SCIENCE

For Class VI

X2X7E3

ਸਮੱਗਰ ਸਿੱਖਿਆ ਅਭਿਆਨ

ਪੜ੍ਹੋ ਸਾਰੇ ਵਧੋ ਸਾਰੇ

ਸਿੱਖਿਆ ਅਤੇ ਭਲਾਈ ਵਿਭਾਗ, ਪੰਜਾਬ ਦਾ ਸਾਂਝਾ ਉਪਰਾਲਾ

PUNJAB SCHOOL EDUCATION BOARD

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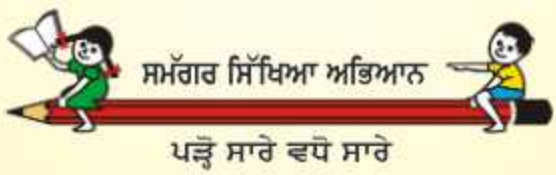

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FOREWORD

Punjab School Education Board has continuously been engaged in the preparation and review of syllabi and text books. In today's scenario, imparting right education to students is the joint responsibility of teachers as well as parents. With a view to carry out entrusted responsibility, some important changes pertaining to present day educational requirements have been made in the textbooks and syllabus in accordance with NCF 2005 and PCF 2013.

Science has an important place in school curriculum and a good textbook is the first requisite to achieve desired learning outcomes. Therefore, the content matter of class VI has been arranged in such a manner so as to develop reasoning power of the students and to enhance their understanding of the subject. Graded questions and exercises have been included to suit the mental level of students. While preparing the book CBSE syllabus has been followed. This step has been taken to maintain the uniformity in the science subject so that science students do not face any problem while appearing in the common entrance test at senior secondary stage.

Every effort has been made to make the book useful for students as well as for the teachers. However, constructive suggestions for its further improvement would be gratefully acknowledged.

Chairman

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Text-book Development Committee

Subject Orientation :

- Upneet Kaur Grewal (Sub-Expert), Punjab School Education Board
- Ravinder Kaur Banwait (Sub-Expert), Punjab School Education Board

Cover Design :

- Manjeet Singh Dhillon (Senior Artist) Punjab School Education Board

Members (Writers) :

- Parminder Tangri (Lect. Biology) Govt. Sr. Sec. Smart School Boha, Mansa.
- Dr. Parminder Singh (Head Master), Govt. High School, Kamalpur, Sangrur.
- Manju, Govt. Girls.Sr.Sec.School, Mullanpur Garibdas, Mohali
- Archana Saini, Govt.Sen.Sec.School Gharuan, Mohali.
- Mahabir Bansal, (Lect. Physics) J.S. Govt. Sr.Sec.School, Zira, Ferozepur.
- Gurpreet Singh, Science Master, Govt. Middle School, Chabba, (Ferozepur)

Vetting Team :

- Gurpreet Singh, Science Master, Govt. Middle School, Chabba (Ferozepur)
- Mahabir Bansal, (Lect. Physics) Jivan Mal Govt. Model Sr. Sec. School, zira (Ferozepur)
- Amarjit Kaur, (Science Mistress) Govt. Sr.Sec.School, Tira, Mohali
- Parmal Singh, (Principal) Govt.Sr.Sec.School, Nadampur, Sangrur
- Manju Bala, Govt. Girls.Sr.Sec.School, Mullanpur Garibdas, Mohali
- Gurbakhshish (Lect. Chemistry) Govt.Sr.Sec.School, Sahora, Mohali
- Parminder Tangri (Lect. Biology) Govt. Sr.Sec.School Boha, Mansa.
- Archana Saini, (Science Mistress) Govt.Sen.Sec.School Ghadua, Mohali.
- Naveen Bansal, Science Master, G.M.S. Jotgarh, Mansa.

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CHAPTER - 1

Food : Where does it come from

Children, all of you might have taken your breakfast today. All of us enjoy our food. We like to eat a variety of food items but have you ever thought that why is food a basic need of all the living beings?

All living beings need energy to carry out their daily activities. The only source of energy available to living organisms is food. Food is essential for life. It helps us in following ways :-

- Food provides energy to do work.
- Food helps in growth and development of body.
- Food protects us from diseases.
- Food keeps us healthy.
- Food helps in healing the injured body parts.

1.1. FOOD VARIETY

What are the sources of food ? Do all people eat same type of food? We eat variety of food like fruits, vegetables, milk products, sweets, eggs, meat, *chapati* and bakery products (Fig. 1.1).

Most of these food items are prepared by adding two or more than two different materials in definite proportions. e.g. *Kheer* is prepared from rice, milk and sugar.

Fig1.1 Variety of food

The materials needed to prepare food items are called **ingredients.**

Activity 1 : To find out ingredients of different food items.

Method : Make a list of food items prepared in your school's mid-day-meal or the food items in your lunch box. Try to find out the ingredients used to prepare these food items and record your observations in table 1.1. Also try to find out whether these ingredients come from animals or from plants?

Table 1.1.

FOOD ITEM	INGREDIENTS	SOURCE-PLANT OR ANIMAL?
KHEER	1. 2. 3.	
MATAR PANEER	1. *PEAS* 2. *PANEER* 3. *SPICES*	*PLANT* *ANIMAL* *PLANT*
CHAPATI/ROTI	1. 2. 3.	
KARHI	1. 2. 3.	
PARANTHA	1. 2. 3.	

Conclusion : From this activity it can be concluded that we get our food from both plants and animals.

Think and Answer

Q.1. What are materials need to prepare food items called?

Q.2. What ingredients are used to prepare *Kheer* ?

1.2. FOOD FROM PLANTS

Plants are chief source of food for us. We obtain vegetables, fruits, pulses, spices, cereals, oil, sugar and tea from plants. Green plants can prepare their own food. They use sunlight, carbon dioxide and water to prepare their food. Plants store extra food in different parts such as roots, stem, leaves, fruits and seeds. We use these parts as food. The plant parts which are used by us as food are called **edible** parts.

Let's learn about different plant parts which are edible and are used as food.

1.2.1 Roots

The roots of carrot, radish, turnip, sweet potato are used as food.

Carrot

Sweet potato

Radish Turnip

Fig. 1.2 Roots as Human Food

1.2.2. Fruits

Fruits are essential for good health. These are important source of vitamins and minerals. Fruits like apple, mango, guava, papaya, orange are eaten raw (Fig. 1.3).

Mango Guava

Apple Banana

Orange Grapes

Fig 1.3 Some Common fruits

Some fruits are also used to make pickles, jams and juices.

1.2.3. Stem

In certain plants stem is used as food. Stems of ginger, potato, onion, turmeric grow underground and store food. Stem of sugarcane is used to make juice, sugar and jaggery. Stems of ginger and turmeric are used as spices. (fig. 1.4)

Ginger Sugarcane

Turmeric Potato

Fig 1.4. Stem as human food

1.2.4. Leaves

We use leaves of various plants like mustard, spinach, cabbage, coriander and mint for making vegetables. (Fig 1.5)

Mustard Cabbage

Corriander Mint

Fig1.5 Leaves as Human food

1.2.5. Seeds

Seeds of many plants are used as food. We use seeds of some crops like gram, peas, kidney beans and green gram (*moong*) as **pulses** (Fig. 1.6).

Kidney Beans

Peas

Green gram (*Moong*)

Gram

Fig. 1.7. Some Common pulses

Seeds of grass like crops e.g. wheat, rice and maize are used as **cereals** (Fig. 1.7.)

Wheat

Maize

Rice

Fig 1.7. Some Common Cereals

Wheat flour is used to make *chapati*, bread and biscuits. Seeds of coriander (*dhania*), cumin (*zeera*) and black pepper are used as spices in kitchen. Oil of mustard seeds is used in cooking.

Activity 2 : To identify edible parts of different plants.

Method : Make a list of few plants which give us food. Now try to find out the parts of these plants which are edible. Record your observations in table no. 1.2.

Table 1.2

Sr. No.	Plant	Edible Part
1.	Mango	Fruit
2.	Mustard	
3.	Wheat	
4.	Sugar Cane	
5.	Carrot	Root
6.	Sweet Potato	
7.	Turnip	
8.	Coriander	Seeds, Leaves

Think and Answer

Q.1. Which term is used for the part of plant we use as food?

Q.2. Which part of mango tree is edible?

1.3. FOOD FROM ANIMALS

Like plants, we get many food items from animals also. We obtain milk, honey, meat, eggs, oil etc. from animals.

1.3.1. Milk

Milk is used worldwide as food. It is also converted into dairy products like cheese, butter, curd, cream etc.

Cheese

Ice cream

Butter

Fig. 1.8. Milk Products

We use milk of buffalo, cow, goat and sheep. Milk contain proteins, sugar, fats and vitamins. It is very good for health.

1.3.2. Eggs

Eggs are commonly used as food. We use eggs of hen and duck as food. White part of egg is called **albumen**. It is rich in protein. Yellow part of egg is called **yolk** and is rich in fat (Fig. 1.9.)

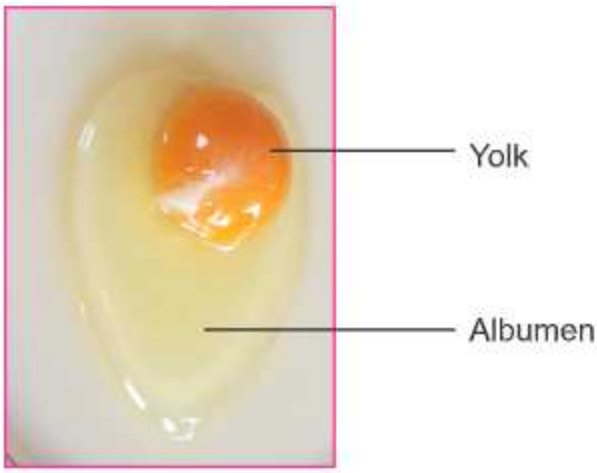

Fig. 1.9. Egg showing yolk and albumen

1.3.3. Meat

The animal flesh which is used as food is called meat. Meat contains great amount of proteins and fats. Meat of goat, sheep, chicken and fish is used as food. In addition, sea animals like prawn, crab are also used as food.

