing in their fineness, shine, length and resistance. The finest is obtained from sheep like Merino, cashmere and Angora goat also provide us good quality fibre. The local breeds do not produce fine wool. They are used to weave coats and carpets.
- When the fur is removed from the animal's body, grading process is started. The grading of the wool involves according to its length, colour, texture, and ease of dyeing.
- When the grading process is completed, drying process is started. In this process, the container of wool is put through a roller to exert pressure in washing out by as much water as possible.
- Asia and the middle East to the cold countries of Northern Europe, Russia, Iceland, South America particularly in southern part. Due to modern farming techniques, sheep are even successfully raised indoors.
- Silk is an animal fibre produced by the silkworm. It eats only mulberry leaves. Within three to four weeks it becomes an adult and then begins to seek place to prepare cocoon. Silk production formally called sericulture is a very complex and lengthy process. It needs a lot of skill too. Silk is a delicate fibre and needs careful handling.

C. Answer the following questions in not more than 120 words :

Ans.

- Wool of Cashmere goat
Wool of Angora Goat
 - It is found in the high plateaus of Asia.
 - It is found in the Angora region in Ankara, Turkey.
 - The fibre is luxuriously soft, providing great warmth without bulk. The colour of fine hair may range from deep brown to grey to white.
 - The fibre obtained from Angora goat is called Mohair. It is durable, light and warm and is specially for ladies sweaters and soft coverings for furniture. It has much smoother surface.
- The silkworm secretes a very fine filament from two glands on its head which solidifies upon coming in contact with air. The silkworm deposits filaments in layers forming the cocoon. The silkworm takes three to seven days to prepare the cocoon. It is formed of about 20 to 39 concentric layers made up of a single thread. Inside the cocoon the silkworm transforms itself into a chrysalis called the pupa stage in a moth's life cycle and then into a moth. The moth eventually leaves the cocoon, which can then be unravelled.

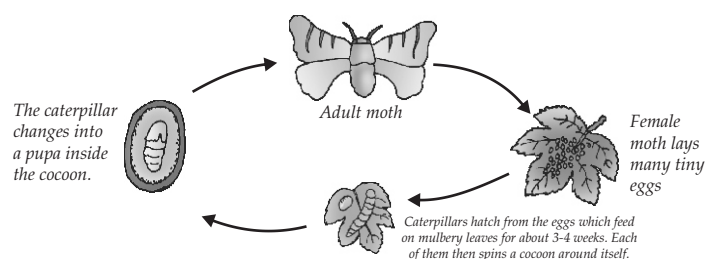


Fig. 3.7 : Life cycle of silk moth

- Silk production, formally called sericulture, is a very complex and lengthy process. It needs a lot of skill too, since it is a delicate fibre and needs careful handling.
The first step involves washing the silkworm eggs that had been stored over the winter. Under natural conditions, the eggs hatch only once a year in spring when the mulberry trees began to leaf. After the eggs hatch, the larvae are spread out on trays to grow. They are fed chopped mulberry leaves for 20-35 days. The worms may need to eat ten times a day, and the trays have to be cleaned regularly.
1. Workers have to handle the dead worms with bare hands, this could lead to infections and illness. The cocoons are first put into the hot water that kills the worms and the silk filament gets loosened. Then they start reeling the thread. The workers have to dip their bare hands into hot water and have to judge

whether the silk thread has been loosened by the worm or not. This causes wounds on their hands, which leads to secondary infection.

- Workers are required to work in unit that are poorly ventilated, dump and dark.
- Workers have to stand continuously for about 12-16 hours a day and focus on the reeling of fine silk threads. This leads to health disorder such as backaches, spinal problems and vision problem.
- The vapours of the boiling cocoons and the diesel fumes make the working conditions for the workers very poor. It causes asthma, and bronchial infection to them.

D. Choose the correct option in the following :

- Ans.** 1. (a) 2. (b) 3. (b) 4. (c) 5. (b) 6. (d)

E. Fill in the blanks :

- Ans.** 1. The best wool comes from the **IWS** member countries.
 2. Cloth is manufactured using **fibres**.
 3. **Sericulture** is the practice of rearing silkworms to produce silk.
 4. **Grading** is sorting of wool according to the quality of the fibre.
 5. Before weaving, the silk threads are **twisted**.
 6. The wool of Arabian camels is used to make **carpets**.
 7. Inside the cocoon, the silkworm changes into a **cacoon**.
 8. The main source of wool is **sheep**.
 9. The Cashmere **goat** is the source of the Cashmere fibre.
 10. The Alpaca and Llama are found in the **Peru, Bolvid and Argentina**.

F. Match the following :

- | I | | II |
|------------------------------|---|---|
| Ans. 1. Cashmere goat | → | (a) usually combined with fine wool |
| 2. Angora goat | → | (b) China |
| 3. Angora rabbit | → | (c) finest wool |
| 4. Merino sheep | → | (d) mohair |
| 5. Camel's hair | → | (e) fur uses to make sweaters, gloves and baby clothes. |

4 Heat



A. Answer the following questions in not more than 30 words :

- Ans.** 1. The melting point of ice is 0° .
 2. When a substance is heated, its molecules begin to move faster. Due to this movement the average distance between the molecules increases and molecules occupy more space. As a result the volume of the substance increases.
 3. As we measure length in metres and kilometres, heat energy is measured in calories or Joules. Joule is the SI unit of heat energy and is denoted by the symbol J.
 4. The boiling point of water is 100°C .
 5. Clinical thermometer.
 6. Mercury is used as a thermometric liquid.
 7. Metals are expended on getting heat.
 8. The three modes of heat transfer are conduction, convection and Radiation.

B. Answer the following questions in not more than 60 words :

- Ans.** 1. One object is hotter than the other one. We can say that the hotter object is at higher temperature and other one's temperature is less. Temperature indicates the degree of 'hotness' or 'coldness' of a body or a place.

- The latent heat of fusion of a substance is the quantity of heat required to convert 1 kg of the substance from solid to liquid state without any change in temperature. It is denoted by letter L . The unit of latent heat is Joule per kilogram (J/kg). The latent heat of ice is = 336000 J/kg.

- Conduction is that process of transfer of heat in which heat travels from one molecule to another, from hot end to cold end. Keeping the original position of molecules same, heat is transferred from one point to another by conduction if the two objects are in contact their temperatures are not the same.

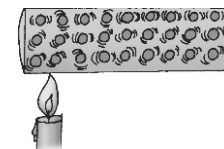


Fig. 4.9 : A metal rod being heated at one end

Conduction stops as soon as the temperature of two objects becomes equal.

- Convection is the process of heat transfer in which the molecules of the medium actually move from a hotter region to a colder region. Heat is being carried by the molecules. Convection is possible in liquids and gases. It is not possible in solids because the molecules are fixed and hence cannot move from one point to another.
- Radiation is a process of transferring of heat in which a material medium is not necessary. Heat is directly transferred from one body to another. The heat is called radiant heat.
- The sun heats up land and water receive the same amount of heat for equal areas. This heating is the greatest at the tropics. The heated earth warms the air coming in contact with it. The hot air expands and becomes less dense than the air from the temperate and polar regions rushes in to take its place. This convection of air is the cause of trade winds.
- Woollen clothes are bad conductors. These clothes are actually not warm but being bad conductor of heat, they do not allow heat to pass out and thus keeps our body warm.
- The temperature can be measured on Celsius or Fahrenheit scale. For scientific work, Kelvin temperature scale is used.
- We can take the example of railway tracks. The railway tracks are not joined tightly to each other, on the other hand there is always some space left between two tracks. The reason behind this is the expansion of metals. In summers the iron metal of the track expands and occupies the space between the tracks.
- The heat capacity of an object is defined as the quantity of heat required to raise the temperature of an object by 1°C .

This can be explained the way that how much heat is required to raise the temperature of an object by 1°C . For example, the heat capacity of two containers of water, one small and one big will be different even if they are made of same substance. The quantity of heat is given by the formula

$$Q = \text{mass} \times \text{specific heat capacity} \times \text{rise in temperature}$$

$$\text{or } Q = m \times s \times t$$

Here, rise in temperature = final temperature - initial temperature.

C. Answer the following questions in not more than 120 words :

- Ans. 1. (i) The most commonly used liquid in a thermometer is Mercury. Mercury is though a metal but its state is liquid. Mercury is used significantly in thermometers due to its certain features as follows :
Mercury does not stick to the walls of the thermometer like other liquids.

Mercury is silver in colour, which is easily visible.

- (ii) Mercury is a good conductor of heat and it expands and contracts uniformly over a wide range of temperature.

Mercury has a freezing point of 39°C , so it cannot be used for measuring below 39°C . Though it can be used in a fairly large range of temperature.

- Take an empty flask with a fitted narrow tube and turn it upside down into a beaker filled with water; so that the glass tube dips into the water. Now fix the apparatus into the stand. Now heat the inverted glass flask. You will see some gas bubbles coming out of the tube. Why does this happen? This is because when you heat the gas flask, the gas (air) in the flask expands and comes out in the form of bubbles. As the flask is cooled, you will see that some of the water rises into the flask through the tube. Reason behind this is that the air inside the flask contracts and water from the beaker rises to fill the empty space in the flask.

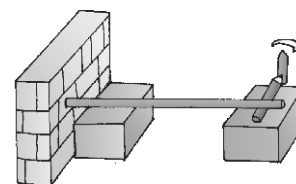
After the flask has cooled to room temperature, hold it firmly with your hands. You will notice that the water level in the tube goes down. This shows that even the heat of your hands is enough to cause a notice

data expansion in a gas.

- Take a metal rod of about 50 cm long. Rest it horizontally on two wooden blocks. Keep one of its ends against a wall. Rest the other end on a round pencil.

Now attach a piece of paper to the pencil. Heat the rod and you will notice the piece of paper starts moving towards right. Why does this happen ?

This happens because when we heat the rod, the iron rod expands. On expanding, it rolls over the pencil and the piece of paper which is attached to the pencil also turns to the right along with the pencil. Thus we can say that when there is a rise in temperature, expansion is caused.

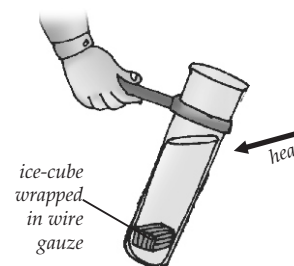


Expansion in an iron rod

- To show that water is a bad conductor of heat.

Material required : Copper wire, ice, wax, a test tube, Bunsen burner.

Method Wrap the copper wire around the piece of ice or wax. Sink it in a test tube containing water. Heat the water in the upper part of the tube with a small flame. The water soon begins to boil without melting the ice or wax. The water and ice (wax) are in contact. But heat from the top does not reach the bottom fast enough as both water and glass are bad conductors of heat.



Water is a poor conductor of heat

- The air we breathe out is warmer and lighter. It moves up and makes its way out of the ventilators. Fresh air comes in through the windows and doors. It is cool air that takes the place of the warm air.

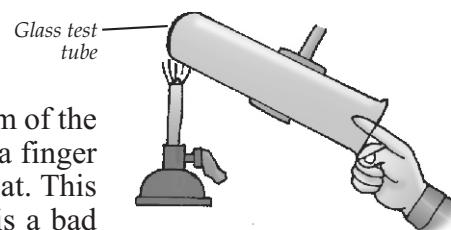
In winter, hotels and other buildings are heated centrally on the principle of convection currents.

Land and sea breezes are convection currents. During the day, the land absorbs the heat of the sun more quickly than the sea. Due to this, the temperature of the land rises more higher than that of the sea. The warm air above the land rises up and the cool air from the sea rushes to take its place. At night the reverse of it happens. [fig. (a) and (b)].

- To show that air is a bad conductor of heat.

Material required : A glass test tube, Bunsen burner

Method Hold the test tube in an inclined position. Heat the bottom of the test tube. The test tube contains only air. After sometime insert a finger into the mouth of the test tube. Your finger does not feel any heat. This shows that air does not get heated up. So we can say that air is a bad conductor of heat.



Air is a bad conductor of heat

- Radiation does not require a medium for transfer For conduction and convection, an intervening medium is necessary because the molecules of the medium play an important role. The heat of the sun reaches the earth even when there is no medium in between. There is vacuum over a large distance. Heat of the sun passes through this vacuum space, enters our atmosphere and we feel it when the rays are stopped by our bodies.

- Good and bad conductors of heat

Materials which allow heat to be conducted through them easily are called good conductors of heat.

Some good conductors of heat are silver and aluminium. Most of the metals are good conductors of heat.

Cooking utensils are made up of good conductors of heat. They get heated up quickly and thus food can be cooked faster in a shorter time. Utensils are generally made up of copper, brass, steel, aluminium etc.

- Preventing loss of heat the thermos flask : A hot object loses heat to the surroundings by conduction, convection and radiation. Similarly, a cold object gains heat from the surroundings by these three methods. So, to keep a hot body hot or a cold body cold, we need to reduce the loss or gain of heat by these three methods.

A thermos flask is a household item that is used to keep things warm or cold for a long time.

- To show that darker bodies absorb heat radiation and also emit heat radiation better than light coloured bodies.



Fig. 4.13 : A thermos flask

Take two identical tin cans, having an equal amount of water. Paint one of them black and the other white. Fit thermometers in both the cans. Place both the cans in the sun. Now note the thermometer readings. Note the temperature of each can after 10 minutes. You will find that temperature of water in the black can is greater.

From this, we conclude that black surface is better absorber of heat radiation than a white surface.

Now if you heat both the cans to the same temperature and keep them in shade, notice which one cools faster. You will find that black coloured can cools down faster. Thus we can conclude that black object radiates and absorbs more heat than white objects.

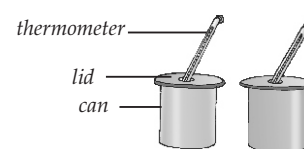


Fig. 4.11 : Absorption of radiant heat

D. Choose the correct option in the following :

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

E. Fill in the blanks :

- Ans. 1. **Temperature** is the measure of the degree of hotness or coldness of a body.
2. **Energy** is defined as the capacity of a body to do work.
3. A solid on heating expands in all **directions**.
4. Convection currents also lead to **oceanic** currents.
5. Black bodies are good **absorber** of heat whereas polished surfaces are good **reflectors** of heat.
6. Most liquids are **bad** conductors of heat.
7. The mode of transfer of heat in which molecules do not travel from the hot end to the cold end is called **conduction**.
8. Radiant heat falling on a body is partly absorbed and partly **reflected**.
9. A bad absorber is a **good** radiator.
10. A thick rod will conduct **less heat** than a thin rod of same material.