1.3.4. Honey

Honey is being used as food since ancient times.. It is also used as medicine. Honey is sweet and thick fluid produced by honeybees. Honeybees collect **nectar** from flowers and convert it into honey and store it in their hives. (Fig. 1.10)

Fig. 1.10. Bee Hive

Honey contains sugar, water, minerals. enzymes and vitamins

1.4. WHAT DO ANIMALS EAT?

Animals can not prepare their own food. They depend on plants or on other animals for food. Plants on the other hand can prepare their own food by the process of photosynthesis. As plants can prepare their own food they are called **Autotrophs** and animals being unable to synthesize their own food depend on plants and other animals for food are called **Heterotrophs**. Now Let's try to find out the food habits of different animals.

Activity 3 : To know the food habits of animals.

Method : Observe the animals listed in table 1.3 and try to find out their feeding habits. Record your observations in table given below.

Table 1.3

Sr. No.	Animals	Food Habits
1.	Buffalow	
2.	Cat	Milk, Rats, *Chappati*
3.	Dog	
4.	Crow	
5.	Rat	
6.	Squirrel	Grains, Fruits
7.	Lizard	
8.	Cockroach	
9.	Pig	
10.	Human beings	
11.	Any other.	

Conclusion : From this activity it can be concluded that different animals eat different things. Some depend on plants, some on animals whereas some eat both plants and animals.

Think and Answer

Q.1. Name two animals which eat only plants or plant products?

Q.2. Name two animals which eat only flesh?

Q.3. Name two animals which eat both plants and animals?

Depending on the variability in food habits animals are of following types :-

1.4.1 Herbivores

Animals which eat only plants and plant products are called herbivores. e.g. cow, goat, rabbit, sheep, deer and elephant. (Fig 1.11)

Rabbit

Goat

Fig. 1.11 Herbivorous animals

1.4.2 Carnivores

Animals which eat other animals are called carnivores, e.g. lion, tiger, lizard and snake (fig. 1.12 and 1.13)

Fig. 1.12 Wolves eating flesh

Lion Eating Flesh

Fig. 1.13. Carnivorous animals

1.4.3 Omnivores

Animals which eat both plant and animals are called omnivores. e.g. Crow, bear, dog and rat (fig. 1.14).

(a) Crow Eating Grains

(b) Crow Eating Flesh

Fig. 1.14 (a, b) Examples of Omnivores

Key Words

Ingredients	:	Materials needed to prepare food items
Edible part	:	Part of plant that can be eaten
Pulses	:	Seeds of some crops like gram, peas, *moong*
Cereals	:	Seeds of grass e.g. crops e.g. wheat, rice, maize
Yolk	:	Yellow part of egg
Nectar	:	Sugary fluid present in flowers
Autotrophs	:	Organisms which can prepare their own food
Heterotrophs	:	Organisms which depend on other organisms for food
Herbivores	:	Animals which eat only plants and plant products
Carnivores	:	Animals which eat other animals
Omnivores	:	Animals which eat both plants and animals.

Summary

- Food is the only source of energy available to living beings .
- We get our food from both plants and animals.
- Plants give us vegetables, fruits, pulses, spices, cereals, oil, sugar and tea as food.
- Various parts of plant such as roots, stems, fruits, leaves and seeds are used as food.

- Like plants, animals also give us food. We get milk, honey, meat, eggs, oil etc. from animals.
- Plants can prepare their own food by the process of photosynthesis and are called autotrophs.
- Animals depend on plants or on other animals for food and are called heterotrophs.
- Different animals eat different things. Some depend on plant, some on animals whereas some eat both plants and animals.
- Animals which eat only plants and plant products are called herbivores.
- Animals which eat other animals are called carnivores.
- Animals which eat both plant and animals are called omnivores.

1. Fill in the blanks.

a. Materials needed to prepare food items are called _____.

b. White part of egg is called _____.

c. Plants can prepare their own food by the process of _____.

d. _____ and _____ of mustard is used as food.

e. Honeybee collects_____ from flowers.

2. Write True or false.

a. All animals are carnivores.

b. Root of sweet potato is used as food.

c. Egg is not nutritional food as it contains no proteins.

d. Stem of sugarcane is used to prepare juice, sugar and jaggery.

e. Butter, curd and Honey are milk products.

3. Match the Column A with column B.

A		B	
1.	Carrot	a.	Pulses
2.	Gram, Peas	b.	Fruit
3.	Wheat, Rice	c.	Root
4.	Potato	d.	Cereals
5.	Orange	e.	Stem

4. Choose the correct answer

(i) Which of the following is an omnivorous animal?

a. Lion b. Eagle

b. Dear d. Crow

(ii) Which part of cabbage is used as food.

a. Stem b. Root

c. Leaves d. None of above

5. Very short answer type questions.

(i) What are ingredients?

(ii) Name any three milk products.

(iii) Name any two seeds which are used as spices.

6. Short answer type questions.

(i) How are the seeds important source of human food?

(ii) What is the importance of food for living beings ?

(iii) Write briefly about any two food products that we get from animals.

(iv) Write briefly about any two food products that we get from plants.

7. Long answer type questions.

(i) How can we categorise animals on the basis of their food habits ? Explain with the help of examples.

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CHAPTER - 2 Components of Food

In the previous chapter we have learnt that food is essential for growth and development of body. We eat variety of food items. We get our food from both plants and animals. Our food consists of pulses, cereals, vegetables, fruits, milk products, eggs etc. In this chapter we will discuss various components of food and their importance for human body.

2.1 COMPONENTS OF FOOD

Different food items contain different nutrients.

Nutrients are the substances which are needed for proper growth and development of body.

The main nutrients of our food are carbohydrates, proteins, fats, minerals and vitamins. Besides, our body also need water and roughage.

2.1.1. Carbohydrates

Carbohydrates are the main source of energy for us therefore these are called energy giving foods. They consist of carbon, hydrogen and oxygen.

Sources of carbohydrates : Plants are the main sources of carbohydrates for us. Bajra, jowar, rice, wheat, jaggery, mango, banana and potato are all sources of carbohydrates.

Fig. 2.1 Sources of Carbohydrates

Types of carbohydrates : The food we eat consist of two types of carbohydrates.

Simple carbohydrates : Sugars are the simple carbohydrates. They are sweet in taste and are soluble in water. Glucose, Sucrose (present in table sugar), Fructose (fruit sugar) and lactose (milk sugars) are examples of types of sugars. All of these are easy to digest. So, they give us quick and instant energy.

Complex carbohydrates : Starch is a complex carbohydrate. It consists of large number of glucose units. Starch is tasteless and is insoluble in water. Potatoes, rice and wheat are rich sources of complex carbohydrates. As starch is first converted to glucose during digestion so it can not give us quick and instant energy.

Functions of carbohydrates : The main function of carbohydrates is to provide energy for various life activities.

We can detect the presence of starch in food items by a very simple test.

Activity 1 : To test the presence of starch in various food items.

Material required : Raw potato, Iodine solution, dropper, petri dish.

Method : Take few pieces of raw potato. Put 2-3 drops of dilute Iodine solution on it. Observe the change in colour of potato.

Fig. 2.2 Test for the Presence of Starch

Observation : The colour of potato turns blue-black on addition of Iodine drops.

Conclusion : Appearance of blue-black colour on addition of Iodine drops indicates the presence of starch.

You can perform this activity with other food items like boiled rice, wheat flour, sweet potato and sugar cane.

Think and Answer

Q.1. What happens when we add few drops of iodine solution to raw potato?

Q.2. What is the colour of Iodine solution ?

Q.3. Besides raw potato which other food items can be used for testing of starch?

2.1.2 Proteins

Proteins are essential for growth and repair of body cells so foods rich in protein content are called **body building foods.** Proteins consist of carbon, hydrogen, oxygen and nitrogen.

Sources of proteins : We get proteins both from plants and animals.

Plant sources of proteins include beans (like soyabean, peas), pulses (like gram, *moong*), and vegetables (spinach, mushroom, broccoli).

Fig. 2.3 Plant Sources of Proteins

Animal sources of proteins include meat, fish, poultry, milk and milk products.

Fig. 2.4 Animal Sources of Proteins

Functions of Proteins : Proteins help us in following ways :-

- Proteins help in growth and repair of body.
- Proteins protect us from many diseases.
- Proteins act as enzymes.

Enzymes are the protein molecules present inside the living cells. They speed up various activities like digestion, respiration inside the living body. They are needed in very minute quantity.

We can detect the presence of proteins in the food products by a simple test.

Activity 2 : To test the presence of proteins in food items.

Material Required : Any food item containing proteins (like boiled egg, *moong dal*, soyabean), Copper Sulphate, Caustic soda, test tube, dropper, beaker.

Fig. 2.5 Test for the presence of Proteins

Method : Take a small quantity of food item say soyabean. Grind it to make powder. Put the powder in test tube and add few drops of water in it. Now with the help of dropper add two drops of Copper Sulphate ($CuSO_4$) and 10 drops of Caustic Soda (NaOH) solution to the test tube. Shake well and let it stand for few minutes.

Observation : The colour of solution in test test tube will change to violet.

Conclusion : Appearance of violet colour indicates the presence of protein in food item.

You can perform this activity with other food items like *moong dal*, boiled egg and peas.

Think and Answer

Q.1. Name the chemicals used to test the presence of proteins in food.

Q.2. Name any two food items containing protein.

2.1.3. Fats

Like carbohydrates, fats also provide energy to body. So foods rich in fats are also called energy giving foods.

Sources of Fats : We obtain fats from both plants and animals. Plant sources of fats are vegetable oils like mustard oil, coconut oil and sunflower

oil. Cashew, almond , groundnut and sesame seeds (*Til*) also contain fats. Animal sources of fats are meat, eggs, fish, milk and milk products like butter, ghee etc.

Fig. 2.6 Sources of Fats

Importance of Fats

1. Fats provide us energy.
2. Fats are stored under the skin and prevent heat loss from body surface.

Like carbohydrates and proteins the presence of fats in various food items can also be detected by a very simple test.

Activity 3 : To test the presence of fats in given food item.

Material Required : A piece of paper, food item like cashew, groundnut, etc.

Method : Take a small quantity of food like cashew or groundnut. Wrap it in a piece of paper and crush it. Take care that paper does not tear. Now remove the crushed cashew from paper and observe the paper carefully. Do you see any oily patch on it ?

Observation : You will observe oily patches on paper and paper looks translucent.

Conclusion : Presence of oily patch on paper shows the presence of fats in given food item.

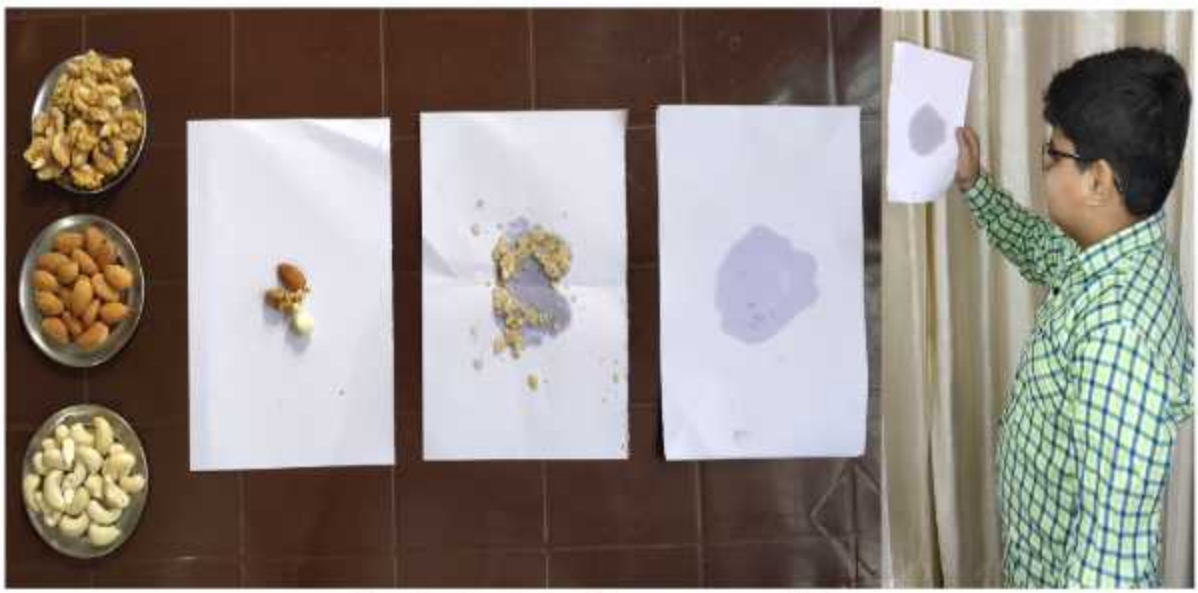


Fig. 2.7 Test for the presence of fats

Think and Answer

Q.1. Why paper becomes transluscent when we crush cashew on it?

Q.2. Name any two food items that contain fats.

Table 2.1

Mineral	Source	Function
Iron	Leafy vegetables, fruits, Jaggery	Needed for formation of haemoglobin in body
Calcium	Milk and milk products, eggs	Needed for formation of bones
Phosphorous	Milk , Cheese , Banana, Bajra, nuts	Provide strength to bones and teeth
Iodine	Iodised Salt, Sea food, Green leafy vegetables.	Essential for normal functioning of thyroid gland.

2.1.4 Minerals

Minerals are needed for good health and proper growth of body. Minerals do not provide energy to body and are needed in very small quantity. Iron, Calcium, Iodine and Phosphorus are important minerals for our body. Sources and functions of these minerals are discussed in table 2.1.

2.1.5. Vitamins

Vitamins are essential for proper functioning of our body. Like minerals they are also required in very small quantity and aslo do not provide any energy to body but help us to fight disease. Some important vitamins along with their soures and functions are discussed in table 2.2.

Table 2.2

Vitamin	Source	Functions
A	Eggs, Meat, Milk, Cheese, Green Leafy Vegetables, Carrot, Papaya	Needed for maintaining healthy eyes and skin
B	Milk, Green Vegetables, Peas, Eggs, Cereals, Mushrooms	Required for normal growth and functioning of central nervous system, digestive system
C	Citrus Fruits (Lemon, Orange), Amla, Tomato, Broccoli	Helps us to fight against diseases

Vitamin	Source	Functions
D	Dairy products, Fish liver oil, Exposure to sunlight	Required for healthy bones and teeth.
E	Nuts such as almonds and peanut, vegetable oils such as sunflower and soybean oils, Leafy vegetables such as spinach and broccoli.	It protects cells from damage, and help in lowering a variety of health problems.
K	Green leafy vegetables (such as spinach, turnip, mustard, broccoli, cauliflower, and cabbage). Fish, meat, eggs, and cereals (contain smaller amounts)	Needed for blood clotting

Besides these nutrients we need roughage and water also.

2.1.6 Roughage

The fibrous indigestible material present in food is termed as roughage.

Sources of Roughage : Fruits, vegetables used as salad like carrot, radish, cabbage and turnip, whole grains, pulses, half crushed grains (dalia) are sources of roughage for us.

Functions of Roughage : It does not provide any nutrient to body but it is essential component of our food. It helps us in following ways :-

- It helps our body to get rid of indigestible food and prevents constipation.
- Roughage helps to retain water in food.
- Roughage is an important food source for growth of good bacteria in stomach.

2.1.7 Water:-

Water is most important constituent of food. It is essential for life. It helps us in following ways :-

- Water helps us in absorption of nutrients from food.
- It helps us to get rid of wastes from body in the form of urine and sweat.

Our body need 3-4 litres of water per day. We get most of water from liquids like water, milk, tea, juice etc. Besides this many food items like fruits, vegetables also contain water.

2.2. BALANCED DIET

The food we eat in a day is our diet. We must take a nutritious diet for proper growth and development of our body. Our diet must have all the nutrients in right quantity.

The diet that contains adequate amount of all the essential nutrients, roughage and water for proper growth

and development of body is called **Balanced diet.**

Do you think that balanced diet is same for all people? People of all ages need same type of diet? No, it is not so. Type of diet depends on the level of activity, status of health, age and gender. A balanced diet for a person who has no or little physical activity will be different from a person who does a lot of physical work. Balanced diet depends on requirement of body. Growing children, pregnant ladies, lactating mothers and an athlete need more proteins than others. People doing more physical work on the other hand need more carbohydrates and fats for energy.

To know more about different components of food you must observe the various food items given to you in your school's Mid day meal. The *chapati* and rice contains carbohydrates. *Moong dal*, gram and gram flour contain proteins. Vegetable oils used in cooking vegetables contain fats. Seasonal vegetables contain roughage and vitamins. So all the nutrients are present in your school's mid day meal. Similarly, you must make a list of nutrients in the food you take at home and discuss it with your class teacher.

2.3. DEFICIENCY DISEASES

The food we consume must contain all the nutrients in required amount. If we take any one of the nutrients in less than required amount this will lead to deficieny of that nutrient in body. Such malnutrition often lead to diseases .

The disease which is caused due to shortage of nutrients in our diet for long time is called **deficiency disease.**

Deficiency of proteins, carbohydrates, different vitamins and minerals results in certain deficiency diseases. Some of these are discussed below in table 2.3.

Table 2.3.

Nutrient	Deficiency disease	Symptoms
Proteins	Kwashiorkor 	Stunted growth, Swelling of face, Dry skin, Retention of water in body, Discolouration of hair.
Proteins and Carbohydrates both	Marasmus 	Dry skin, Sunken eyes, prominent ribs. Body becomes very lean, thin and weak enough that child may not be able to move.

Nutrient	Deficiency disease	Symptoms
Vitamin A	Night blindness	Poor vision, unable to see in dark.
Vitamin B	Beri-Beri	Weak muscles, very less energy to work, loss of appetite and weight
Viamin C	Scurvy 	Bleeding gums
Vitamin D	Rickets	Bones become soft and bent
Calcium	Bones and tooth decay	Weak bones, tooth decay.
Iodine	Goitre	Enlargement of gland in neck (Thyroid)
Iron	Anaemia	Weakness, Fatigue, Skin becomes pale.

The person suffering from these deficiency diseases need not be given any medicine instead the person should be given required amount of balanced diet.

Key Words

Nutrients : Substances needed for proper growth and development of body.

Balanced diet : A diet that contains sufficient amount of all essential nutrients.

Deficiency diseases : Diseases caused by long time shortage of nutrients in diet.

Goitre : Enlargement of gland in neck.

Scurvy : Disease caused by dificiency of vitamin-C.

Beri-Beri : Disease caused by dificiency of vitamin-B.

Summary

- The major components of our food are carbohydrates, proteins, fats, vitamins and minerals.
- Carbohydrates and fats provide energy.
- Vitamins help in protecting our body against diseases.
- Proteins and minerals are needed for maintenance and growth of body.
- Deficieny of nutrients in food for long period of time causes certain deficiency diseases.

EXERCISE

1. Fill in the blanks.

a. We use _____ solution to test the presence of starch.

b. Potato, rice and wheat are rich sources of _____.

c. Citrus fruits mainly contain vitamin_____.

d. Anaemia is caused by deficiency of _____.

e. Goitre is caused by deficiency of _____.

2. Write True or false.

a. Vitamin D is synthesized when body is exposed to sunlight.

b. We get calcium from milk and milk products.

c. Pulses are chief sources of fats.

d. Rice alone can provide all necessary nutrients to body.

e. Night blindness is caused due to deficiency of vitamin A.

3. Match the Column A with column B.

A		B	
1.	Protein deficiency	a.	Rickets
2.	Vitamin A	b.	Beri-Beri
3.	Vitamin B	c.	Scurvy
4.	Vitamin C	d.	Night blindness
5.	Vitamin D	e.	Kwashiorkor

4. Choose the correct answer

(i) Which of the following is rich source of Protein.

a. Potato b. Mango

c. Rice d. Moong Dal

(ii) Which of the following is essential for normal functioning of thyroid gland.

a. Vitamin D b. Calcium

c. Iodine d. Iron

(iii) Anaemia is caused due to deficiency of

a. Vitamin A b. Calcium

c. Iron d. Iodine

A. Very short answer type questions

(i) What is balanced diet ?

(ii) What are the chief sources of carbohydrates?

(iii) Why are the proteins called body building foods?

(iv) What is the importance of roughage for human body?

(v) Name any two food items containing fats.

B. Short answer type questions

(i) Why is water essential for life?

(ii) Name five types of nutrients that our body need.