F. Match the statements in column A with those in column B :

- Ans. 1. Transmission of heat energy with actual movement of the particles of a medium — (a) Thermometer
2. A device which measures the degree of hotness — (b) Thermos flask
3. An international thermometric scale — (c) Conduction
4. A process of transmission of heat which does not require any medium — (d) Convection
5. A process of transmission of heat in which particles of a medium do not move toward the source of heat — (e) Radiation
6. A device used for keeping hot things hot and cold things cold for a long time — (f) Kelvin

G. Write 'T' for True and 'F' for False for the following statements :

- Ans. 1. True 2. True 3. False 4. True 5. True
6. True 7. True 8. False 9. False 10. False

H. Write short notes on

- Ans. 1. (a) Building materials like brick, asbestos, mud, grass, etc. are bad conductors of heat. They do not allow heat or cold to pass through them and thus keep houses warm in winter and cold in summer. Asbestos sheets are therefore used to make roof due to this reason.
Hair and fur of animals are bad conductors of heat. They protect the animals from cold.
(b) Most liquids are bad conductors of heat. Mercury is an exception which is a good conductor of heat. All the gases are bad conductors of heat. This is because gas molecules are far apart and hence conduction is very limited.
2. Radiation is a process of transferring of heat in which a material medium is not necessary. Heat is directly transferred from one body to another. The heat is called radiant heat.
When we stand before fire, we feel hot. In this case heat comes to our body neither by convection nor by

conduction. It reaches us by radiation.

3. A thermometer which measure our body temperature is called clinical thermometer.
4. The process of turning liquid (water) into vapour is called evaporation.

I. Differentiate between the following :

Ans.

Difference between conduction, convection and radiation

Conduction	Convection	Radiation
Heat is transmitted by molecules of the medium. Material medium is necessary.	Heat is transmitted by molecules of the medium. Material medium is necessary.	Heat can pass through vacuum. Material medium is not necessary.
Heat travels in any path.	Heat travels in any path.	Heat travels in straight line.
Heat passes from one molecule to another without any transfer of molecules.	Molecules carrying heat move from one point to another.	Presence of molecules is not necessary. It takes place even in their absence.
Solids, liquids and gases are heated by conduction.	Liquids and gases are heated by convection.	Medium is not heated up by radiation.

2. (i) It is the quantity of heat required to raise the temperature of 1 kg of a substance through 1°C.
- (ii) When we heat same amount of two different liquids, their temperature goes up by different amounts. This property of substances is called specific heat capacity. For example specific heat capacity of water is 4200 J/kg °C.
3. Heat is a form of energy, it transfers from a hot object to a cold object.
The degree of hotness or coldness of a body is called temperature. Substances expand on heating and contracts on cooling. Solids show least expansion whereas gases expand the most.
4. Condensation is conversion of a vapour or a gas to liquid while evaporation is turning liquid into vapour.

J. Solve the following :

Ans.

1. (a) Ratio of °C to °F is 100 : 150 i.e. 5 : 9 25°C to F2.

$$F = \left(\frac{9}{5} \times C\right) + 32$$

$$F = \left(\frac{9}{5} \times 25\right) + 32$$

$$R = (9 \times 5) + 32$$

$$L = 45 + 32 = 77^\circ\text{F}$$

- (b) 86°F to C2.

To convert

$$C = \left(\frac{5}{9}\right)(F - 32)$$

$$= \left(\frac{5}{9}\right)(86 - 32)$$

$$= \left(\frac{5}{9}\right) 54 = 30^\circ\text{C}$$

2. m = 500 g or 0.5 kg

$$s = 4200 \text{ J/kg } ^\circ\text{C}$$

$$t = (60^\circ\text{C} - 50^\circ\text{C}) = 10^\circ\text{C}$$

$$= 0.5 \times 4200 \times 10$$

$$= 21000 \text{ J}$$

3. s = 420 J/kg °C

$$m = 200 \text{ g or } 0.2 \text{ kg}$$

$$t = 20^\circ\text{C to } 200^\circ\text{C or } 200^\circ\text{C } 20^\circ\text{C} = 180^\circ\text{C}$$

$$\begin{aligned} \text{Now Amount of heat needed } Q &= mst \\ &= 0.2 \times 420 \times 180 \\ &= 84 \times 180 \end{aligned}$$

4. Latent heat of vapourization of water = 226000 J/kg
 Heat is required to convert 1 kg of water to steam of 100°C = 2260000 J
 Heat is required to convert 2 kg of water to steam of 100°C = (2260000 \times 2) J
 = 4520000 J

5 Light



A. Answer the following questions in not more than 30 words :

Ans. 1. The branch of physics which deals with light and vision is called optics.

2. Moon is non-luminous object.

3. The Sun is main the primary source of light.

4. Bulb, gas, lamp, oil lamp, candle are man-made sources of light.

5. Natural source of light.

6. A pin hole camera works on the principle that light travels in a straight line.

To make a pin hole camera, you will need a cardboard box. You can take a shoe box either, a trace paper and a thick paper. Firstly empty the cardboard box and remove a pair of opposite sides. Cover one side with thick paper and the other side with trace paper. The side with trace paper works as the screen. Make a pin hole on the thick paper side. Take a burning candle and put the candle in front of the camera. You will see an inverted image of the candle on the tissue paper. If you take the candle away from the hole you will see that size of the image decreases.

7. Solar eclipse : It is the eclipse of the sun. A solar eclipse can occur only on new moon day. (amavasya). On this day, the moon is not visible on the night side of the earth. When the moon comes between the sun and the earth, it casts a shadow on the earth and some part of it comes in the umbra. People living in umbra part of the earth can see a total solar eclipse. People who live in the penumbral region are not able to see a part of the sun. And so this is called a partial solar eclipse. During a total solar eclipse, the sun appears as a black circular disc. In the picture, position A is the umbral region whereas position B and C are the penumbral region.

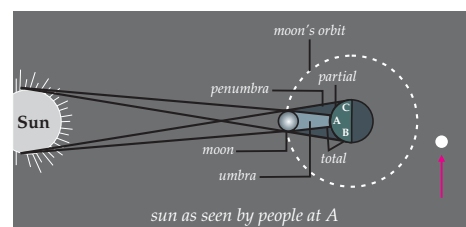


Fig. 5.4 : Solar eclipse

8. (i) A spherical mirror is one whose reflecting surface is part of a hollow sphere of glass.

The spherical mirrors are of two types :

1. Concave mirror

2. Convex mirror

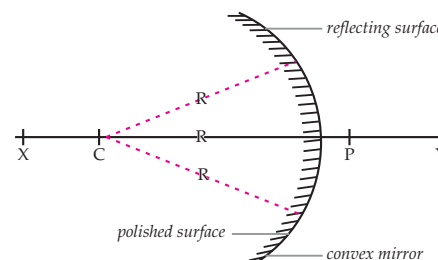
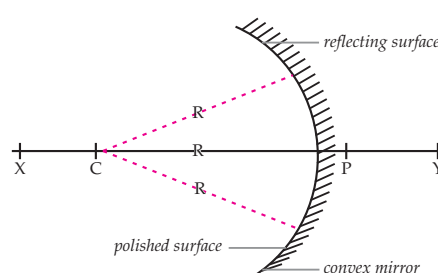
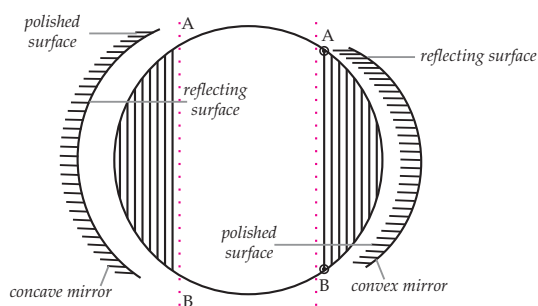


Fig. 5.13 : Types of spherical mirrors

1. Concave mirror : A concave mirror is formed by polishing the bulged part or outer part of the spherical surface.
2. Convex mirror : A convex mirror is formed by polishing the inner part of the spherical surface.
9. Speed of light in vacuum is 3×10^8 m/s. It varies from medium to medium.
10. A plane mirror forms a virtual, erect and upright image and same as the size of an object.
11. Yes
12. (i) This kind of periscope is used to see above the heads of crowds. If the mirror of the periscope gets
(ii) dirty due to dust or moisture, it stops working because reflection of light does not take place.

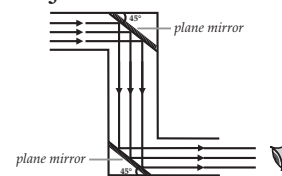


Fig. 5.8 : Reflection periscope

B. Answer the following questions in not more than 60 words :

- Ans.**
1. Non-luminous Objects : The bodies which do not give out light of their own are called non-luminous bodies. These bodies only reflect the light falling on them. Due to reflection, these are visible. For example, moon (it reflects the light of sun), chair, human body, etc. There are so many bodies which do not emit light of their own and are non-luminous bodies. There are some objects which are non-luminous at ordinary or room temperature but if we increase their temperature, they become luminous. For example, if we take an iron rod, it is not luminous at ordinary temperature but if we heat it to about 600°C to 800°C . It begins to glow and emit light. Thus it becomes luminous.

2. Shadows have following two parts :

Umbra : The region of the shadow which is completely dark is called umbra. This is the region where no ray of light enters.

Penumbra : The region of the shadow which is of partial darkness, surrounding the umbra is called the Penumbra. This portion of shadow receives some of the light from the source.

3. The shadow cast by one heavenly body on the other is called an eclipse. Eclipses are the best examples of the shadow formed by the nature. An eclipse also confirms the validity of rectilinear propagation of light.
4. Reflection is the returning or bouncing or wave off a surface which resists that kind of wave. Total internal reflection is a special case of reflection created when a light ray passes from more optically dense medium to a less dense one, at an angle such that there is no reflected ray.

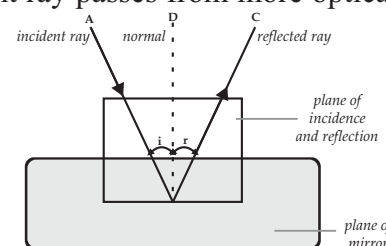


Fig. 5.6 : Reflection from a plane surface

6. Properties of images formed in a plane mirror

The image formed by a plane mirror always appears inside the mirror. If we place a white screen (white chart paper or cloth) in front of the mirror, the image will not appear on it. Such an image which cannot be taken on a screen is called a virtual image. To study the other properties of an image formed in a plane mirror let us do this activity.

7. (i) All rough surfaces like the cardboard, that has an irregular surface cause irregular or diffused reflection.

- (ii) Due to reflection in different directions, we see the object from various directions. If we place our eye anywhere, our eye will receive light reflected from such surfaces. It is good for eyes.

8. Luminous Objects : The bodies which give out light of their own are called luminous bodies. Some luminous bodies are sun, a lighted candle; electric bulb, tube light, etc.

Non-luminous Objects : The bodies which do not give out light of their own are called non-luminous bodies. These bodies only reflect the light falling on them. Due to reflection, these are visible. For example, moon (it reflects the light of sun), chair, human body, etc. There are so many bodies which do not emit light of their own and are non-luminous bodies.

9. 1. Transparent Bodies Substances which allow light to pass through them easily, and the objects through which we can see properly are called transparent objects. For example glass, air, water, etc., are

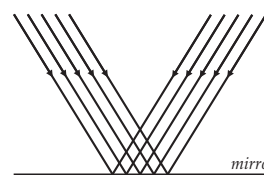


Fig. 5.7 : Regular reflection

transparent objects. Cellophane paper and polythene are also examples of transparent bodies.

2. **Translucent Bodies** Substances which allow light to pass through them only partially and substances through which we cannot see clearly are called translucent bodies. For example, ground glass, wax paper, muddy water, greased paper, butter paper, smoke, dust filled air, fog, etc. are all translucent bodies.

3. **Opaque Bodies** Substances which do not allow light to pass through them at all are called opaque bodies. We cannot see through such bodies. For example; wood, brick, stone, cardboard, thick cloth, metals are all opaque substances.

10. The reason behind is that the sun rays falling on a flying bird form a shadow in sky only, but since the shadow does not reach the earth therefore we cannot see it. Since the formation of shadow depends on the distance of an object from the screen.

11. 1. Plane mirrors are used as looking glasses. We use plain mirrors in bathrooms, dressing tables, barber's shop, tailor's shop, etc.

2. Plane mirrors are also used for displaying jewellery and providing dimensions in showcases.

3. They are also used in solar cookers for reflecting sunlight into the interior of the solar cooker.

4. Plane mirrors also have many scientific uses. In most measuring objects, a plane mirror is placed under the scale and pointer. When the pointer moves, the image in the plane mirror also moves. The eye should be placed such that the pointer and the image coincides. Thus the eye, the pointer and the image in the mirror are all in the same line perpendicular to the scale. By this, we can get the correct reading.

12. We all use plane mirrors to see our own image in it. Stand in front of a plane mirror and look at your image. A plane mirror is a smooth flat glass plate that is polished or coated by a shiny silver material at its back surface. It forms the image of an object kept in front of it by reflecting light coming from the object.

13. (i) When we look into a mirror, we notice that the size of our body formed is same as that of us but the left hand side is seen on the right hand side and (ii) vice-versa. This phenomenon is called lateral Inversion.

For example, if we write letter 'F' on a paper and we see that image of 'F' is like '𐄂' i.e., it becomes laterally inverted.

However, the size of the object is equal to the size of the image. Here lateral means side ways.

14. The angle between the reflected ray and the normal is known as the angle of incidence. The angle between the reflected ray and the normal is known as the angle of reflection. These two angles are labelled with the Greek letter 'theta' accompanied by a subscript 'i' read as 'Q_i' for angle of incidence or simply it can be denoted 'i' and 'Q_r' for angle of reflection or simply by 'r'.

15. 120°

16. It is not necessary for all the mirrors to be flat, some of the mirrors can be curved or spherical. The most common curved mirrors are spherical mirrors. A spherical mirror is a part of a spherical surface of a hollow sphere.

A spherical mirror is one whose reflecting surface is part of a hollow sphere of glass.