(iii) From where do we get vitamin C? What can happen to human body due to the deficiency of vitamin C ?

(iv) Fats and carbohydrates are called energy giving foods. Explain Why?

C. Long answer type questions

(i) What are deficiency diseases? Write briefly about the diseases caused by deficiency of proteins and carbohydrates in human body.

(ii) Discuss the importance of minerals for human body.

(iii) What are vitamins? Discuss the importance of different types of vitamins for human body.

J9L4X1

CHAPTER - 3

Fibre To Fabric

We all wear clothes . Do you know why ? Clothes protect us from sunlight, wind, cold, heat, rain, etc. People wear different kind of clothes to feel comfortable in different weather conditions. People also wear clothes to look smart. People wear different types of clothes like sari, coat pent, suits, jeans, T- shirts, Turban, kurta - pajama, salwar kameez, lungi, dhoti etc. Do all type of clothes made up of same kind of material ? Absolutely No. Clothes are made of different types of materials. The things we use in daily life like bedsheets, blankets, towel, curtains, duster, floor mats are made up of different fabric. Even our school bags, belt, socks, ties are made up of different kind of fabric.

3.1 Variety of fabrics

Activity 1 : To know different type of fabrics.

Material required : T-shirts, dupatta, socks, school bag, jute carry bag, sweater.

Procedure : Just touch the fabric of t-shirt, jute bag, school bag, sweater etc. What do you observe ?

You will observe that some clothes are light and soft, some are smooth and shiny whereas some are rough.

3.1 Variety of clothes

Conclusion : Dupatta is light and smooth as it is made up of cotton. Sweater is soft and warm as it is made up of wool. Jute is strong and rough, neck tie is smooth and shiny as it is made up of silk.

Think and Answer

Q.1. List any two types of fabric ?

Q.2 How does silk fabric feel ?

Q.3. With what kind of fabric your dupatta is made up of ?

Activity 2 : What are fabric made up of ?

Material Required : Jute sack, scissors, needle etc.

Procedure : Cut a small piece of jute sack with the help of scissor. Now try to pull a thin loose thread or yarn present at the edges. You can also use needle or pin to separate it [Fig. 3.1 (a) & (b)].

3.1 (a) Pulling a Thread

3.1 (b)

Conclusion : We will see jute fabric is made up of thin thread. These thin threads are known as yarn.

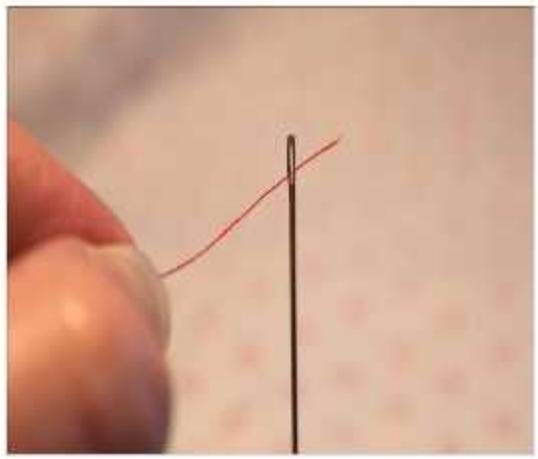
YARN : Yarn is a thin thread used for making different fabrics.

3.2 FIBRE

Activity 3 : What are yarn made up of ?

Material required : A piece of cloth, ear buds, a small needle, scissor.

Procedure : Cut a small piece of cloth with scissor. Can you see loose thread or yarn at the edge? Pull few of them out. Now take a needle. Try to pass that yarn to the end of the needle (fig. 3.2). What do you see?



3.2 Pass thread through the eye of needle

Conclusion : You are able to see that this yarn is made up of very small strands.

These small strands are **FIBRES**. These fibres make it difficult for the yarn to pass through the small hole of the needle.

Try something else to show fibres. Scratch the ends of a cotton ear buds and pull it, you will see many fibres of cotton [fig. 3.3 (a) & (b)].

3.3 (a) Ear buds

3.3 (b) Scratch the Fibre from ear bud

TYPES OF FIBRES

1. Natural fibres
2. Synthetic fibres

NATURAL FIBRE

Fibres that are obtained from nature are called natural fibre.

These are of two types :

1. Plant fibre : cotton, jute, coir
2. Animal fibre : wool, silk

The Fibres obtained from plants are called **plant fibres**. For example : cotton, jute, coir.

The fibres obtained from animal are called **animal fibres**. For example : wool, silk.

COTTON

Cotton is soft fibre that is grown in the field. It is one the major crop of the kharif season. It is sown between May and December in different parts of the country.

Cotton balls are the fruits of cotton plants. Their size is almost same that of the lemon. When the cotton crop gets mature cotton balls burst open (fig. 3.4). Now these cotton balls are ready for picking.

3.4 Cotton balls

Picking : Picking of cotton balls is generally done by hand (fig. 3.5).

3.5 Picking of cotton balls

Ginninig : when cotton balls burst open after maturing, cotton balls are picked by hand [fig. 3.6 (a)]. Fibre are seperated from the seeds by combing. This process is called **ginning**. Ginning was traditionally done by hand but these days machines are also used for ginning [fig. 3.6 (b)].

3.6 (a) Ginning of cotton

3.6 (b) Ginning of cotton

SPINNING

The fibres are spun in yarns by pulling out and twisting the fibres together. The process of making yarn from fibres is known as **spinning**. In India, earlier spinning was done with hand spindle (takli) or on a spinning wheel (charkha). [fig. 3.7 (a)] Now a days machines are used. Use of charkha was popularised by Mahatma Gandhi as part of the independence movement. He encouraged people to wear cloths made up of home spun yarn and shun imported cloths made in the mills of Britain.

Spinning of yarn on a large scale is done on spinning machines [fig. 3.7 (b)] After spinning, yarns are used for making fabrics.

3.7 (b) Spinning of Cotton Yarn

JUTE

Jute is the second most important plant fibre after cotton. Jute is long, soft, shining plant fibre that can be spun into long string and rough yarns. It is the cheapest natural fibre and is harvested [fig. 3.8 (a)] when plant is at flowering stage.

3.7 (a) Charkha

3.8 (a) Jute Plants

3.8 (b) Bundles of Jute plant

After harvesting, these jute stems are tide into bundles and soaked in water for 15 days. This process is called **retting** [fig. 3.8 (b)].

When the jute fibre become loose then these are separated from the plant stem by hand. Now these fibres are washed in fresh water, then allowed to dry in the sunlight for 2-3 days. These fibres are converted into yarn as shown in figure [fig. 3.8 (c)].

3.8 (c) Process of making jute fibres

In India, jute is cultivated in states of Aasam, Bihar and West Bengal. It is used to make curtains, chair coverings, carpets, mats, ropes, ginny bags [fig. 3.8 (d)].

3.8 (d) Ropes and mats from Jute fibres

COIR

Coir is another natural fibre . It is exiracted from the fibrous outershell of a coconut [fig. 3.9 (a)]. The coir fibre is relatively water proof and is one of the few natural fibres resistant to damage by soft water.It is used to make floor mats, door mats, brushes, mattresses and ropes [fig. 3.9 (b)].

3.9 (a) Coconut Shell

3.9 (b) Coolar Mat from Coir

Think and Answer

Q.1. Name the items that are made from jute plant and coconut fibre ?

Activity 4 : How is yarn made ?

Material required : Cotton

Procedure : Hold some cotton in one hand and pinch it between the thumb and forefinger of our hand. Now gently start pulling out cotton while continuously twisting the fibre. You will see that you are able to make yarn.

3.10 (a) Making yarn from cotton

Think and Answer

Q.1. Yarn is made of ----------

Q.2. What is yarn ?

Q.3. How do you make yarn from cotton ?

Yarn to Fabric

There are many ways by which fabrics are made from yarns. The two main processes are :-

1 Weaving

2 Knitting

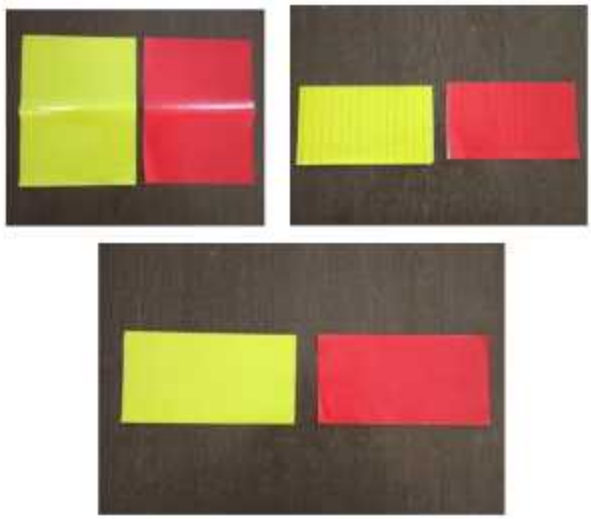
The process of arranging two sets of yarn together to make fabric is called **weaving**. Let us perform a activity to know what is weaving.

Activity 5 : How weaving is done?

Material required : Coloured sheets of paper, scissors, pencils,etc

Procedure : Take two different coloured sheets of paper. Now cut square piece of 20cm of each sheet.

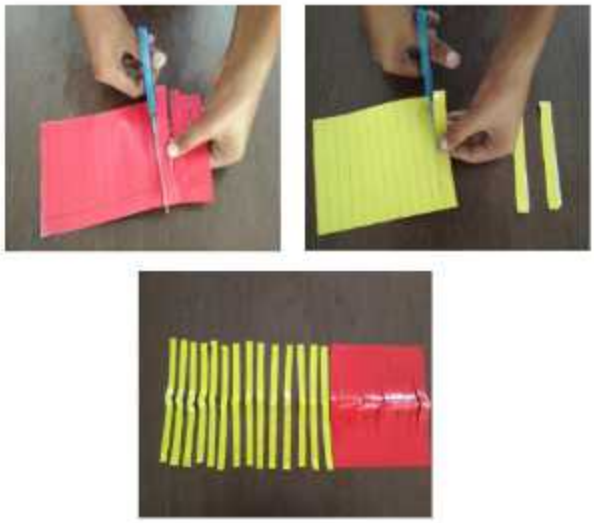
Now fold each sheet into half. Draw parallel lines(0.5cm apart) as you see in the picture [fig. 3.11 (a)].