17. The image formed by a plane mirror is always virtual. A virtual image is always vertical. It is called virtual because the image cannot be obtained on a screen placed either at I or anywhere behind the mirror. A virtual image cannot be touched. An image that can be obtained on the screen is called a real image. For example, the pictures we see on the screen in a cinema hall are the real images.

18. (i) **Principal axis** : A straight line that passes through the pole and the centre of curvature of a spherical mirror is known as the principal axis or we can say that the line joining the pole and the centre of curvature is principal axis.

Principal Focus : Let us consider a beam of light incident on the mirror parallel to the principal axis. If the mirror is a concave mirror, the rays after reflection converge at a point 'F' on the principal axis.

- (ii) **Focal Length** Focal length of a spherical mirror is the distance between the principal focus and the pole of the mirror. It is denoted by 'f'.

The radius of curvature 'R' of a spherical mirror is twice its focal length.

19. (i) concave mirror (ii) convex mirror



Fig. 5.11 : Lateral Inversion

(iii) concave mirror
(v) concave

(iv) plane mirror
(vi) plane mirror

C. Answer the following questions in not more than 120 words :

Ans. 1. Any ray of light which first passes through or appears to pass through centre of curvature after reflection travels back along its initial path.

Images formed by a Concave Mirror

Different types of images are formed when an object is placed at different positions in front of a concave mirror.

2. Pinhole Camera

It is a very simple device. It can form pictures or images of stationary objects. It is based on the rectilinear propagation of light.

Construction : It consists of a box made of cardboard, wood or metal. In the front face, there is a pinhole O and the back face S is made of green grass. The green grass serves as a screen on which the picture is formed and seen. The box is blackened from inside so as to absorb any light which falls on it.

Working : When a lighted candle is placed in front of the hole, the image or picture of the candle is clearly seen on the screen S. This image is inverted or upside down.

3. **(i) Solar eclipse :** It is the eclipse of the sun. A solar eclipse can occur only on new moon day. (amavasya). On this day, the moon is not visible on the night side of the earth. When the moon comes between the sun and the earth, it casts a shadow on the earth and some part of it comes in the umbra. People living in umbra part of the earth can see a total solar eclipse. People who live in the penumbral region are not able to see a part of the sun. And so this is called a partial solar eclipse. During a total solar eclipse, the sun appears as a black circular disc. In the picture, position A is the umbral region whereas position B and C are the penumbral region.

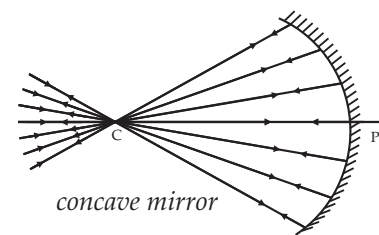


Fig. 5.16 : Reflection of light in spherical mirrors

- (ii) Lunar Eclipse :** This is the eclipse of the moon. When the earth comes between the sun and the moon, the earth casts a shadow on the moon. At this time moon receives no light from the sun. It is in umbral region of the shadow. So when these are on the same straight line, the moon is totally blocked from the view, causing a total lunar eclipse while if they are slightly out of line, only some part of the moon is in the umbral region and thus a partial lunar eclipse will occur.

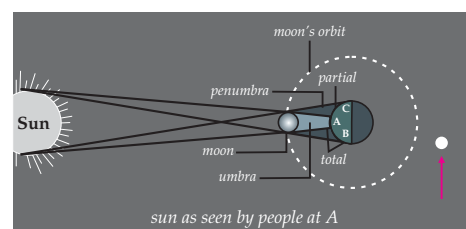


Fig. 5.4 : Solar eclipse

4. The process of photosynthesis occurs in the presence of sunlight. Light also accelerates the growth of plants by affecting the cell division. The complete growth of the plants, i.e., germination, growth of seedling and flowering is accelerated by sunlight. The seeds of many plants germinate either in light or in darkness. Light is very essential for the proper growth of plants. If the plants are grown in darkness, they will become weak and grow small and their leaves will be pale and yellowish. The effect of the duration of light and darkness on flowers is termed as photoperiodism. This process is stimulated by a pigment called phytochrome.
5. To show that light travels in a straight line. Take three cardboards of same size. The cardboards should be identical. Put the cardboards one after the other and make holes through them with the help of a nail. Make sure that holes are in the same straight line. Now arrange these cardboards in a straight line upright on the table. Now light a candle and place its flame in front of the hole. The flame will be visible from the hole in the cardboard from the other side. Now move the middle cardboard a little so that the holes are not in a straight line. The flame will not be seen through the holes at the other end.

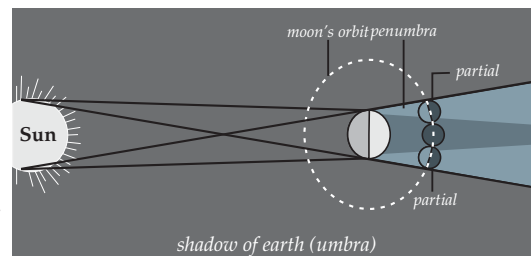
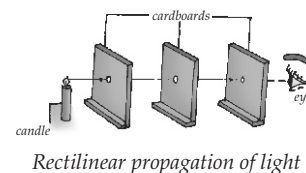


Fig. 5.5 : Lunar eclipse



Rectilinear propagation of light

This proves that light does not travel in a zigzag path rather it travels in a straight line.

We can also perform an experiment to show the rectilinear propagation of light. Take a lighted bulb and take a rubber pipe or hollow tube. Place it in front of the bulb such that the bulb is visible at the other end of the pipe. Now bend the pipe; the bulb cannot be seen now. This shows that light travels in a straight line.

6. (i) We can see objects around us due to reflection of light. Smooth plane surfaces are called regular surfaces. Smooth surfaces provide regular reflection of light. All rough surfaces like the cardboard, that has an irregular surface cause irregular or diffused reflection. Smooth surfaces like mirror has a regular surface reflect the light in the angle equal to the angle of incidence, i.e., if a parallel beam of light falls on a mirror then reflected ray is also a parallel beam of light. This phenomenon is called the regular reflection of light. It is not good for our eyes. Uneven surfaces scatter the light in different directions. An uneven surface does not give a clear image. This is why when a mirror loses its smoothness it does not form a clear image.

- (ii) When we look into a mirror, we notice that the size of our body formed is same as that of us but the left hand side is seen on the right hand side and vice-versa. This phenomenon is called lateral Inversion. For example, if we write letter 'F' on a paper and we see that image of 'F' is like ' ' i.e., it becomes laterally inverted.

However, the size of the object is equal to the size of the image. Here lateral means side ways.

7.

8. (i) 1. The shadow of an object is always formed on the opposite side of the object.
2. As the position of the light source changes, the position of the shadow also changes along with. We can take the example of sun. Sun is a source of light, as the position of sun changes from morning to evening, the direction and length of the shadow also changes along with.
3. The position of the shadow also changes with the movement of the object.

- (ii) Shadows have following two parts :

Umbra : The region of the shadow which is completely dark is called umbra. This is the region where no ray of light enters.

Penumbra : The region of the shadow which is of partial darkness, surrounding the umbra is called the Penumbra. This portion of shadow receives some of the light from the source.

9. (i) **When the object is at centre of curvature :** When the object is placed at the centre of curvature, the image formed by a concave mirror is real, inverted and of the same size and is formed at the centre of curvature in front of the concave mirror.

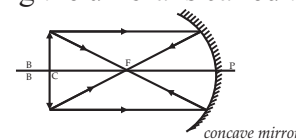
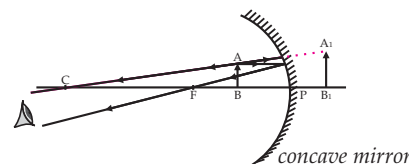


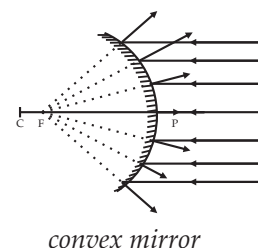
Fig. 5.18 : Object is at centre of curvature

- (ii) **When the object lies between the principal focus and the pole :**

When the object is placed between the pole and the principal focus, the image is formed behind the concave mirror. The image so formed is virtual, erect and enlarged.



(iii) The focus of a convex mirror is not outside the mirror, it is a virtual point. Therefore, the images formed by a convex mirror are always a virtual, erect and smaller in size. Thus we can say that a convex mirror has a wider field of view than a concave or plane mirror. The image formed is similar to that of a concave mirror.



1. When object is at infinity : When object is at infinity, the image formed is virtual, erect, diminished to a point and is formed at the principal focus, behind the convex mirror.
2. When object is between pole and infinity : When object is anywhere between pole and infinity, the image formed is virtual, erect and diminished. Image is formed behind principal focus and pole.

D. Choose the correct option in the following :

Ans. 1. (iii) 2. (iv) 3. (iii) 4. (i) 5. (i) 6. (iii) 7. (ii) 8. (i)

E. Write 'T' for True and 'F' for False for the following statements :

Ans. 1. False 2. True 3. True 4. False 5. True
6. True 7. True 8. False 9. True 10. True
11. True 12. False 13. True 14. True 15. False

E. Fill in the blanks :

- Ans.**
1. Ground glass in a **translucent** body.
 2. A pinhole camera is based on the principle of **rectilinear** propagation of light.
 3. An electric bulb is **man-made** source of light.
 4. A transparent medium is one through which **light** can pass easily.
 5. Bodies which give out light of their own are called **luminous** bodies.
 6. A plane mirror reflects **image** of the light which falls on it.
 7. The angle between incident ray and the normal is called the angle of **incident**.
 8. A lunar eclipse occurs only on **full moon** days.
 9. A solar eclipse occurs only on **new moon** days.?
 10. We are able to see objects due to **sefflection** of light.
 11. **Concave** mirrors are used in reflecting telescopes.
 12. The mid point of a spherical mirror is called **vertex**.
 13. The angle of incidence is always equal to angle of **reflection**.
 14. Doctors use **concave** mirrors for examining internal parts of the ear, throat, nose etc.

G. Match the following :

- Ans.**
- | | | |
|-----------------------|---|--|
| 1. Stone | → | (a) new moon day |
| 2. Umbra | → | (b) Translucent |
| 3. Penumbra | → | (c) Faintly lighted position of shadow |
| 4. Lunar eclipse | → | (d) Opaque |
| 5. Solar eclipse | → | (e) Full moon day |
| 6. Wax paper | → | (f) Dark position of the shadow |
| 7. Concave mirror | → | (g) Convex mirror |
| 8. Convex mirror | → | (h) Best mirrors |
| 9. Metals | → | (i) Focus is a virtual point? |
| 10. Rear view mirrors | → | (j) Converging mirror |

6 Sound



A. Answer the following questions in one word only :

- Ans.**
- | | | | |
|------------------------------------|-----------------|--------------|---------------|
| 1. Vibrations | 2. Amplitude | 3. Frequency | 4. Hertz (Hz) |
| 5. Woman | 6. Water | 7. Noise | |
| 8. Audible sound (20 + 2000 hertz) | 9. Ultra sonics | 10. Sonar | |

B. Answer the following questions in not more than 30 words :

- Ans.**
1. The vibration which travel through the air or another medium and are sensed by the ear is called sound. It is a thing that can be heard.
 2. The vibrations in a sound producing object are so rapid that they cannot be properly observed. We can produce slower in brations called oscillations.
 3. The distance covered by oscillating or vibrating object moves from its central position is called amplitude.
 4. The sound travels through a medium. The medium can be solid, liquid or gas.
 5. Echo is simply the reflection of found by a hill or large building some distance away.

6. There are objects which vibrate and produce a sound of above 2000 hertz, these are also not audible to us. Such type of sound are known as the ultrasonics.

C. Answer the following questions in not more than 60 words :

- Ans.** 1. Vibrations or Oscillations : The vibrations in a sound producing object are so rapid that they cannot be properly observed. You can produce slower vibrations called oscillations; just by hanging a ball from a thread. This arrangement is called pendulum. If you push the ball, it will perform to and fro movements about the central position. These are called oscillations.
2. An air molecule is made to vibrate by a vibrating object. These vibrations when reached to our ear are collected by the pinna and are funnelled into the ear tube. These vibrations when are striken to the eardrum, start vibrating with the same frequency. By this, the delicate bones of the middle ear are caused to be vibrated. There are some tiny hair in the hearing organ which are stimulated by the vibrations and then send a signal to the auditory nerve of the nervous system. The signals are taken to the brain by these auditory nerves by which we are able to hear a sound.
3. Audible and inaudible sounds : Our ears are able to listen to the sound of the frequencies between 20 hertz and 20000 hertz. The sounds of the lower frequencies called the infrasonic cannot be heard by the ears. Actually it is a boon that we cannot listen to the infrasonic but you have many times heard the sound produced by our muscles or our body movements. There are objects which vibrate and produce a sound of above 20000 hertz, these are also not audible to us. Such type of sound are known as the ultrasonics.
4. The echo : It is simply the reflection of sound by a hill or a large building some distance away. You know that the surfaces whether they are far or near reflect sound. Then, we hear an echo only from the surface far away from us. It is so? This is because if the echo reaches your ears very quickly, it is not possible to distinguish it as a separate sound. In fact, only if the second sound is received 1/10th of a second or more after the first sound then only your ears are able to distinguish two separate sounds.

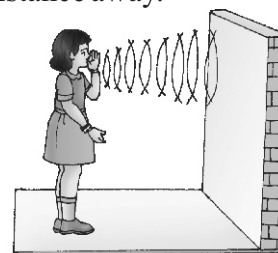


Fig. 6.7 : The echo of sound

The speed of sound in air is about 340 m/s. Therefore, distance travelled by sound in

$$\begin{aligned} 1/10 \text{ seconds} &= \text{speed} \times \text{time} \\ &= 340 \text{ m/s} \times (1/10) \text{ s} = 34 \text{ m} \end{aligned}$$

Then as shown in the figure, the echo can be heard, separately by the girl only if she is at a distance of more than 17 m from the wall.

5. Just like the light, the sound is also reflected. Reflection of the sound also follows the law that the angle of reflection (r) is equal to the angle of incidence (i) as in the case of light. In the above activity when the conditions are satisfied you will hear the loudest reflected sound.
6. The sound also, like heat and light when falls on a surface is partly reflected and partly absorbed. Walls of a room are good reflectors of sound. Wood, carpets, curtains, clothes and even our bodies absorb sound better and reflect less. In fact the hard surfaces are good reflectors of sound while on the other hand, the soft surfaces are better absorbers of sound.