3.11 (a) Yellow sheet and Red sheet

Cut yellow sheet into pieces as you see in the picture and cut red sheet upto lines as shown (here red strips are not separated from the

sheet). Now unfold red sheet and strips of yellow sheet [fig. 3.11 (b)].



3.11 (b) Cutting into strips

Place red sheet on a smooth surface, Take one strip of yellow sheet. Hold it perpendicular to red strip of red sheet. Now pass it above and below red strip of red sheet alternatively. Eventually you will get a beautiful weaving pattern as shown in picture [fig. 3.11 (c)].

3.11 (c) We got weaving with paper strips

Yarns are much thinner than our paper strips. So weaving of fabric is done on looms. The looms are either hand operated or power operated.

3.11 (d)

Cotton cloth is soft and let air to pass through it and. It also absorbs sweat. The advantages of cotton cloth is that the sweat it absorbs evaporates because of the air it 'breathes', this results in cooling down of the body. The cotton cloths are comfortable to wear in hot humid weather.

KNITTING

As we learn earlier two sets of yarns are used in weaving. In contrast, a single yarn is used to make a piece of fabric in knitting.

You might have seen your mother knitting wool to make sweater. Knitting is done by hands or by machines.

3.12 Knitting of sweater with wool

3.6 Animal fibres

The natural fibre obtained from animals are known as animal fibres, for example wool, silk etc.

WOOL

Wool is the fibre derived from the hair of sheep, camel, yak. Removing the wool from sheep using special clipper is called **shearing**. After this the wool is transported to the mills where it is cleaned and combed with the help of machine. It is then separated and spun into fibre. This fibre is used to make wollen clothes and carpets.

3.13 Wool

Wool is fluffy and hence retains air. Wool has the property of retaining heat and therefore clothes made by wool are worn in cold weather.

Think and Answer

Q.1. Wool is _____ and _____air.

Silk

Silk is also natural fibre. It is obtained from the cacoon of silkworm. Silkworm are fed on the leaves of mulberry trees. Each worm spin a

3.14 (a) Cacoon of silk

continuos thread upto 700 m long to make a cocoon.

The cocoon is boiled in water to kill the silk worm and then unwound to get silk fibre. The rearing of the silk worm for production of silk is known as **sericulture.**

3.14 (b)

3.7 SYNTHETIC FIBRE

The fibres made by man from, chemical are called **synthetic fibres.** For example : Nylon, acrylic and Polyster are synthetic fibres. Synthetic fibres are stronger and wrinkle free. They also dry easily. They have less air spaces between them. These fibres do not absorb water, so these fibres are not suitable for hot and humid weather. Synthetic fibre are used to make socks, tooth brush bristles, car seat belts, carpets, ropes, school bags etc [fig. 3.15 (a), (b), (c)].

3.15 (a) Synthetics Fibre Plastic Toothbrush **(b) Synthetics cloth** **(c) Socks**

Key Words

Ginning : The process of seperating cotton fibres from the seeds by combing.

Shearing : Removing of wool from sheep using clippers.

Sericulature : The rearing of silk worms to produce silk.

Summary

- We wear clothes to protect our bodies against the weather and insect and to look good.
- Ancient people covered their bodies with leaves and skin of animals.
- Fibres are either natural or synthetic.
- Fibres are made from yarns.
- Cotton clothes are good for humid and hot weather. It absorbs water easily.
- Silk is made from the cacoon of silkworm.
- Jute fibre is strong and obtained from jute plant.
- Synthetic clothes are strong, wrinkle free but does not absorb water easily like cotton.

Exercise

1. Fill in the blanks.

a. Silk is smooth and _____.

b. _____ is extracted from the outer covering of coconut.

c. _____ and _____ are synthetic fibres.

d. Cotton is a _____ fibre.

e. Yarns are made of _____.

2. Write true or false.

a. Polyester is a natural fibre.

b. In knitting, a single yarn is used to make a piece of fabric.

c. Cotton clothes are comfortable to wear in hot humid weather.

d. The process of removing seed from cotton is called retting.

e. The fibres are spun in yarns by pulling out and twisting the fibres together.

3. Match the Column A with column B.

A		B
a.	Jute	a. outer covering of coconut
b.	Acrylic	b. stem
c.	Coir	c. separation of seeds
d.	Ginning	d. synthetic fibres
e.	Hand spindle	e. spinning

4. Choose the correct answer.

(i) Which of the following is not a natural fibre

a) Wool c) Nylon

b) Cotton d) Jute

(ii) Which of these fabrics will you choose to wear in hot and humid weather

a) Cotton c) Wool

b) Silk d) Nylon

(iii) The process of separation of seeds from cotton balls is

a) Spinning c) Retting

b) Ginning d) Picking

(iv) Acrylic is

a) Natural fibre c) Animal fibre

b) Plant fibre d) Synthetic fibre

(v) Which of these is a plant fibre

a) Polyester c) Wool

b) Acrylic d) Jute

5. Very short answer type questions.

(i) Name any two animal fibres ?

(ii) Name the two basic types of animal fibres ?

(iii) What is the right time for harvesting of jute plant ?

(iv) List any two uses of jute ?

6. Short answer type questions.

(i) Write differences between natural and synthetic fibres ?

(ii) What is sericulture ?

(iii) What is meant by ginning of cotton ?

7. Long answer type questions.

(i) Why do we prefer cotton clothes in summer ?

(ii) How spinning of cotton is done ?

H4G3M4

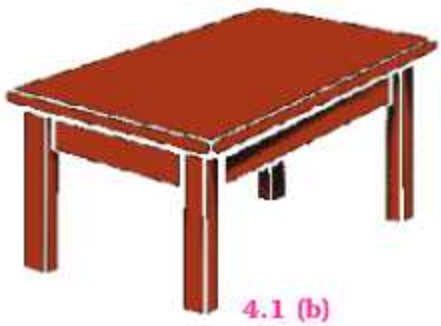
Sorting Material into Groups

CHAPTER - 4

4.1 OBJECTS AROUND US

You can see many different type of things around you. They look different and have different properties from each other. What are these things made up of ? In our classroom also there are variety of things, like table pencil, book, school bag, eraser, fan etc as shown in fig (4.1 a, b, c)

4.1 (a)



4.1 (b)

4.1 (c) Objects around us

You are provided a list of objects in table 1. Complete the columns given below using your knowledge.

Table 1 : Objects and the materials they are made of

Objects	Materials they are made of
Plate	Steel, glass, plastics (any other)
Pen	Plastics, metal
Tumbler	
Clothes	

Similarly you are provided material in Table 2. You have to complete the column with the name of objects made of that material.

Table 2 : Objects made of same material

Wood	Chair, table, door, desk ,...
Paper	Books, notebooks, newspaper, toys, calendars.
Glass	
Plastics	
Iron	

What do we find from these table

- Same object can be made from different kind of material. For example, a *tumbler* can be made of glass, plastic, thermocole, *ceramic* or paper.
- Several objects can be made from same material. For example your book, note book, newspaper etc. are made from paper.

Matter is everything around you. The bones and flesh of your body, clothes, food, table, chair, book , tree, water, air are all matter. But then, what is not matter? Feelings of love or sadness do not occupy space and do not have mass. These are not matter. Radio and Tv sets, cellphone are matter. But the signals they receive are not.

- Matter is everything around you.
- A piece of iron is matter. If an iron piece is broken, what happen? It forms smaller pieces of iron. If we continue breaking this piece of iron, it becomes smaller and smaller. So this smallest piece is called **atom**.
- Atoms are extremely small.
- Matter is defined as anything that has mass and takes up space (it has volume)
- All material around us is matter because all materials occupy space and have mass.

4.2 PROPERTIES OF MATERIALS

Have you ever wondered why a tumbler is not made with a piece of cloth? Recall our experiments with pieces of cloth in Chapter 3 and also keep in mind that we generally use a tumbler to keep a liquid. Therefore, would it not be silly, if we were to make a tumbler out of cloth (Fig 4.2)! What we need for a tumbler is glass, plastics, metal or other such material that will hold water. Similarly, it would not be wise to use paper-like materials for cooking vessels.

We see then, that we choose a material to make an object depending on its properties, and the purpose for which the object is to be used. So, what are all the properties of materials that would be important for their usage? Some properties are discussed here.

Appearance

Material usually look different from each other. Paper looks different from cloth, wood looks different from iron, Iron looks different from gold and silver. Materials can be Classified on the basis of their appearance.

Lustre

A metal spoon shines where as wooden spoon does not shine.

Silk cloth shines whereas woollen clothes does not. We say metal has more lustre than wood and silk has more lustre than wool.

1 : To differentiate lustrous and non lustrous materials.

Material Required : Paper, cardboard, wood, copper wire, Aluminium foil, chalk, steel plate.

Procedure : Collect the above material and separate them in two groups. Material having shiny surface is placed in one group and non shiny material is placed in another group.

Conclusion : Material such as copper wire, Aluminium foil, steel plate are Lustrous in nature.

Material such as paper, cardboard, chalk, wood are non lustrous in nature.

An iron rod may not appear lustrous. However, if we use sandpaper to remove the top layer we will see that it is lustrous. Some metals lose their lustre when exposed to air and moisture.

Texture

Different metals feel different when you touch them, that is, they have different textures. For example, metal is hard and smooth whereas wool is soft and rough. Soft materials can be compressed or scratched easily. Hard materials are difficult to compress. Material such as aluminium sheet, a piece of stone, iron, gold, silver are hard in nature.

Activity 2: To check texture of material.

Material Required : Silk cloth, wooden spoon, sponge, woollen cloth, cotton, sand paper.

Procedure : Close eyes of your friend with the help of cloth. Place the material like silk cloth, sand paper, wooden spoon, metal spoon, woollen cloth, plastic mug. Ask your friend to touch the material and tell their texture.

Conclusion : Material such as silk cloth, cotton, sponge are soft to touch whereas material such as sand paper, wooden spoon, woollen cloth are hard to touch.

Soluble and Insoluble

Activity 3 : To observe solubility in water.

Material required : Beakers, water, sugar, salt, chalk powder, sand, sawdust, stirrer.