In the auditoriums, sound absorbing materials are used in the walls to stop undue reflections. It is also used to cut down the noise in factories, offices, aeroplanes and hospitals.

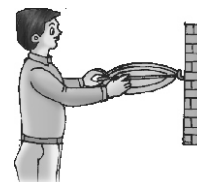
D. Answer the following questions in not more than 120 words :

- Ans.** 1. Sound is produced by the vibrations. To verify this statement let's perform an activity.

Tie one end of a rubber band to a nail in a wall and then pull the other end of the rubber band. Now pluck the rubber band with your fingers. Does it make a sound ?

You will notice that the rubber band would rapidly move to and fro when it is plucked. The sound will also stop if you would stop to and fro movement of the rubber band. These rapid to and fro movements are called vibrations. Now you are able to know that the sound is produced through vibrations.

2. Amplitude of oscillation is the maximum displacement of pendulum on a their side of its mean position. A time taken by the pendulum to complete one oscillation is called the time period. For example, if an oscillating simple pendulum takes 12 seconds to complete 10 oscillations, then the average time for one



The rapid to and fro movement of a rubber band produces sound

complete oscillation is $12/10 = 1.25$. Thus, the time period for simple pendulum is 1.2 seconds. In other words, the simple pendulum takes 1.2 seconds to complete one oscillation.

3. The following are the characteristics of sound :
 - (i) Pitch and loudness : high or low.
 - (ii) Frequency of the sound : time taken or speed of sound
 - (iii) Aro does the sound travel : medium air, water, solid.
4. Put a hand firmly on your throat and sing. Can you feel the vibrations in your throat that produce the sound? Sing it low and high. Can you feel the difference in vibrations? We produce sound in the larynx of our throats. The larynx has two vocal cords, which are folds of tissue with a slit-like opening between them. When we speak, air passes through the opening and the vocal cords vibrate to produce sound.
5. Principle of reflection of sound is also used by the Nature. The nocturnal bats use the echo to feel their way through and also to detect their prey. The ultrasonic pulses called the 'shrikes' are given out by him which get reflected from the insect or from the obstacle in his path. By this, the bat can detect the obstacle and make himself safe from it with the help of echo. And if this echo comes from an insect, then it makes the bat able to know about its prey and it catches the insect. The instrument made by man on this principal is SONAR.
6. (i) Application of echo : An instrument called SONAR is used to find out the depth of the sea at any place. The principle of reflection is used in this instrument.
Ultrasonic pulses are produced by SONAR which are sent down into the sea from the ship. These pulses are when reflected by the bottom of the sea, are received back. The time that is taken by the echo to be received is used to measure the depth of the sea.



Fig. 6.9 : A bat uses the echo to hunt

(iii) **Absorption of Sound** : If you speak to someone in an empty room, i.e., an unfurnished room then what would you observe ? It would be difficult to hear the voice clearly. Why is it so ? This is because in an empty room, the voice will reflect from one wall to another. Thus, any sound takes a lot of time to die out. The sound overlaps when you speak and it is difficult to till them apart. However, if in a room there are curtain and the furniture present, then this problem will not take place there. Why? This is because the furniture and the curtains will absorb the sound produced.

E. Fill in the blanks :

- Ans.
1. Sound is produced due to **vibrations**.
 2. Woman's voice is **higher** than man's voice.
 3. The sound travels through **mediums**.
 4. A soft board will **reflect** most of the sound falling on it.
 5. In our ears, the vibrations in the air are picked up by the **pinna**.
 6. We cannot hear **infrasome** and **ultrasonics** types of sounds.
 7. Frequency is measured in **hertz**.
 8. Tabla is a **percussion** type of instrument.
 9. The sound produced by the irregular vibrations is called **noise**.
 10. Frogs produce sound by their **vocal cord**.
 11. Fishes use the **blowhole** to produce the sound.

F. Write 'T' for True and 'F' for False for the following statements :

- Ans.
- | | | | | |
|----------|----------|---------|----------|----------|
| 1. True | 2. False | 3. True | 4. True | 5. False |
| 6. False | 7. True | 8. True | 9. False | 10. True |

G. Tick (3) the appropriate option in the following :

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

7

Measurement



A. Answer the following questions in not more than 30 words :

- Ans.**
- To measure the diameter of a wire or thickness of a page, a ruler or meter scale is not the right instrument to be used. We cannot use them to measure a small length directly. We use indirect methods to make these measurements.
 - density
 - We define the area of an object as the measurement of the surface of an object. The SI unit of area is m^2 , i.e., the standard unit of area is metre. Smaller areas such as area of a postcard, a piece of paper is measured in centimetre squares (cm^2).
 - (i) The space occupied by an object is called its volume.
(ii) The SI unit of volume is metre cube (m^3) or cubic metre. Volume of a cuboid
 $V = l \times b \times h$
 - SI unit of density is Kilogram per cubic metre (kg/m^3) is also expressed in grams per cubic centimetre (g/cm^3).
 - The overflow can is filled with water until some water flows out of the spout. Now the solid is tied to a string and lowered into the can until it is fully immersed. The water displaced by the solid flows out of the spout. Collect and measure it. The volume of water collected gives the volume of the solid.

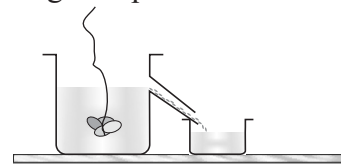


Fig. .7.7 : Using an overflow can to measure the volume of larger solids

B. Answer the following questions in not more than 60 words :

- Ans.**
- To measure the area of a palm by using graph paper
Take a centimetre graph paper and put a palm over it. Trace the outlines of the palm using a sharp pencil. Now remove the palm and count the number of squares that are completely inside the outline of palm and that are half or more than half inside. The total of these two will give the area of the leaf. For example, number of squares completely inside the surface of leaf = 7

Number of squares half or more than half inside the surface = 8

Approximately calculated area

$$= 7 \text{ cm}^2 + 8 \text{ cm}^2 = 15 \text{ cm}^2$$

- (i) Measuring the thickness of a sheet of paper.

With the help of a ruler, measure the thickness of 200 pages. 200 pages means 100 sheets. Now divide this total thickness by 100 (no. of sheets). (1 sheet = 2 pages). You will get the thickness of one sheet of paper.

If total thickness = 1 cm

Then thickness of 1 sheet = $1 \text{ cm} \div 100$

$$= .01 \text{ cm} = 0.1 \text{ mm}$$

- A meter scale has 1 mm as the smallest reading, it means that it cannot be used to measure lengths smaller than 1 mm. This is called the least count of that instrument. In other words, we can say that the minimum measurement that can be measured by a measuring instrument is called least count.
- We cannot measure length in only one standard unit side as metre because very small areas are measured in millimetre square (mm^2). Larger units of area are 'ares', 'hectare' or (kilometre)² (km^2). These units are used to measure area of fields, play grounds. etc. One 'are' is the measurement of area in metric system i.e. equal to 100 m^2 . The area of a rectangle is the product of its length and breadth. Using this formula, we can find the area of a room. Similarly we can find the areas of regular shapes such as rectangle, square, triangle or circle by using different formulae.

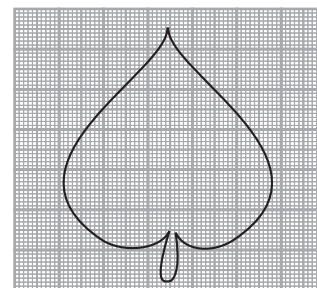
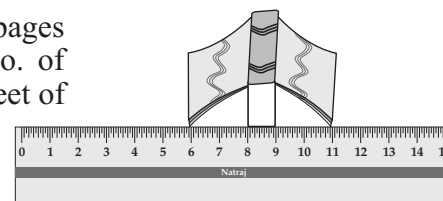


Fig. 4.2 : Finding the area of leaf



Measuring the thickness of a sheet of paper using a ruler

Area of a rectangle = length \times breadth

Area of a square = side \times side

5. Thus density of a substance is defined as its mass per unit volume.

Density of substance can be found by dividing its mass by its volume.

$$\text{Density} = \frac{\text{Mass}}{\text{Volume}}$$

$$\rho = \frac{m}{v}$$

Greek letter 'p' (rho) is used to describe density.

Thus, if mass and volume of a substance are known, then density of a substance can be determined.

6. We have to find the volume of a cuboid swimming pool having length = 25 m, breadth = 10 m, height = 2.5 m.

$$\begin{aligned}\text{Then its volume will be} &= 25 \text{ m} \times 10 \text{ m} \times 2.5 \text{ m} \\ &= 625 \text{ m}^3\end{aligned}$$

7. 6 cm³

8. (i) $\frac{1}{2} \text{ base} \times \text{height}$

$$(ii) \times (\text{radius})^2 = r^2$$

$$(iii) \text{ side} \times \text{side} \times \text{side} = (\text{side})^3 = a^3$$

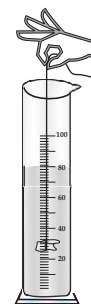
$$(iv) l \times b \times h$$

9. Measuring the volume of piece of wood

Take a piece of wood. Tie a stone to the wood such that both sink together in water. Use the method described in activity 7.5 to find the volume of the stone with the piece of wood and the volume of the stone alone. Subtract initial volume from final volume to get the volume of wood.

10. (i) 9 time

- (ii) 27 times



Measuring the volume of a solid that floats on water

C. Answer the following questions in not more than 120 words :

Ans.

1. (i) The density of substance is defined as its mass per unit of volume.

(ii) Relative density or specific gravity of a substance is used to compare the densities of two substances. Relative density is the ratio of the density of a substance to the density of water. Hence the relative density of a substance, is the ratio of the mass of any volume of the substance to the mass of an equal volume of water.

Since relative density is a ratio, therefore it has no units. If relative density of a substance is less than 1, then it is less dense than water and it will float on water. If the relative density is greater than 1, then it is denser than water and will sink in it.

(iii) Density of liquids : To measure the density of a liquid, we measure the volume of liquid using a measuring cylinder. To find the mass, first weigh an empty beaker and then pour the liquid in the beaker and weigh it again. Now find the difference of the two masses. You will get the mass of the liquid. Then calculate the density using the formula $\rho = m/v$.

2. Density of solids : To measure the density of a solid, we have to find its mass and volume. Mass can be determined by weighing it and volume can be determined by using the respective formulae. For example, if we have a cuboid then $V = l \times b \times h$.

In case of an irregular solid, the volume can be found by earlier discussed methods. Once mass and volume are known density can be determined using formula $\rho = m/v$.

3. To find the diameter of a cylinder indirectly. We will follow the following method. First of all radius (r) will be converted in diameter and then as per formula we will find the diameter as given below :

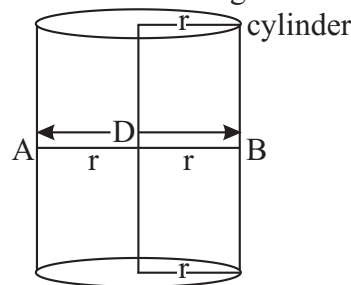
$$\text{vol of cyl} = \pi r^2 h$$

$$\text{Diameter} = 2 \times \text{radius}$$

$$r = \frac{D}{2}$$

$$\therefore \text{vol of cyl} = \pi \left(\frac{D}{2}\right)^2 h$$

$$4 \times \text{vol} = \pi D^2 h$$



$$D^2 = \frac{4 \times \text{Vol}}{\lambda h}$$

$$D = \sqrt{\frac{4 \times \text{Vol}}{\lambda h}}$$

4. Measuring the volume of Irregular Solids

We cannot find the volume of irregular solid such as a stone. We can, however, use a measuring cylinder for measuring its volume. You can see from the figure, that the volume of stone is 76 ml - 60 ml = 16 ml or 16 cm³. This method can also be used to measure the volume of regular solids. However, this method cannot be used for a solid (such as wood) which floats on water.

To find the volume of a solid soluble in water (such as lump of sugar), we can use another liquid (such as oil) in which the solid is not soluble.

D. Choose the correct option in the following :

- Ans. 1. (i) 2. (ii) 3. (i) 4. (iii) 5. (iv) 6. (iii) 7. (i)

E. Fill in the blanks :

- Ans. 1. 1 'ares' is equal to **4840 sq. yards**.
 2. **SI** units are used uniformly all over the world.
 3. The length is measured in cm. The unit of area is **cm²**.
 4. The standard unit of volume is **m³**.
 5. The area of a triangle is equal to **1.2 × base × height**.
 6. The amount of surface an object occupies is called its **Area** and the amount of space it occupies is called **volume**.
 7. If the dimensions of a cube are doubled, its volume increases **8** times.
 8. **Area** is defined as the measure of the surface of an object.
 9. Volume of cuboid = **length × breadth × height**.
 10. SI unit of volume is **m³**. It is equal to **cubic** litres.
 11. 1 cc = **1** ml.
 12. To find the volume of a large stone, we can use an **overflow** can.

F. Write 'T' for True and 'F' for False for the following statements :

- Ans. 1. True 2. True 3. False 4. False 5. True
 6. False 7. True 8. True 9. True 10. True

G. Match the columns :

- Ans. 1. Cube → (a) graph paper
 2. Cuboid → (b) m³
 3. Volume → (c) six faces
 4. 1 m → (d) approximate value
 5. Estimation → (e) lbh
 6. Area of a leaf → (f) (side)³
 7. Density → (g) 1000 mm.
 8. kg/m³ → (h) λr²
 9. m² → (i) SI unit of density
 10. circle → (j) mass per unit volume

8

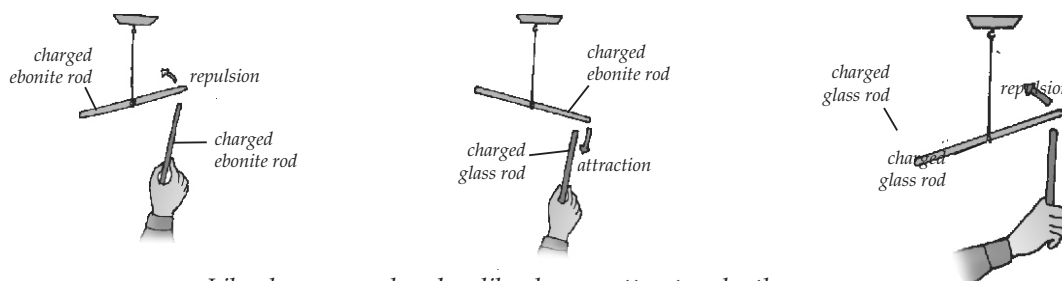
Electric Charges At Rest



A. Answer the following questions in not more than 30 words :

- Ans. 1. There are two kinds of charges one positive and one negative.

- Rub an ebonite rod with wool or flannel and hang it with a thread. Rub another ebonite rod in the same way and bring it near the suspended rod. You will find that the two ebonite rods repel each other. Now rub a glass rod with silk and bring it near the charged ebonite rod. The glass rod will attract the ebonite rod. Repeat the activity by bringing a charged glass rod near another suspended charged glass rod. The two will repel each other. Glass rod with silk is positively charged.



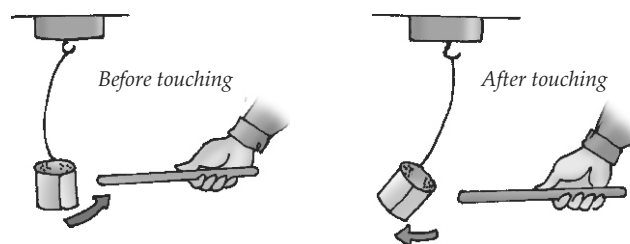
Like charges repel and unlike charges attract each other

- Metals are good conductors of charge.
- Negative
- They will repel each other.
- They acquire opposite charge.
- Positive charge.
- No, it does not flow.
- Electroscope.
- Lightning conductor
- Positive
- Electroscope be initially charged.
- flow of charge is known as electric current.
- Positive charge or Negative charge

B. Answer the following questions in not more than 60 words :

Ans.

- (i) **Charging by Friction :** Take a scale whose one (ii) side is lined with flannel. Take another simple plastic scale and rub it on the side which is lined with flannel. Now take some paper bits and bring the two scales near the paper bits one by one. You will see that each scale attracts paper bits. Now hang one scale from a stand and bring the other scale near it. You will see that they attract towards each other. This shows that they have equal and opposite charges and this is the reason they get attracted.
- Suspend a small paper cylinder by a thread and bring a charged ebonite rod near it. The cylinder is attracted towards the rod. Now touch the cylinder with the ebonite rod. The cylinder is now repelled by the ebonite rod. This repulsion shows the presence of similar charges on the cylinder as well as ebonite rod.
This shows that on touching the rod to the cylinder, the cylinder also acquires negative charge.
- Normally air is bad conductor of electricity. When two clouds having a strong amount of positive and negative charges approach each other, the air becomes a good conductor of electricity. Thus the electrons from the negatively charged cloud push their way through air to reach the positively charged cloud.
- (i) When we rub the glass rod with silk, it acquires positive charge. At the same time, silk acquires equal negative charge.
In the same way, when ebonite is rubbed with wool, ebonite gets negatively charged. Whereas wool acquires equal positive charge.
(ii) We can say that when two bodies are rubbed together, they acquire an equal but opposite charge.



Charging by conduction (touching)

5. To test whether the body has a positive or negative charge it is necessary that the electroscope should be charged with a known charge positive or negative.
Touch the body to be tested to the metal disc of the gold leaf, electroscope. See what happens? If the leaves diverge, the body is charged.
6. Two like charges repel each other.
Two unlike charges (or bodies having dissimilar charges) attract each other.
We conclude that like charges repel and unlike charges attract each other.
7. 1. There are two kinds of charges one positive and one negative.
2. Two like charges repel each other.
3. Two unlike charges (or bodies having dissimilar charges) attract each other.
We conclude that like charges repel and unlike charges attract each other.
8. Take a plastic comb and a few small paper cuttings. Now bring the comb near the paper cuttings, you will observe that the comb does not attract these cuttings. Now rub the comb with silk or hair. Your hair should be dry. Now bring comb again near the paper cuttings. The comb will attract them. The comb is now said to be charged. Many materials like plastic, ebonite, glass get charged by rubbing with a suitable material.



Pieces of paper get attracted to a charged comb

C. Answer the following questions in not more than 120 words :

- Ans.** 1. Electroscope is an instrument used to detect the presence of charge and its nature on a body.

This happens because when we touch the strip with ebonite rod, it gets negatively charged. And the two arms of the strip repel each other. The greater the charge on the ebonite rod; the more charge it will transfer to the strip and the separation between the arms will be greater.

This arrangement can be used to detect if a body is charged or not. The amount of charge can also be measured by the amount of separation between the arms of the strips.

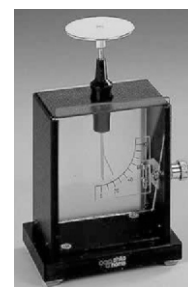
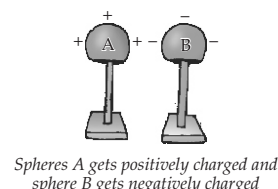
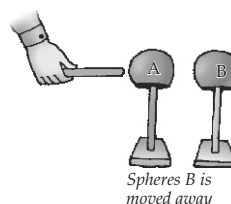
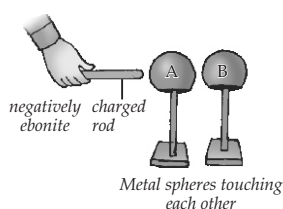


Fig. 8.2 : Electroscope

2. A body can also be charged by touching it to a charged body. In this process, some of the charge from the charged body transfers to the uncharged body. This method of charging a body is called conduction. A body which is charged by conduction acquires similar charge as that of the charged body.
3. Charging by Induction

A body can also be charged by bringing a charged body near it, but without touching it. This is called charging by induction.

Take two metal spheres. Fix these metal spheres on wooden stands. Place them in contact with each other. Now bring a negatively charged ebonite rod near one sphere without touching it. Now separate the two spheres holding the ebonite rod at the same position. Remove the ebonite rod and test the spheres for charge.



4. **(i) The Lightning Conductor :** The lightning conductor or is a simple device to provide protection against damage due to lightning. This device is a long, flat, thick strip of copper with a sharp point or spikes. The (ii) lower end of the lightning conductor is connected to a copper plate buried deep in the earth. This device is fixed on the top of the buildings to protect them from damage by lightning. If lightning does strike the building, it flows to the earth through the metal rod without harming or doing any damage to the building.
5. The electrons from the negatively charged cloud push their way through air to reach the positively charged cloud. During this phenomenon, the air gets white hot and a dazzling bluish white streak of light is formed. This is called lightning.
Intense heat is produced during this phenomenon. Due to intense heat, the air suddenly expands and sends out huge pressure waves. This sudden disturbance produces sound which is heard as thunder.

6. **Gold Leaf Electroscope :** It consists of a glass bell jar fitted on the wooden base. From the mouth of the bell jar a metal rod is attached. The metal rod passes through a tightly fitted rubber stopper called shellac seal. On the upper end of the brass rod, there is a disc shaped brass cap. And at the lower end of the brass rod, two thin gold leaves (thin strips) are suspended. This bell jar rests on a wooden base. Tin foil stripes are fixed on the sides of the bell jar.

The Tin foil helps the charge to stay on the gold leaf for a longer period of time. And the glass jar protects the gold leaves from the damage due to wind, air, etc.

The gold leaf electroscope is so sensitive that it can detect charge on the body which has to be detected by it.

7. **Charging an Electroscope by Induction.**

When we charge an electroscope by conduction, it gives a charge similar to that of the charging body. We can also charge an electroscope by induction. In induction the electroscope acquires the charge opposite to that of the charging body.

Bring a positively charged rod near the disc of an electroscope, without touching it. What do you observe ? The leaves of the electroscope will diverge as they get a positive charge. This is because the positively charged rod attracts negatively charged particles, which collect in the disc and the leaves get positive charge.

8. Doing this activity, you will find that the leaves of the second electroscope also diverge. Also the leaves of the first electroscope come closer. This is because the charge from the first electroscope transfers to the second through the copper wire. Now if we join the discs of two electroscopes by putting a plastic scale over the discs, we see that the leaves of the second electroscope do not diverge. By this experiment, we can conclude that charge flows through copper wire but not through plastic scale. Therefore we can say that copper is conductor of charge. Whereas plastic is a not conductor of charge. It means that plastic is an insulator. Insulator is a material which do not conduct charge.
9. (i) Sometimes when the direction of wind changes, the clouds move and the charge in them travel to the earth. This charge passes through trees, buildings and other structures on the ground. Then it is said that lightning has struck an object. It is dangerous to stand under a tree during thunderstorm, because there is a possibility of lightning hitting it.
- (ii) This device is a long, flat, thick strip of copper with a sharp point or spikes. The lower end of the lightning conductor is connected to a copper plate buried deep in the earth. This device is fixed on the top of the buildings to protect them from damage by lightning. If lightning does strike the building, it flows to the earth through the metal rod without harming or doing any damage to the building.
10. Charges can flow through conductors, but not through non-conductors. Flow of charge in conductor is called an electric current. Examples of conductors are copper, aluminium, iron and wood, plastics and rubber are non conductor.

D. Choose the correct option in the following :

- Ans. 1. (iv) 2. (i) 3. (ii) 4. (ii) 5. (i) 6. (iii)

E. Match the following columns :

- Ans.
- | | |
|---|-------------------------------------|
| 1. Electrons are | →(a) moist air |
| 2. Like charges | →(b) charging by induction |
| 3. Conduction produces | →(c) non conductors of electricity. |
| 4. Electric current is | →(d) dry air |
| 5. Good conductors of electricity | →(e) charging by induction |
| 6. Insulators are | →(f) frictional energy |
| 7. Unlike charges | →(g) charging by conduction |
| 8. Bad conductor of electricity | →(h) always repel each other |
| 9. Charging an uncharged body by placing it near a charged body charged | →(i) negatively |
| 10. Objects rubbed together | →(j) flow of charge |
| 11. Charging an uncharged body by touching it with the charged body | →(k) always attract each other. |

F. Write 'T' for True and 'F' for False for the following statements :

- Ans.** 1. True 2. False 3. True 4. False 5. True
6. True 7. False 8. True 9. True 10. True

G. Fill in the blanks :

- Ans.** 1. A negatively charged object will **attract** a positively charged object.
2. The human body is a **conductor** of electricity.
3. Charging a body by bringing a charged body near it, but not touching it, is called charging by **induction**.
4. When two bodies are rubbed together, both get **opposite** charges.
5. The flow of heavy charge through air, accompanied by heat and light is called **thunder**.
6. Lightning can be discharged into the ground harmlessly through **lightning conductor**.
7. Substances through which electricity can pass are called **conductors**.
8. Electric charge is due to the loss or gain of **electric current**.
9. Mica is used in electric irons because it is a **insulator** of electricity.
10. The charge acquired by an ebonite rod rubbed with a piece of flannel is **negatively charged**.

9

Acids, Bases and Salts



A. Answer the following questions in not more than 30 words :

- Ans.** 1. Tomato juice = oxalic acid Soap solution = sodium hydroxide
Toothpaste = Sodium Hydroxide Lemon juice = Citric acid
Sugar = Hydrochloric acid Vinegar = acetic acid
Common salt = Hydrochloric acid
2. Latin word 'Acidus' means 'sour'. The compounds which have a sour taste are called acids.
3. When metals like sodium (Na), potassium (K) and calcium (Ca) react with water, they liberate hydrogen gas and they also form sodium hydroxide (NaOH), potassium hydroxide (KOH) and Calcium hydroxide $[Ca(OH)_2]$ respectively.
4. Indicators
The substances which change their colour when treated with acids or bases are called indicators. Examples of indicators are litmus solution, methyl orange and phenolphthalein. Their colours with acids and bases are given in this table :

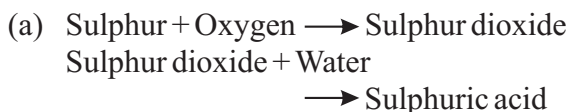
Indicator	Colour with acid	Colour acid bases
Limus	Red	Blue
Methyl orange	Red	Yellow
Phenophythalain	Colourless	Pink

5. The bases, which are soluble in water are called alkalis. Sodium hydroxide (NaOH), potassium hydroxide (KOH) and Calcium hydroxide $[Ca(OH)_2]$ are soluble in water, so they are alkalis.

B. Answer the following questions in not more than 60 words :

- Ans.** 1. **Physical Properties of Acids**
1. All acids have sour taste.
 2. Most of acids are soluble in water.
 3. Acids change the colour of blue litmus solution to red.
 4. Acids change the colour of methyl orange solution to pink.
 5. Acids do not affect phenolphthalein solution.
 6. Strong acids cause painful blisters on our skin, so they are corrosive in action.
2. The acids are prepared by dissolving oxides of non-metals in water. The oxides of non-metals like carbon, sulphur and phosphorus react with water to form acids. Such oxides of non-metals which react

with water to form acids are called acidic oxides.



3. The substances which change their colour when treated with acids or bases are called indicators. Examples of indicators are litmus solution, methyl orange and phenolphthalein.

4. Preparation of Alkalis

When basic oxides of some metals like sodium, potassium, calcium and magnesium are dissolved in water, alkalis are formed.

Soluble basic oxide + Water \longrightarrow Alkali

Examples are :

(a) Sodium oxide + Water

Sodium hydroxide (caustic soda)

5. Acidity of Bases : The number of replaceable hydroxyl (OH) groups in a base is called the acidity of that base. For example, sodium hydroxide (NaOH) and potassium hydroxide (KOH) has one replaceable (OH) group, so their acidity is one and they are called mono-acidic.

C. Answer the following questions in not more than 120 words :

Ans.

1. To show acids reacts with alkalis and a neutralisation reaction takes place.

Take some volume of sodium hydroxide in a beaker. Add red litmus solution to this base. Red litmus turns blue.

Now with the help of a dropper, add vinegar to this base, drop by drop (vinegar contains acid).

You will observe that at some state, by the addition of a drop of vinegar, the sodium changes to red.

At this stage sodium hydroxide (base) is completely reacted with vinegar (acid) to form salt and water. The last drop of vinegar makes the solution acidic, so blue colour of litmus changes to red.

This process of reaction of acid with base to form a salt and water is called neutralization.