Procedure : Collect samples of some solid substances such as sugar, salt, chalk powder, sand and sawdust. Take five glasses or beakers. Fill each of them about two-third with water. Add a small amount of sugar to the first glass, salt to the second glass, add small amount of other materials in other glasses. Stir each of them with a stirrer [Fig. 4.2 (a) & (b)].

4.2 (a)
Beaker with chalk

4.2 (b)
Beaker with sugar

Conclusion : You will see that sugar and salt dissolves in water, we cannot see them while sand, saw dust, chalk does not dissolve in water and are clearly visible.

Table 3 : Solubility of some common liquids in water

Material	Disappear in Water/Does not
Salt	
Sugar	
Sand	
Chalk powder	
Sawdust	
Milk	

You will notice that some substances have completely disappeared or dissolved in water .

We say that these substance are **soluble** in water.

Few substance do not mix with water or do not disappear in water even after stirring for a long time. These substances are **insoluble** in water.

Water plays an important role in the functioning of our body because it can dissolve a large number of substances.

Liquids which mix with each other are called **miscible liquids**. Liquids which do not mix with each other are called **immiscible liquids.**

Activity 4 : To observe miscible and immiscible liquids

Material required : Beakers, water, lemon, musturd oil or coconut oil, stirrer.

Procedure : Take two beakers. Fill them with water. Now add lemon juice in first beaker. When we add lemon juice to water, it completely disappear because it is soluble in water. Now take another beaker filled with water. Put a few drops of mustard oil or coconut oil in water, oil will float on the top of water because it is insoluble in water.

4.3 Some liquids mix well with water while (b) some others do not

Table 4 : Objects that float or sink in water

Liquid	Mixes well/ Does not mix
Vinegar	Mixes well
Lemon juice	
Mustard oil	
Coconut oil	
Kerosene	

Conclusion : We notice that some liquids get completely mixed with water. Some do not mix with water and form a separate layer on water.

Objects may float or sink in water

Some materials that do not mix with water, float on the surface of water. Others may have sunk to the bottom of the beaker. We notice many examples of objects that float in water or sink. Dried leaves fallen on the surface of a pond will float on it whereas a stone that you throw into this pond will sink and settle at bottom.

Some objects sink and some float

If you drop an iron nail in water, it will sink but a piece of wood will float on water. If you weigh equal volume of iron, water, wood, you will find that iron is the heaviest and wood is the lightest. An equal volume of aluminium will be lighter than iron but heavier than water. It will sink in water. An equal volume of cotton will be lighter than water [Fig. 4.4 (a) & (b)]. It will float on water if placed on wax paper. **The mass per unit volume of substance is known as density.**

4.4 (a)

4.4 (b)

4.4 Cork float in water

Think and Answer

Q.1. The density of an object is slightly less than that of water will it sink or float in water ?

Transparency

You can see through glass, but not through wood, metal plate, apple, banana. Do you know why ? This is because light can pass through glass but not through wood metal and apple. On this basis we can classify objects into three group :-

1. Transparent
2. Translucent
3. Opaque

1. Transparent

If most of the light can pass through an object, it is known as transparent objects. Those substances or material through which things can be seen are called transparent [Fig. 4.5]. For e.g. glass, water, air etc.

4.5 Clear water is transparent

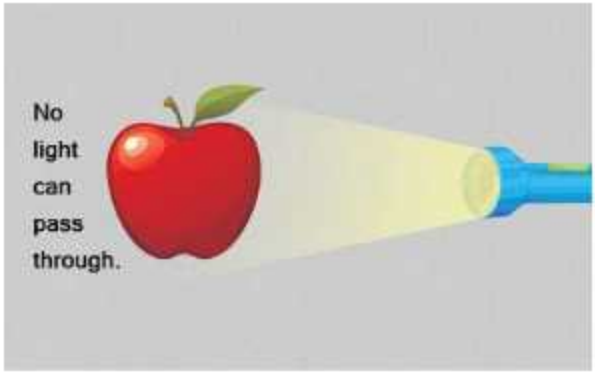
2. TRANSLUCENT

If light can pass through an object partially, it is called translucent. We can not see through such objects clearly. For e.g. Examples frosted glass used in windows (fig. 4.7).

4.6 Frosted glass

3. Opaque

If no light can pass through an object, it is called opaque object. Through such object we cannot see things (fig. 4.7). Examples wooden box, cup, coloured bottle, cardboard, metal container etc.



4.7 Light can not pass through apple

Activity 5 : To demonstrate transparent, opaque and translucent substance.

Material required : Electric bulb, sheet of paper, oil, plane glass.

Procedure : Take a sheet of paper. Look towards electric bulb through sheet of paper. Bulb is not visible. Put some oil drops on this paper and again look towards electric bulb. Now the bulb will appear faintly. Now take a plane glass and look through it to the other side of the glass. You will see the bulb clearly.

Conclusion : We can see objects placed on the other side of glass. So plane glass is transparent. We can not see an object on the other side of paper so, paper is opaque. On adding drop of oil on the paper, we can see faintly, so it is transluscent.

Think and Answer

Q.1. Is clear water opaque, transparent or translucent ?

Summary

- Material are grouped together on the basis of similarities and difference of properties.
- Objects around us are made up of a variety of materials.
- Some materials are soluble in water and some are insoluble.
- Some materials are shiny in appearance while others are not.

Key Words

- Materials
- Soluble
- Object
- Metal
- Transparent
- Opaque
- Rough
- Lustre
- Transluscent

EXERCISE

1. Fill in the blanks

a. Name five objects which can be made from wood.

_____, _____, _____, _____, _____ .

b. Sugar is _____ in water.

2. Write true / false

a. Stone is transparent.

b. A piece of wood floats on water.

c. A windowpane is opaque.

d. Oil mixes with water.

e . Vinegar dissolves in water.

3. Match the Column A with column B.

A		B	
1.	Book	a.	Glass
2.	Tumbler	b.	Wood
3.	Chair	c.	Paper
4.	Toy	d.	Leather
5.	Shoes	e.	Plastics

4. Choose the correct answer.

(i) Which of the following is not matter.

a) water b) sound

c) air d) fruits

(ii) Which property is common to all matter ?

a) Matter takes up space and has no mass

b) Matter takes up space and some mass

c) Matter takes up space and has mass

d) matter takes up space and may or may not have mass

(iii) Which of the following is transparent ?

a) wood b) glass

c) paper d) plastic

5. Very short Questions / Answer?

(i) What is an atom?

(ii) Define density.

(iii) What are transparent objects.

(iv) What are opaque objects.

(v) What are translucent objects.

6. Short answer questions.

(i) What is the difference between transparent and translucent objects? Give examples.

(ii) Select the objects from the following which shine. Glass bowl, plastic mug, steel chair, cotton shirt, gold chain silver ring.

7. Long answer question.

(i) Are all liquids soluble in water?

(ii) List any four item that can float on water and five items that can not float on water ?

X2B7W5

CHAPTER - 5 Separation of Substances

When you go to market with your mother to bring fruits and vegetables, the vendor gives you vegetables in separate bags. Vendor has separated out different vegetable in different heaps. (fig. 5.1) At home also you keep different things like clothes, shoes, books at different places This means you have separated all the substances differently. In daily life you often see that most substances are mixed up with some other substances. These substances may be desirable or undesirable. Similarly, you might have observed your mother taking out fine pebbles and other unwanted substances while cleaning rice, grains and pulses. Why is cleaning of rice, grains and pulses essential before cooking? Are stones, soil and mud present in rice, grains and pulses useful or harmful. So your mother separate undesirable substances from grains. **Separation means process of moving something apart.**

Fig. 5.1 Vegetable vendor

5.1. Need for separation of substances

Taking out useful substances from a mixture is usually the main reason for separation of substances. The need to separate components of mixture or an impure substance is due to following reasons:-

- **To remove undesirable and harmful substances** - For example, separating stones from rice, grains and pulses. Similarly, water you drink comes from rivers and lakes. But it contains impurities and germs and could make us sick. Thus, separation is necessary to remove these impurities.
- **To obtain desirable components:-** Some substances are more desirable than others in a mixture. Therefore, they need to be separated. For example, churning curd to obtain lassi and butter. Similarly Petrol, diesel, kerosene and paraffin wax has to be separated from the Petroleum.

5.2 Methods of separation

When two or more substances are mixed in any ratio they form mixture. The substances in a mixture are separated due to differences in their physical properties, such as their particle size, ability to get dissolved etc. The more different the properties are, the easier it is to separate the substances. For example, tea leaves donot dissolve in water, so your mother use strainer to separate tea leaves from tea. Here are some simple methods of separating substances.

5.2 Separation of solids from other solids

Handpicking

Activity 1 : To demonstrate handpicking

Material Required : Sheet of paper, wheat grains, stones, husk.

Procedure : Take a mixture of grain, stone and husk.Spread them on a sheet of paper. Now, remove the pieces of stone and husk from the mixture, with your hand.

Conclusion : By handpicking you can separate unwanted substances from grains.

Think and Answer

Q.1. How will you separate rotten tomatoes from a basket of tomatoes?

Q.2. How will you separate green grapes from black grapes?

The method of separating undesirable solid substances or impurities from useful solids by hand is known as **handpicking**. For example slightly larger sized impurities like pieces of dirt, stone, as well as lighter impurities like husk are separated from wheat or rice by handpicking. The quantity of such impurities is usually not very large. In such situations, we find that handpicking is a convenient method of separating substances (Fig. 5.2). This method can also be used to separate a mixture of peas, carrot and corn.

Fig. 5.2Hand picking

Threshing

Have you ever seen bundles of wheat or paddy stalks lying in fields after harvesting of crop? These stalks are then dried in the sun. Each stalk has many grains attached to it. Just think how does the farmer separate grain seeds from these bundles of stalks?

Threshing is a process of separation of grains from stalks.

Threshing can be done in following three ways:

- **Manual threshing :** It is done by beating the stalks with sticks on

the ground or beating against any hard object (Fig. 5.3).

Fig. 5.3 Manual Threshing

- **Threshing by Animals :** Some animals like bullocks are allowed to trample the stalks (Fig. 5.4).

Fig. 5.4 Threshing by Animals

- **Threshing by Machine :** Threshers are generally used for this purpose (fig. 5.5). These days a Combine is used for both harvesting and threshing process (Fig. 5.6).