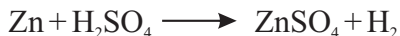
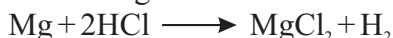
2. Reaction with Metals : Metals displace hydrogen from acids. When an acid reacts with a metal, it forms a salt and hydrogen is released. It can be represented by following equation :

Acid + Metal \longrightarrow Metal salt + Hydrogen gas

Examples of this type of reactions are given below :

(a) Magnesium + Hydrochloric acid

\longrightarrow Magnesium Chloride + Hydrogen gas



3. Uses of some common bases are given below :

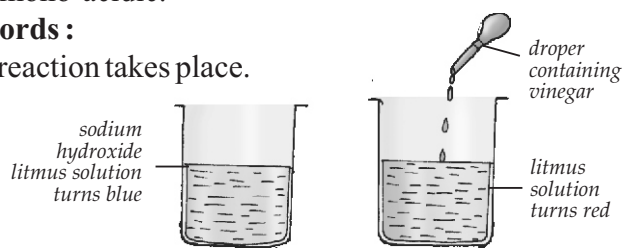
(i) Sodium hydroxide (NaOH)

1. It is used in soap, textile, plastic and paper industries.
2. It is used for making artificial fibres like rayon and nylon.
3. It is used in petroleum refining.
4. It is used in manufacture of medicines.
5. It is also used as a laboratory reagent.

(ii) Calcium hydroxide $[\text{Ca}(\text{OH})_2]$

It is commonly called slaked lime.

1. It is used in the manufacture of bleaching powder.
2. It is used in preparation of mortar, plasters and in white wash.
3. It is used for removing hair from the animal skin in leather industry.
4. It is used as dressing material for acid burn and as an antidote for acid poisoning.
5. It is also used as a water softener and for neutralizing acidity of soil.



(iii) Ammonium hydroxide (NH_4OH)

1. It is used to remove ink spots from clothes.
2. It is used to remove grease from window panes.
3. It is also used as reagent in chemistry laboratories.

4. Uses of Salts

1. Common Salt (NaCl)

1. It is used as an essential constituent of our diet.
2. It is used for food preservation.
3. It is used as freezing mixture with ice.
4. It is used in the manufacture of some chemicals like caustic soda, washing soda and chlorine.

2. Sodium Carbonate (Na_2CO_3)

1. It is used a laundry for washing clothes.
2. It is used in the manufacture of glass, caustic soda and detergents.

3. Sodium Bicarbonate (NaHCO_3)

1. It is used as baking powder in baking industry.
2. It is used as medicine to neutralize acidity in stomach.
3. It is also used in fire extinguishers.

4. Potassium Nitrate (KNO_3)

1. It is used in the manufacture of gun powder and fire works.
2. It is used in refrigeration, in glass industry and as fertilizers.

5. Copper Sulphate (CuSO_4)

1. It is use as fungicide in agriculture.
2. It is used in dyeing and printing industry.
3. It is also used in electroplating copper metal.

6. Potash Alum ($\text{K}_2\text{SO}_4 \cdot \text{Al}_2(\text{SO}_4)_3 \cdot 24\text{H}_2\text{O}$)

1. It is commonly called phitkari.
2. It is used in purification of water and in tanning of leather.
3. It is also used to stop bleeding from minor cut.

D. Tick (3) the correct option in the following :

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

E. Fill in the blanks :

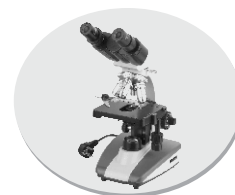
- Ans. 1. The compounds which have a sour taste are called **Acids**.
2. **Hydrochloric acid** is used for making glucose from starch.
3. **Nitric acid** has the capacity to dissolve gold.
4. **Sulphuric acid** is called the king of chemicals.
5. **Sodium Hydroxide** is used in the manufacture of soap.
6. **Potassium Nitrate** is used for making given powder and fire works.

F. Write 'T' for True and 'F' for False for the following statements :

- Ans. 1. True 2. False 3. False
4. False 5. True 6. True

G. Match the name of acid with its source :

Acids	Source
Ans. Tartaric acid	→ Tomatoes
Citric acid	→ Sour milk
Oxalic acid	→ Vinegar
Malic acid	→ Grapes
Lactic acid	→ lemons
Acetic acid	→ Apples



A. Answer the following questions in not more than 30 words :

- Ans.**
- Respiration is a process common to all plants and animals. It is a process whereby living organisms produce energy from the food they eat. This energy is necessary for various life activities. Oxygen is required for this process and carbon dioxide is formed as a waste.
 - Humans need a continuous supply of oxygen for cellular respiration, and they must get rid of excess CO₂, the poisonous waste product of this process. CO₂ supports the cellular respiration by constantly supplying oxygen and removing CO₂. The pathway of human respiratory system is as follows
 - Nostrils
 - Nasopharynx
 - Oral pharynx
 - Epiglottis
 - Trachea
 - Bronchi
 - Bronchioles
 - Alveoli
 - (i) There are different modes of respiration or exchange of gases in different types of animals.
 Unicellular animals : The mode of respiration in unicellular animals like amoeba is mainly diffusion. The simple diffusion takes place by the movement of the gases to the low concentration to the higher concentration. Hydra also breathes through the body surface.
 (ii) In insects : In insects like cockroaches and grasshoppers, the respiration process takes place through spiracles. These show a regular breathing pattern. The breathing is accomplished by a complicated sequence of opening and closing of the spiracle valves of tracheal system and by venting the content of the trachea respiratory tubes through dominal motion.
 - Difference between aerobic and anaerobic respiration

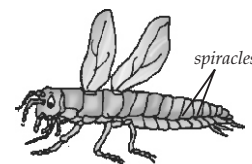


Fig. 10.3 : Spiracles in an insect

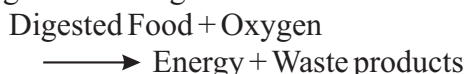
S.No.	Aerobic respiration	Anaerobic respiration
1.	Oxygen is required for aerobic respiration.	Oxygen is not required for the anaerobic respiration .
2.	There is a complete break down of food in aerobic respiration.	Food is partially broken down in anaerobic respiration.
3.	Only water and carbon dioxide are produced in aerobic respiration.	In anaerobic respiration along with carbon dioxide and water, alcohol and acids are formed.
4.	More energy is released.	Less energy is released.

B. Answer the following questions in not more than 60 words :

- Ans.**
- Respiration is a process of inhaling of O₂ to get energy and exhaling of CO₂ (a toxic waste product).
S.No. Respiration
 - Respiration is a slow process.
 - Respiration takes place at the body temperature.
 - Fuel for oxidation reaction is food.
 - The oxidation reaction is always complete and the reaction products are CO₂, water and energy.
 - Respiration takes place inside the biological cell.
 - Respiration takes place at all times when the cell is alive.
 - Respiration is a process opposite to photosynthesis. This can be proved as follows :
 - Respiration is a process in which food is broken down into simpler substances. Photosynthesis is a process during respiration, while energy in the form of sunlight is required during photosynthesis.
 - Energy is produced during respiration, while energy in the form of sunlight is required during photosynthesis.
 - Oxygen is used in respiration. This gas is produced during photosynthesis.
 - When we breathe in, we suck air into parts of our body calls lungs. Lungs are full of tiny tubes of blood. The oxygen in the air goes through the tiny tubes into the blood, and the blood carries it to all the other

parts of the body. There is sugar which is combined with blood and energy is produced.

When the oxygen and sugar (from the food) join to make energy, another gas called carbon dioxide is produced. The body does not need this. It is a waste product and the blood carries it back to the lungs. The lungs get rid of this gas when we breathe out. Respiration can, thus, be represented as follows :



The released energy is stored in source special molecules. Respiration is characterized by following acts :

1. Food is used up.
2. Energy is produced.
3. Exchange of gases occurs. Oxygen is used up and carbon dioxide is given out.
4. Cellular respiration or internal respiration : A chemical process in which food molecules are broken down into simpler molecules within cells and energy is produced. A number of chemical reactions catalyzed by enzymes occur during this process. Cellular respiration takes place in all living organisms, from bacteria to human beings.

C. Answer the following questions in not more than 120 words :

Ans. 1. **Aerobic respiration :** Aerobic respiration is the release of energy from glucose or another organic substance in the presence of oxygen. Strictly speaking, aerobic means the air, but it is oxygen in the air which is necessary for the aerobic respiration.

2. **Anaerobic respiration :** Anaerobic respiration is a biochemical process in living things whereby sugar and similar substances, resulting from the digestion of food, are broken down to release energy in the absence of oxygen. 'Anaerobic' means without oxygen.

Humans need a continuous supply of oxygen for cellular respiration, and they must get rid of excess CO₂, the poisonous waste product of this process. CO₂ supports the cellular respiration by constantly supplying oxygen and removing CO₂.

3. (i) **Breathing or external respiration :** A physical process in which an organism takes in (inhales) oxygen and give out (exhales) carbon dioxide. This process involves exchange of gases only. The exhaled air has more carbon dioxide than the inhaled air.

(ii) There are different modes of respiration or exchange of gases in different types of animals.

Unicellular animals : The mode of respiration in unicellular animals like amoeba is mainly diffusion. The simple diffusion takes place by the movement of the gases to the low concentration to the higher concentration. Hydra also breathes through the body surface.

(iii) **In aquatic animals :** Fish and many other aquatic animals have special structures called gills. Through these gills, dissolved oxygen is used from the water entering these organs.

(iv) Earthworms absorb the atmospheric oxygen through their moist skin.

(v) Frogs, when in water, also breathe through their moist skin. Frogs on land, breathe through their nostrils.

4. To show that carbon dioxide is produced during respiration.

Keep some germinating seeds in a flat-bottom flask and plug it with a rubber cork having two holes. In one hole, introduce a thistle funnel. In the second hole insert the twice bent glass tube. See that the stop cock is closed. Place the free ends of the glass tube inside a glass test tube containing water. Leave the set up for about an hour. Then replace the test tube containing water with another test tube containing limewater. Open the stop cock. Put water from the thistle funnel into the flask, filling it almost completely. (This will force the air present in the flask to enter the test tube containing limewater).

It is observed that limewater turns milky. So, we can say that germinating seeds produce carbon dioxide during respiration.

D. Write 'T' for True and 'F' for False for the following statements :

- Ans.** 1. True 2. False 3. False 4. True 5. True 6. False

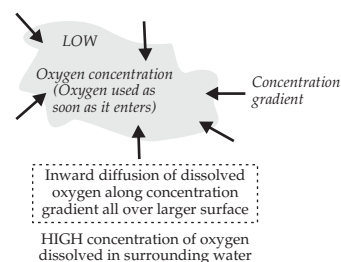


Fig. 10.2 : Diffusion in Amoeba

E. Fill in the blanks :

- Ans.**
1. **Inhale** of oxygen and **exhale** of CO₂ is called respiration.
 2. **Aerobic** respiration requires oxygen.
 3. **Cellular** respiration takes place inside the cells.
 4. **Nasopharynx** are the hollow spaces inside the bone of head.
 5. **Stomata** are used by the plants for respiration.
 6. Fish has **gills** for the process of respiration.

F. Choose the correct option in the following :

- Ans.**
1. (c)
 2. (a)
 3. (a)
 4. (d)

11

Climate and Soil



A. Answer the following questions in not more than 30 words :

- Ans.**
1. The weather of a place on a particular day is the condition of the air around that place on that day. That means how hot or cold, or dry or wet the air is.
 2. The climate of a place is its average weather pattern. Latitude is a major factor that determines climate. Height above sea level and distance from the sea are some other factors that affect climate.
 3. In sandy soils, the particles are large and loose, so they do not hold water. In clayey soils, the particles are very fine. They stick together and hold water, but there is not enough space for air. So the roots of plants cannot breathe in such soils.
 4. Desert or desert regions have sparse vegetation, consisting of cacti and other xerophytes. Xerophytes, you may remember, have special adaptations to cope with intense heat and light and shortage of water. In cacti, the leaves are modified into spines and the spongy stems store water.
 5. This type of soil is formed by the deposition of rock particles, called alluvium, by rivers. As rivers flow down from the mountains to the plains, they slow down and are unable to carry the load of rock particles, which they deposit over the plain. Alluvial soil is found in the plains of Punjab, Haryana, Uttar Pradesh, Bihar, West Bengal, Assam and the coastal plains.
 6. Air helps to form soil in two ways. The oxygen present in it reacts with some minerals in rocks and makes the rocks crumble. This is somewhat the way iron crumbles when it rusts in the presence of moist air. Like rainwater, wind too carries away loose pieces of rock.

B. Answer the following questions in not more than 60 words :

- Ans.**
1. The maximum and minimum temperatures for a city are generally higher than those of the surrounding rural areas. This is because the concrete absorbs more heat than the ground does. It also retains heat for longer. Besides, urban areas lack the shade provided by trees and the cooling effect of transpiration from plants.
 2. Animals too are adapted to cope with the climate they live in. Animals living in very cold climates, for example, yaks, polar bears and minks, have a thick coat of fur. They may also have a thick layer of fat (seals, penguins, whales), which protects them from the cold and acts as a store of food in winter. Some, like brown bears, hedgehogs, bats and squirrels, sleep, or hibernate, through the winter months to cope with the cold and shortage of food.
 3. Camels are among the few animals that can withstand the harsh climate of deserts. They excrete very concentrated urine to reduce the loss of water and can drink large quantities of water at a go. They can also tolerate changes in their body temperature, which helps them cope with the hot days and cold nights of the desert.
 4. Rain is another agent that helps to form soil from rocks. Rainwater loosens pieces of rock and carries them with it. As the pieces tumble and knock against each other, they break into smaller pieces. Rainwater also enters cracks in rocks and freezes in winter. When water freezes, it expands, which

makes the rocks crack further to break.

5. When the winds finally cross to the other side of the mountains they do not have enough moisture to bring rainfall. This is why Mumbai, which is on the windward side of the Western Ghats, gets a lot of rainfall, while Pune, which is on the leeward side, does not get much rain.
6. Air helps to form soil in two ways. The oxygen present in it reacts with some minerals in rocks and makes the rocks crumble. This is somewhat the way iron crumbles when it rusts in the presence of moist air. Like rainwater, wind too carries away loose pieces of rock.

C. Answer the following questions in not more than 120 words :

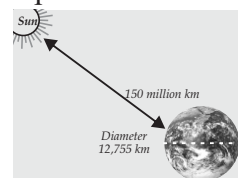


Fig. 11.1 : Atmosphere

- Ans.**
1. (i) Some of the reasons why the earth is an ideal place for living beings are (a) the right range of temperature, (b) the presence of water, and (c) an atmosphere that supports life. And what makes these conditions possible are the mass (or size) of the earth and its distance from the sun.
 - (ii) Had the earth been much smaller (say, like the moon) its force of gravity, too, would have been much less. Then (like the moon) it would not have been able to hold on to the blanket of air around it. On the other hand, if the earth had been much bigger (like Jupiter), its force of gravity would have been stronger. It would have held on to a much heavier blanket of air, which would have been crushing for all life forms.
 2. Relative humidity is the amount of water vapour present in the air expressed as a percentage of the maximum amount of water vapour it can hold at that temperature. When it is close to 100, the air is close to being saturated with water vapour.

The relative humidity of the air does not remain constant over the day. It changes with temperature, for example. That is why newspapers show two figures maximum relative humidity and minimum relative humidity.

D. Fill in the blanks :

- Ans.**
1. The **climate** of a place is its average weather pattern.
 2. Water sweeps **faster** through sandy soil than it does through clayey soil.
 3. Black soil is good for the cultivation of **cotton and sugarcane**.
 4. Lateritic soil is found in the **Western, Eastern and north eastern states of India**.
 5. The colour of red soil is due to the presence of **iron oxide**.
 6. Decaying organic matter present in soil is called **humus**.
 7. The capacity of the air to hold water vapour **humidity** with temperature.

E. Match the columns A and B :

- | Column A | | Column B |
|----------------------|---------|------------------------------|
| (a) Equatorial | → (i) | deciduous trees |
| (b) Tropical | → (ii) | mosses |
| (c) Cool temperature | → (iii) | broad-leaved evergreen trees |
| (d) Polar | → (iv) | cacti |
| (e) Desert | → (v) | conifers |

F. Choose the correct option in the following :

- Ans.** 1. (c) 2. (b) 3. (a) 4. (d)

12

Wind, Storm and Rain



A. Answer the following questions in one word only :

- Ans.**
- | | | |
|--------------------------|-----------------------|---|
| 1. Balanced diet | 2. Diarrhoea, Cholera | 3. Kitchen, bathroom |
| 4. Health | 5. Loss of body mass | 6. Night blindness, Xerophthalmia |
| 7. Proper growth of body | 8. Scurvy | 9. Rickets 10. Haemorrhage |

B. Answer the following questions in not more than 30 words :

- Ans.** 1. "Health is a state of complete physical, mental and social well-being".
An individual is said to be healthy if he has the following characters :
- Body with no disease and sickness.
 - All the body organs (internal or external) are in a proper function.
 - Body must work efficiently.
 - There must be no social or psychological tension.
2. Proper exercise : Proper exercise is also essential for good health. It keeps our body fit and improves the stamina.
3. Clean, hygienic food and pure water : We must eat clean and hygienic food with pure water as you all know very well that the directly food and impure water contain several germs and bacteria which may cause diseases like, diarrhoea and cholera. So the precautions must be taken for the clean food and pure water.
4. Malnutrition is a term when the individual is not getting proper nutrients from the diet he is having. Even if an individual is having a sufficient amount of food but the nutrients are not in proper amount then the individual is said to be malnourished. This situation mainly arises due to the inadequate or imbalanced food.

C. Answer the following questions in not more than 60 words :

- Ans.** 1. (i) Balanced diet : As you all know a proper and balanced diet is very essential for the maintenance of good health. By having balanced diet, we can acquire the whole nutrition with proper nutrients. These nutrients give us energy and help us to fight the different diseases that can be caused due to the deficiency of those nutrients.
- (ii) Personal hygiene : We must take a great care about our personal hygiene. Germs get collected in our body through sweating and dirt.
- (ii) Domestic hygiene : As we should keep our body clean, we must also take care about the cleaning of our house. Especially, kitchen, bathroom and the garbage area are the main places where the germs and insects breed.
2. Deficiency of proteins : Deficiency of proteins is also known of 'Protein energy malnutrition'. Insufficient consumption of protein and carbohydrates causes loss of both body mass and adipose tissues, although one or other loss may predominant in an individual. Protein energy malnutrition occurs in two circumstances in developing nations, it may be present in the endemic form and in famine conditions.
3. World Health Organization (WHO) : World health organization generally known as WHO, is a worldwide health care agency of the United Nations with its headquarters in Geneva. The motto of this agency is to take care and is concerned with the health of the people all over the world.
4. Now a days 58% of population had become addicted to tobacco chewing, smoking, alcohol and drugs. Youngsters had made all these things their status symbol. While they don't know that these things are very harmful for their physical as well as their mental health. Tobacco, cigarette, contains nicotine, tar, carbon monoxide and some other gases. Nicotine is very harmful for brain and heart as it may leads to total damage of heart and brain.

D. Answer the following questions in not more than 120 words :

- Ans.** 1. There are various factors that influence the good health. Mainly there are two factors i.e., personal and environmental. Apart from these two social-cultural factors, hereditary factor also plays a vital role in the maintenance of good health. Balanced diet, clean hygiene food, water domestic, proper exercise come under personal factors community hygiene, hereditary, malnutrition so cultural factors come under ensure factors.
2. (i) Malnutrition is a term when the individual is not getting proper nutrients from the diet he is having. Even if an individual is having a sufficient amount of food but the nutrients are not in proper amount then the individual is said to be malnourished. This situation mainly arises due to the inadequate or imbalanced food.

(ii)	Vitamin	Deficiency disease
	Vitamin A	Night blindness (poor night vision) Xerophthalmia
	Vitamin B1	Beri-Beri (nervousness, loss of appetite, paralysis)
	Vitamin B2	Skin disease.
	Vitamin C	Scurvy (bleeding of gums, swelling of joints)
	Vitamin D	Rickets (weak bones, decaying teeth)
	Vitamin K	Haemorrhage (clotting of blood affected)

3. **Deficiency of Minerals :** The body needs various minerals for good health. Inadequate diet can lead to mineral deficiency or at least to insufficient minerals. Some of the more common deficiencies are iron deficiency and iodine deficiency and calcium deficiency. Iron is needed by blood and iron deficiency leads to anaemia and various other symptoms. Iodine deficiency leads to goitre, but is less common in industrialized nations due to the addition of iodine to table salt. The body needs calcium for bones and other purposes. Calcium deficiency or atleast an inadequate intake of calcium can be implicated in osteoporosis and other disease.

E. Choose the correct option in the following :

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

F. Write 'T' for True and 'F' for False for the following statements :

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

G. Fill in the blanks :

Ans. 1. Good health is the **key** of happy life. 2. **PEM** is caused due to protein energy deficiency.
 3. **Lack of vit. C** is responsible for scurvy. 4. **Lack of vit. D** is responsible for rickets.
 5. Tobacco and cigarette contains **nicotine**. 6. **Alcohol** is a stimulant.
 7. **WHO** is an international health organization.

13 Nutrition



A. Answer the following questions in not more than 30 words :

- Ans.** 1. (i) Green plants are known as autotrophs. The food which is synthesized by the (ii) green leaves is transported to other parts of the plant, by the type of conducting tissues, called phloem.
 2. (i) Some plants that can't prepare their food, depend on green plants or on other living bodies for the food. The nutrition that these heterotroph plants (non-green plants) get from others is called heterotrophic, nutrition.
 (ii) Such kinds of plants are usually whitish with dark coloured flowers. These plants lack green colour. These plants derive their food from dead animals and plants found in soil. Mushrooms, yeast, fungi and many bacteria are saprophytic plants which can be seen during rainy season.
 (iii) Parasitic : Living on another organisms and deraining food from that organism. The organism deceiving food is called a parasite and the other organism from which the food is derived by the parasite, is called the host.
 3. The enzymes break down the food into more and more simpler substances.
 4. Heterotrophs produce readymade food from their surroundings.
 5. Ingestion and Digestion : Food is taken into our body through the mouth. It is then mixed saliva, a liquid secreted in the mouth. Saliva contains the enzyme amylase that breaks down starch into sugar. This is the initiation of digestion. You can actually taste this change as you chew a piece of chapati. It will slowly begin to taste sweet. Saliva also lubricates the food, making it easier to swallow. The tongue helps to roll and push the food into the food pipe or oesophagus.

B. Answer the following questions in not more than 60 words :

- Ans.** 1. (i) Such kinds of plants are usually whitish with dark coloured flowers. These plants lack green colour. These plants derive their food from dead animals and plants found in soil. Mushrooms, yeast, fungi and many bacteria are saprophytic plants which can be seen during rainy season.
- (ii) Saprophytes are capable of using dead plants and animals due to the presence of fungi in these. As fungi is capable to digest dead and decaying material.
- Parasitic : Living on another organisms and deraining food from that organism. The organism deceiving food is called a parasite and the other organism from which the food is derived by the parasite, is called the host.
2. Nutrition in Amoebea :
- Collect water from a pond where water has been standing for sometime. Examine a drop of this water under the microscope. Food of an amoeba consists of bacteria, minute algae and other small organisms. Under the microscope, you will observe that an amoeba comes near its food. The food is taken in any place of its body of means of projecting structures called false feet or pseudophodia (singular pseudopodium). Soon the pseudopodia surround the food. The food particle with a drop of water forms a food vacuole.
3. (i) Ingestion and Digestion : Food is taken into our body through the mouth. It is then mixed saliva, a liquid secreted in the mouth. Saliva contains the enzyme analyse that breaks down starch into sugar. This is the initiation of digestion.
- (ii) You can actually taste this change as you chew a piece of chapati. It will slowly begin to taste sweet. Saliva also lubricates the food, making it easier to swallow. The tongue helps to roll and push the food into the food pipe or oesophagus.
4. The main organs of digestive system are mouth, slivary glands, oesophagus, stomach, liver, large intestine, small intestine, pancreas and gall bladder.

C. Answer the following questions in not more than 120 words :

- Ans.** 1. Four methods of Heterotrophic nutrition are as under :
- (i) Saprophytic (ii) Parasitic (iii) Symbiotic (iv) Insectivores
- (i) Saprophytic : Such kinds of plants are usually whitish with dark coloured flowers. These plants lack green colour. These plants derive their food from dead animals and plants found in soil e.g. mushroom, yeast.
- (ii) Parasitic : Living on another organisms and deraing food from that organisms. The organism receiving food is called a parasite is called the host. Examples are dodder and amarbel.
- (iii) Symbiotic : Feeding on small insects, pitcher plant, venus-fly trap sundew plant are called insectivorous plants. When an insect happens to enter a pitcher, the lid is closed.
- (iv) Insectivores : These different organisms live together and both benefit from each other such as lichen. In a lichen, algea and fungal partnous live together and both are mutually beneficial.
2. To test a leaf for starch
- Pluck a leaf from a plant which has been exposed to sunlight for some time or few hours. Put it in a beaker of water and then boil it for few minutes. Then put it in a tube containing alcohol and then heat the water until the alcohol in the tube also starts to boil. You will see that alcohol will dissolve the chlorophyll and the leaf will start to lose its colour.
- Now take the leaf out and wash it in warm water to remove alcohol from it. Then deep this leaf in a bowl containing dilute iodine solution for five minutes. Again put it out from the solution and wash it with warm water. Hold it up in your hand against light. The leaf will turn blue-black in colour if starch is present.
3. Have you seen a cow or a buffalo chewing the grass or fodder given to them. These animals quickly eat the fodder. Then they relax leisurely and chew what they have. This act of chewing is known as chewing cud. Animals like sheep and deer also chew cud. All the animals who chew cud are called ruminants. How is it possible for a ruminant to bring the food back to the mouth from its stomach?

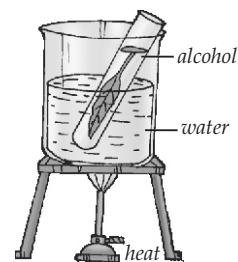
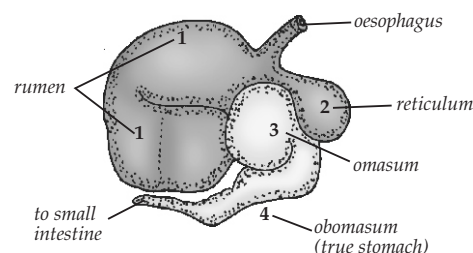


Fig. 13.1 : To test a leaf for starch



Look at the figure. It shows the stomach of a ruminant. What does it show?

It shows four chambers (rumen, reticulum, omasum and abomasum). Such a stomach is called a compound stomach. The food enters the first chamber. This chamber is the largest. From here, the food enters the second chamber. In these two chambers, the food is converted into a soft pulp. When the animal relaxes, the soft pulpy food from the second chamber is brought back to the mouth. It is now chewed thoroughly. This is called the chewing of the cud. At this stage, it mixes with saliva and becomes a semi-liquid paste.

From the mouth, the food is pushed directly into the third chamber. From the third chamber, the food enters the fourth chamber. In the fourth chamber, digestive juices are mixed with semi-liquid food. Digestion of food starts now. From the fourth chamber, the food enters the small intestine.

4. Light is necessary for photosynthesis

Choose a long leaved potted plant like Hibiscus and place it away from sunlight in a room for 1-2 days. You will see that photosynthesis will not occur as the leaf will become starchless or starch free.

Now cover the leaf with two black strips of paper with both sides. Then put the plant in sunlight. The covered portion of the leaf will not receive the sunlight while the uncovered portion of the leaf will receive it.

Pluck the leaf from the plant after a few hours then test the leaf for starch. You will see that covered portion will not turn blue-black as the covered portion did not receive the sunlight.

D. Choose the correct option in the following :

- Ans.** 1. (b) 2. (b) 3. (b) 4. (b) 5. (a) 6. (a)

E. Fill in the blanks :

- Ans.** 1. The process of consuming and utilizing food is called **nutrition**.
2. Lichen is the mutual combination of **algae** and **fungal**.
3. Heterotrophs derive their food from **surroundings**.
4. Nitrogen requirement of insectivorous plants is provided by **insects**.
5. Saprophytic plants lack **green colour**.
6. All green plants are **autotrophic** in nutrition.
7. Animals which feed on both plants and animals are **omnivores**.
8. **Amarbel** is a parasitic plant.
9. The green pigment found in the leaves of plants is **chlorophyll**.