Fig. 5.5 Threshing by Machine

Fig. 5.6 Threshing by Machine (Combine)

Winnowing

Winnowing is an agricultural method for separating grains from chaff. It is also used to remove hay and chaff or other pests from stored grains.

Let us perform an activity to know what is winnowing?

Activity 2 : To demonstrate winnowing.

Material Required : A mixture of wheat grain and husk.

Procedure : Take a mixture of husk and wheat grains. You can also use powdered leaves instead of husk. Put the mixture in a plate or cardboard. Take this mixture to an open ground. Hold the plate or cardboard at your shoulder height in the direction of wind as shown in (Fig. 5.7). Tilt it slightly.

Fig. 5.7 Winnowing

Conclusion : The lighter particles i.e. husk or dry leaves are blown away with wind, while heavier particles like wheat grains falls closer to you.

The separated husk is used for many purposes such as fodder for cattle.

This method is commonly used by farmers to separate lighter husk particles from heavier seeds of grain.

Think and Answer

Q.1. What is the role of wind in winnowing?

Q.2. Can you separate mixture of channa dal and moong dal by winnowing?

Winnowing is used to separate heavier and lighter components of a mixture by wind or by blowing air. In case wind is not blowing, fan is also used for this purpose. (fig 5.8)

Fig 5.8 Winnowing fan

Sieving

Let us perform an activity to know what is sieving?

Activity 3 : To demonstrate sieving.

Material Required : A sieve, flour and plate.

Procedure : Take some flour in a sieve. Shake the sieve to-and-fro above the plate (Fig. 5.9).

Fig. 5.9 Sieving

Conclusion : The fine particles of flour passes through the fine holes of the sieve and get collected in the plate placed below the sieve. Bigger bran particles which could not pass through the holes remain in the sieve.

Think and Answer

Q.1. Can you separate a mixture of salt and flour with sieve? Why or Why not?

Sieving is a method to separate larger substances from smaller substances using a sieve.

Advantages of sieving

It is very easy method of separation. It is a cheap method.

Disadvantage of sieving

Components of same sizes in a mixture cannot be separated. For example, you cannot separate chalk powder from flour.

You must have noticed larger sieve used at construction sites to separate pebbles and stones from sand. (Fig. 5.10)

Fig. 5.10 Pebbles and stones being removed from sand by sieving

5.2.2 Separation of insoluble solids/liquid from liquids

Sedimentation & Decantation

You must have seen your mother soaking rice grains in water before cooking them. This is done to separate insoluble solids like tiny pieces of straw, dirt, insects from rice grains. In this case, rice grains being heavier settle at the bottom and impurities or unwanted substances can be separated by sedimentation, followed by decantation.

Let us perform an activity to know what is sedimentation and decantation?

Activity 4 : To demonstrate sedimentation & decantation.

Material Required : Two beakers, water, sand, stirrer.

Procedure : Take a beaker. Pour some water in it. Put some sand in this beaker. Now keep it for 2-3 hours (fig. 5.11(a)].

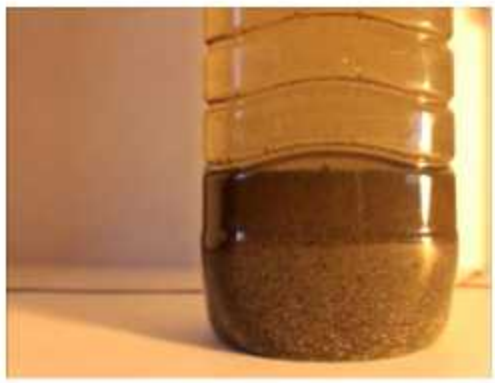


Fig. 5.11 (a)

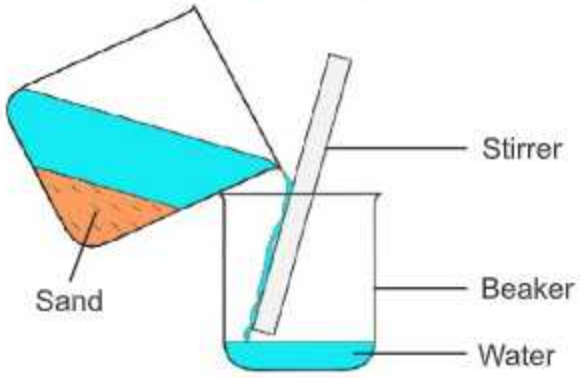


Fig. 5.11 (b)

Fig. 5.11 Separating two components of a mixture by sedimentation [Fig. 5.11 (a)] and decantation [Fig. 5.11 (b)]

Observation : Heavier particles of sand will settle down and water forms a layer on the top. Pour out the water present at the top layer in another beaker [Fig. 5.11(a)].

Conclusion : Settling of heavy particles is the result of **sedimentation**. While collection of water in another beaker is called **decantation**.

Think and Answer

Q.1. You are provided with a solution of chalk powder and water in a beaker. Keep the beaker undisturbed for some time. What will you observe? Name the process.

Sedimentation is a process in which heavier particles of an insoluble solid settles down in liquid. The solid particles which settle down are called **sediments.**

Decantation is the process of pouring out the liquid or water present on top layer without disturbing the sediments below.

Filtration

Filtration is process by which an insoluble solid is separated from liquid by using a filter.

Activity 5 : To demonstrate filtration.

Material required : Beaker, sand,mud, filter paper, funnel, water, stand, stirrer.

Procedure : Take a filter paper.Fold it in the form of cone as shown in (fig 5.12).

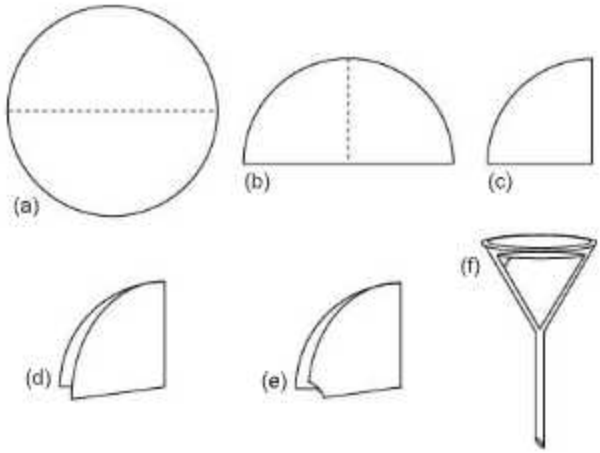


Fig. 5.12 Folding filter paper to make a cone

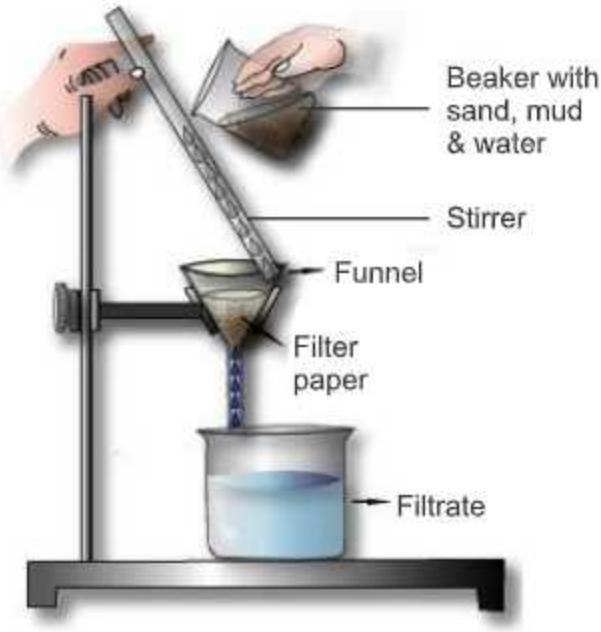


Fig. 5.13 Filtration using filter paper

Place the cone in funnel. Rinse the funnel with water before placing the cone in it.Fit the funnel in the stand. Place a beaker under the funnel. Take some water in an another beaker. Mix some sand and mud in it. Stir it with help of stirrer. Now pour this muddy water into the filter cone with the help of stirrer (fig. 5.13).

Observation : Clean water is collected in the beaker placed below the funnel while solid impurities i.e. sand and mud are left in the filter paper.

Conclusion : In filtration, an insoluble solid is separated from a liquid using a filter paper. The clean liquid so obtained is known **filtrate.** The sand and mud left in the filter paper is known as **residue.**

Think and Answer

Q.1. Your father asked you to bring fresh orange juice from market. Do you observe the strainer used to separate pulp and seeds from the juice? Which strainer is the best for this purpose? Whether tea strainer, filter paper, muslin cloth or strainer with large holes can be used for this purpose.

Some other examples:

- Fruit and vegetable juices are usually filtered to separate their seeds and pulp.
- Cheese (paneer) is prepared by the process of filtration. Lemon juice drops are added to boiled milk. By doing this, a mixture of solid paneer and a liquid is obtained. Then solid paneer is filtered using a fine cloth or a strainer.

5.2.3 Separation of soluble solids from liquids

Evaporation

The process of converting a liquid into its vapour form is called **evaporation.** The liquid component evaporates and solid component is left behind.

Let us perform an activity to understand the process of evaporation.

Activity 6 : To separate salt from salt solution.

Material required : Glass/Beaker, water, salt, tripod stand, wire gauge, spirit lamp, china dish.

Procedure : Take a glass/beaker containing some water. Now, add two spoons of common salt and stir it well. You will see that the salt will dissolve in water. Heat the salt solution in china dish, using wire gauge on a tripod stand. Let the water boils away.