F. Write 'T' for True and 'F' for False for the following statements :

- Ans.** 1. False 2. True 3. True 4. False 5. False

14 Food And Nutrition



A. Answer the following questions in not more than 30 words :

- Ans.** 1. Carbohydrates : Carbohydrates are simple organic compounds that are aldehydes or ketones with many hydroxyl groups added. The basic carbohydrate units are called monosaccharides such as glucose, galactose and fructose.
2. Fats : Fats are also the energy generating nutrients like carbohydrates. One gram of fat gives us energy of 37 kilojoules, i.e., 9.1 kilo calories which is just double of the carbohydrates. Some of the vitamins are essentially absorbed by fats.
3. (i) The transportation of food, chemicals throw away of gases and wastes is carried out by water.
(ii) The breakage of the complex food to the easier one is carried out by the water in the body.
(iii) Transportation of the waste in the form of sweat and urine.
4. Balanced diet : As you all know a proper and balanced diet is very essential for the maintenance of good

health. By having balanced diet, we can acquire the whole nutrition with proper nutrients. These nutrients give us energy and help us to fight the different diseases that can be caused due to the deficiency of those nutrients.

B. Answer the following questions in not more than 60 words :

- Ans.** 1. Nutrition refers to the balance of nutrients taken into the body versus the body's requirement for them. These nutrients break down into various categories and classification. Ways of classifying nutrients are given below.
- | | |
|--------------------------------------|--|
| 1. Solids vs Liquids | 2. Macro nutrients and Micro nutrients |
| 3. Fats vs carbohydrates vs Proteins | 4. Fibre (wet and dry) |
| 5. Calorie content | |
2. Our body uses the protein we eat to make lots of specialized protein molecules that have specific job. For example, our body uses protein to make haemoglobin, the part of red blood cells that carries oxygen to every part of our body.
- Different kinds of proteins : Protein which we get from animals such as meat and milk is called complete, because it contains all of the essential amino acids. Most vegetable proteins are considered incomplete because those lack one or more of the essential amino acids. This can be a concern for someone who doesn't eat meat and milk products. But people who eat a vegetarian diet can still get all the essential amino acids by eating a wide variety of protein rich vegetable food.
3. (i) The food must be used by considering its nutritive value and cost.
 (ii) Washing, pre-soaking and over cooking of pulses and vegetables should be avoided.
 (iii) The vegetables should be washed before cutting them to prevent their nutritive value.
 (iv) The food should be stored properly in a desirable temperature though it can be prevented by fermentation.
4. Minerals are substances that are found in foods we eat. Our body needs them to work properly. Some of the important minerals are as under :
- (i) Calcium : It is found in bread, vegetables, milk etc. Its function is to form teeth, blood clotting etc. Its deficiency causes brittle bones, executive bleeding.
 (ii) Phosphorus : It is found in fish, egg, meat, milk, potatoes, bread etc. It is required for bone and teeth formation. Its deficiency caused body weakness, bad bones & teeth.
 (iii) Potassium : It is found egg, milk, potatoes etc. It causes nerve impulse condition.
 (iv) Sodium : It is found in cheese, salt, bread, butter etc. Its function is osmocontrol. It efficiency causes dehydration, extreme weakness.
 (v) Son : It is found in bread, flour, liver, egg, green vegetables, meat etc. Its function is to create liaemoglobin, enzyme activity. Its deficiency causes anaemia.
 (vi) Iodine : It is found seafish, iodized salt. It helps in thyroid function. Its deficiency causes Goitre, Abnormal metabolism.

C. Answer the following questions in not more than 120 words :

- Ans.** 1. Vitamins and Minerals : Vitamins and minerals are substances that are found in foods we eat. Our body needs them to work properly, so we grow and develop just like we should. Each vitamin has a special role to play.
- Our body is a powerful machine, capable of doing all sorts of things itself. But one thing it can't do is to make vitamins. Our body gets the vitamins it needs from the food we eat because different foods contain different vitamins.
2. Food preservation is the process of treating and handling food in a way that preserves its value as food. Preservation usually involves preventing the growth of bacteria, fungi and other microorganisms, as well as retarding the oxidation of facts which cause rancidity.
- (i) Drying : The oldest method of preservation is drying which reduces water activity sufficiently to delay or prevent bacterial growth.
 (ii) Smoking : The combination of heat to dry the food without cooking it, and the addition of the aromatic hydrocarbons from the smoke preserves the food.
 (iii) Freezing : Freezing is also one of the most common processes to preserve cooked as well as uncooked food materials.

(iv) Vacuum packing : Vacuum packing stores food in a vacuum environment, usually in air-tight jars or bottles.

(v) Salting : Salting or sugar curing draws moisture from the meat and sugar through a process of osmosis.

(vi) Pickling : It is a method of preserving food by placing it or cooking it in a substance that inhibits or kills bacteria and other micro-organisms..

(vii) Lye : Sodium hydroxide (lye) makes food too alkaline for bacterial growth.

3. Every living thing needs food to survive. For human beings, we rely on a wide variety of different foods in order to maintain good health. We need things like milk and cheese which contain calcium to keep strong bones. We need meat with protein and iron for our muscles, and we need fruits and vegetables to keep our internal organs and eyesight in good shape. Everyone should rely on food health as a source of pure nutrition, but sadly many people in the world today do not. Instead more and more of us are eating junk food with little to no nutritional value, and we are losing sight of the wonderful resources that natural food provides.

4. (i)

Vitamin	Sources	Function	Deficiency disease & symptoms
Vitamin A	Milk, butter, cheese, tomatoes, carrot, cod liver oil, yellow fruits	Good eyesight	Night-blindness (poor night-vision)
Vitamin B complex (mixture of several vitamins)	Milk, egg, cheese, meat, liver, husk of cereals and pulses	Digestion, growth	Beri-Beri (nervousness, loss of appetite, paralysis).
Vitamin C (ascorbic acid)	Citrus fruits (orange, lime, lemon) green vegetables, tomatoes	Muscles and teeth	Scurvy (bleeding of gums and swelling of joints)
Vitamin D (produced by sun in skin)	Milk, yellow portion of egg, liver, fish oil.	Strong bones and teeth	Rickets (decaying teeth, weak bones)
Vitamin K (made by bacteria in large intestine)	Leafy green vegetables (Spinach and cabbage)	Blood clotting	Haemorrhage

- (ii)

S.No.	Age	Energy	Required
1.	5 yrs	6000 kj	Per day
2.	11 yrs	9000 kj	Per day
3.	18 yrs	11000 kj	Per day
4.	Adult (normal work)	9600 kj	Per day
5.	Adult (heavy work)	12000 kj	Per day
6.	Adult (very heavy work)	16000 kj	Per day

D. Write 'T' for True and 'F' for False for the following statements :

- Ans. 1. False 2. True 3. False 4. False 5. True

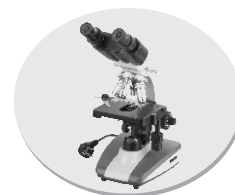
E. Fill in the blanks :

- Ans. 1. Carbohydrate is the component of **food**.
 2. Adults with heavy work requires **12000 kj** energy per day.
 3. Proteins are **body building** food material.
 4. Deficiency of minerals leads to **body weakness, bad bones and teeth**.
 5. Deficiency of phosphorus leads to **body weakness**.

F. Choose the appropriate option in the following :

- Ans. 1. (c) 2. (a) 3. (d) 4. (a)

15 Reproduction



A. Answer the following questions in one word only :

- Ans.** 1. Meioses 2. Ovum 3. Tests 4. Puberty
5. Testes 6. Ovaries 7. Uterus

B. Answer the following questions in not more than 30 words :

- Ans.** 1. Reproduction is the biological process by which new individual organisms are produced. Reproduction is a fundamental feature of all known life, each individual organism exists as the result of reproduction.
2. Budding : Budding is the formation of a new organism by the protrusion of part of another organism. This is very common in plants and fungi, but may be found in animal organism as well, such as Hydra.
3. Fragmentation : Fragmentation is a form of asexual reproduction where an organism is split into fragments. The splitting may or may not be intentional.
4. Spore is formed by the process of sporogenesis. The term is also used to refer to the process of reproduction via spores.
5. Reproduction in human is sexual and involves two sexes male and female. The reproductive system in male and female are different from one another.

C. Answer the following questions in not more than 60 words :

- Ans.** 1. (i) The methods of reproduction are broadly grouped into two main kinds asexual and sexual.
(ii) Sexual reproduction
In sexual reproduction, two individuals produce offspring that have genetic characteristics from both parents. Sexual reproduction introduces new gene combinations in a population.
2. Vegetative reproduction is a type of asexual reproduction found in plants, and is also called negative propagation. It is a process by which new plants individually arise or are obtained without production of seeds or spores. It is both a natural process in many plant species. Vegetative production takes place by the following method :
(a) Vegetative production by leaves. (b) Vegetative production by stems.
(c) Vegetative production by roots.
3. Pollination : When a pollen grain reaches the stigma, it germinates into a pollen tube. The germ cell is divided by mitosis forming two sperm cells. These, along with the tube nucleus, migrate down the pollen tube as it grows through the style, the micropyle, and into the ovule chamber.
4. Age of puberty in male is 11-16 and is marked by some features, such as :
(i) Voice becomes deeper (ii) Development of muscles
(iii) Growth of hair on face and body (iv) Production of sperms by the testes
Age of puberty in the female is 10-15 and is marked by
(i) development of breasts (ii) development of hips
(iii) voice becomes high pitched (iv) menstrual cycle begins
5. (i) Reproduction in human is sexual and involves two sexes male and female. The reproductive system in male and female are different from one another.
(ii) Epididymis : The sperms are stored in the epididymis. These are the coiled structure in which each testis leads.
(iii) Vas Deferens : The sperms are carried by the vas deferens. Vas deferens are the long tubes continued by the epididymis and enters the abdomen.
(iv) Penis : The tubular organ situated outside the body is called Penis which is used for injecting sperms inside the female body organ.

D. Answer the following questions in not more than 120 words :

- Ans.** 1. Asexual reproduction : In asexual reproduction, one can reproduce without involvement another individual

of that species. The division of a bacterial cell into two daughter cells is an example of asexual reproduction. Asexual reproduction is not, however, limited to single celled organisms. Most plants have the ability to reproduce asexually.

Binary fission : Binary fission is the form of asexual reproduction in single-celled organisms by which one cell divides into two cells of the same size, used by most unicellular organs like bacteria, amoeba, etc.

Binary fission is asexual, the organism splits directly into two equal-sized offsprings, each with a copy of the parents genetic material.

Multiple Fission : In multiple fission, the parent organism divides repeatedly to form many daughter organisms. Amoeba reproduces by multiple fission in unfavourable conditions.

2. Sexual reproduction in plants

Mostly flowers contain four parts: sepals, petals, stamen and carpel.

Stamens : Stamens consist of a lobbed anther and filament. Stamens are the male reproductive organs. Stamens develop two celled pollen grain. Pollen grains are very small in size and produce male gametes.

Carpel : Carpels consist of a stigma, style or ovary. Carpel is a female part of a flower which contains many ovules. Ovules produce eggs which are female gametes.

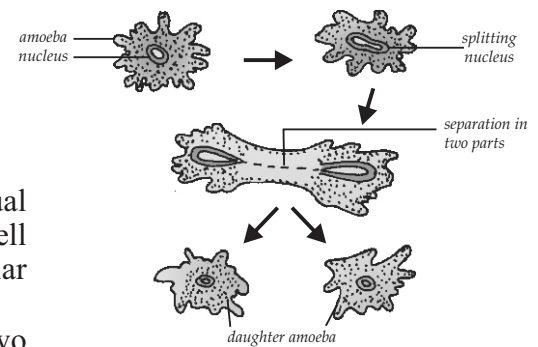


Fig. 15.1 : Binary fission in amoeba

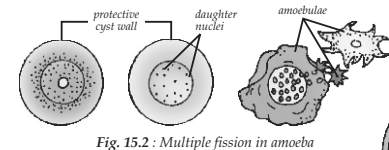


Fig. 15.2 : Multiple fission in amoeba

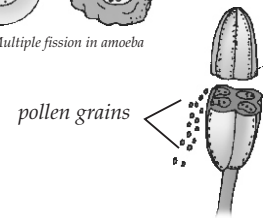


Fig. 15.8 : T.S. of an anther

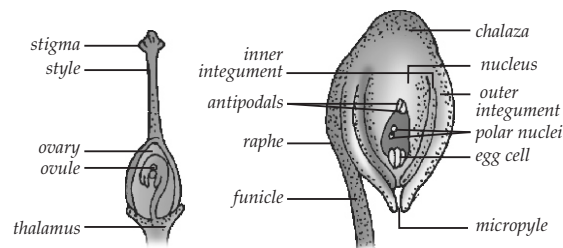


Fig. 15.9 : Structure of an ovule and its position inside the ovary

3. Sexual reproduction in animals takes place in many ways.

Unicellular organisms : Reproduction in unicellular animals takes place in two ways :

- First when the two unicellular organisms are similar in shape and size, they take part in sexual reproduction such as monocyctus.
- Second when the two unicellular organisms that are dissimilar in shape and size, take part in the sexual reproduction such as plasmodium.

Multicellular Organism : In multicellular organisms, sexual reproduction is carried out by the encompasses of the fusion of two distinct gametes to form a zygote. Gametes are produced by a type of cell division called meiosis. The gametes are haploid (containing only one set of chromosomes) while the zygote is diploid (containing two sets of chromosomes). In most cases, the male gamete, called the spermatozoan, is relatively mobile and usually has flagellum. On the other hand, the female gamete, called the ovum, is non-mobile and relatively large in comparison to the male gamete.

- Fertilization and the development of the zygote occurs in the female's body. Function and development of the reproductive system in the human body is carried out in the influence of certain chemicals called hormones. The reproductive organs become functional after attaining the sexual maturity which is known as puberty.

E. Write 'T' for True and 'F' for False for the following statements :

Ans. 1. False 2. True 3. True 4. False 5. False

F. Fill in the blanks :

- Ans.**
1. **External** type of fertilization takes place in frog.
 2. Development of **muscles** occurs at the age of puberty in men.
 3. Sexual reproduction takes place in **multicellular** organisms.
 4. **Ova** are produced in ovaries.
 5. Male gametes are called **testes**.
 6. Female gametes are called **ovum**.

G. Tick the appropriate option in the following :

- Ans.**
- | | | | | | |
|--------|--------|--------|--------|--------|--------|
| 1. (b) | 2. (c) | 3. (c) | 4. (d) | 5. (c) | 6. (a) |
|--------|--------|--------|--------|--------|--------|