Fig. 5.14 Salt added to water

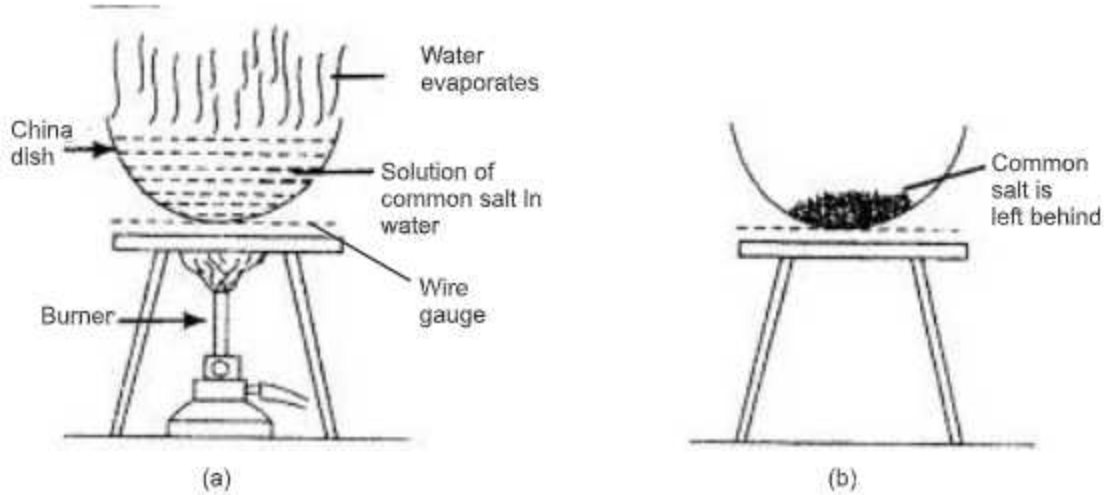


Fig. 5.15 (a) Showing Evaporation (b) Showing salt in china dish

Observation : You will observe that salt is left in the china dish.

Conclusion : On heating, water changes into vapours and goes into the air. The solid salt remains behind in the beaker [Fig. 5.15 (a) & (b)].

Think and Answer

Q.1. Name the process involved in preparation of "Khoya" from milk?

Another example:

- Salt from sea water is obtained by the process of evaporation. Sea water is collected and then kept for evaporation in sunlight. When water is evaporated into vapour, salt is left behind. This salt contains salts of other metals also. So, it is then purified for domestic use (fig. 5.16).

Fig. 5.16 Obtaining salt from sea water by evaporation

Condensation

Let us boil some water in a beaker and cover it with a plate. Remove the plate after few minutes. You will notice water droplets under the plate. The water vapours have condensed into liquid form. Thus, the process of conversion of water vapours into its liquid form is called **condensation.**

Other example, formation of water droplets on the outer surface of glass containing ice cold water is because of the condensation of atmospheric water vapour.

- In winters, we observe water droplets on the outer surface of window panes and car windows (Fig. 5.17). This is due to the condensation of atmospheric water vapour.

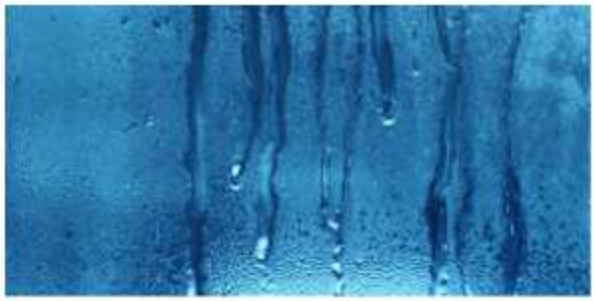


Fig. 5.17 Condensation (Water droplets on window panes)

5.2.4 Separation using more than one method

Activity 7 : Separation of salt,sand and water from the mixture.

Material required : Beaker, salt, water, sand, metal plate, ice, kettle of metal base, spirit lamp.

Procedure : Take a mixture of sand and salt on a sheet of paper. We know that handpicking would not be a practical method for separating these.

Put this mixture in a beaker and add some water to it. Leave the beaker undisturbed for some time. After some time, the sand will settle down at the bottom. The sand can be separated by decantation or filtration. The decanted liquid contains the salt which was there in the mixture at the beginning?

Now, we will separate salt and water from the decanted liquid. Transfer this liquid to a kettle and close its lid. Heat the kettle for some time. The water starts evaporating and steam comes out from the spout of the kettle.Take a metal plate with some ice placed on it. Hold the plate just above the spout of the kettle (Fig. 5.18).

Fig. 5.18 Evaporation and condensation

Observation : The steam condenses when comes in contact with this metal plate and forms liquid water. We can collect water droplets in an empty beaker and salt in kettle.

Conclusion : We can separate a mixture of salt, sand and water using processes of decantation, filtration, evaporation and condensation.

Think and Answer

Q.1. Name the process by which water changes to vapours.

Q.2. Name the process by which vapours changes to water.

Saturated solution : The solution in which no more solute (salt, sugar, etc.) can be dissolved at a given temperature is called saturated solution.

Unsaturated solution : The solution in which more of solute can be dissolved at the given temperature is called unsaturated solution.

Key Words

Bran	Stones	Churning	Vendor
Combine	Sediments	Condensation	Seawater
Decantation	Sieve	Filtration	Separation
Grains	Solution	Handpicking	Threshing
Husk	Undesirable	Impurities	Vapour
Stalks	Winnowing		

Summary

- Separation means process of moving apart.
- Separation of component of mixture is done to remove undesirable and harmful substances and to obtain desirable components of mixture.
- Handpicking is a method of separating undesirable solid substances or impurities from useful solids with the help of hands.
- Threshing is a process of separation of grains from stalks.
- Combine is used for both harvesting and threshing process.
- Winnowing is a method to separate heavier and lighter components of a mixture by wind or by blowing air.
- Sieving is a method to separate larger substance from smaller substances.
- Sedimentation is a process in which heavier particles of an insoluble solid settles down in liquid. The solid particles which settle down are called sediments.
- Decantation is the process of pouring out the liquid present on top layer without disturbing the sediments below.
- Filtration is process by which an insoluble solid is separated from liquid by using a filter paper.
- Evaporation is a process of converting a liquid into its vapour form.
- Condensation is a process of conversion of water vapours into its liquid form.

Exercise

1. Fill in the blanks.

a. Filtration process is helpful in separating an insoluble _____ from a _____ .

b. Small pieces of stones can be removed from rice by _____ method.

c. _____ is used to remove husk from flour.

d. The method in which stalks are beaten to separate the grains is called _____.

e. _____ is the process of pouring out the liquid present on top layer without disturbing the sediments below.

2. Write true or false:

a. Sieving is used when the component of mixture has different sizes.

b. Process of converting liquid to vapours is called condensation.

c. A mixture of salt and flour is separated by handpicking.

d. Threshing is a process of separating grains from stalks.

3. Match the Column A with column B.

	Column A		Column B
a.	Separating salt from water	a)	condensation
b.	Heavier particles settle down	b)	winnowing
c.	Separating different components by blowing wind or air	c)	evaporation
d.	Conversion of vapour into liquid	d)	Sedimentation

4. Choose the correct answer.

(i) Which method is used to separate heavier and lighter components in a mixture by wind?

a) Hand picking b) Threshing

c) Sieving d) Winnowing

(ii) Formation of water droplets on the outer surface of glass containing ice cold water is because of:

a) Evaporation of water from glass

b) Condensation of atmospheric water vapours.

c) Water that seeped out from glass

d) Evaporation of atmospheric water vapours.

(iii) You must have seen your mother taking out fine gravels from rice. Which method can be used to separate pebbles from rice?

a) Handpicking b) Decantation

c) Evaporation d) Sedimentation

(iv) We need to separate one substance from mixture because:

a) To separate two different but useful components

b) To remove undesirable substances

c) To remove harmful substances

d) All the above

5. Very short answer type questions.

(i) Define sedimentation.

(ii) What is evaporation?

(iii) For what purpose combine machine is used for?

6. Short answer type questions.

(i) Give difference between evaporation and condensation.

(ii) Give difference between saturated solution and unsaturated solution.

(iii) Explain different types of threshing.

7. Long answer type questions.

(i) Explain the following methods of separation.

a. Threshing.

b. Winnowing.

c. Sieving.

(ii) What is separation? Why do we need to separate different components of a mixture?

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CHAPTER - 6

Changes Around Us

Change is law of nature. Without change, life is not possible on the earth. Everyday lot of changes occur in our surroundings. For example, change of day and night, setting of curd from milk, moving bus changes its position with time.

Let us define **change**. **It is an act by which a thing becomes different from its previous one.** For example, a child becomes man with the passage of time. If you plant a tree on your birthday, you will find the tree changes its size on your next birthdays.

Some changes are naturally occurring and never ending, these are **natural changes**. Whereas some changes occur due to efforts of human beings and are called **manmade changes**. For example,melting of snow is a natural change.Similarly, falling of leaves from tree is also a natural change. Whereas preparing chapattis from wheat flour is a manmade change.

Slow changes and Fast changes :

Slow changes are those which takes more time to happen. For example, growing of tree, a baby becoming adult, etc.

Fast changes are those that happen very fast.For example, burning of match stick, bursting of crackers, etc.

Periodic and Non periodic changes:

Periodic change : Changes that are repeated after regular interval of time are called periodic changes. For example: - Change of day and night, swinging of pendulum of clock, beating of heart, change of seasons.

Non-periodic changes : Changes that are not repeated after regular interval of time are called non-periodic changes.For example: - occurrence of earthquakes, occurrence of rain, etc.

6.1 Reversible and Irreversible Changes

Reversible change : When a change in a substance can be reversed by changing the conditions it is said to be a reversible change. For example, ice changes to water on melting and water can be changed into ice by cooling, is a reversible change.

Activity 1 : To understand reversible change.

(a) Reversible change in rubber-band

(b) Reversible change in balloons

Fig. 6.1 Reversible changes

Material Required : Rubber band, Balloon.

Procedure : (i) Take a rubber band. Stretch it for a few seconds and release it. (ii) Similarly take a balloon. Blow air into it and after some time release the air (fig. 6.1).

Conclusion : Rubber band on stretching changes its length and on releasing it comes back to its original shape. Similarly, on releasing air from balloon it comes back to its original shape.

Think and Answer

Q.1. Before preparing roti your mother makes a ball from dough. Can the ball be reversed into dough?

Q.2. You make a toy boat from a piece of paper. Can you obtain back the paper in original form?

Irreversible change:

If a substance after change cannot be brought back to its original state then the change is said to be an irreversible change. For example, roti once prepared on tawa, cannot be changed back to dough again.

Activity 2 : To understand irreversible change.

Material Required : A sheet of paper, candle, match stick, pencil and sharpener.

(a) Burning of paper

(b) Sharpening of pencil

Fig. 6.2 Irreversible changes

Procedure :

(i) Take a candle. Lit it with the help of match stick. Take a sheet of paper and burn it with the help of burning candle.

(ii) Take a pencil and sharpen it. Sharpe it repeatedly.

Conclusion : Paper after burning cannot be obtained back. So it is irreversible change [Fig. 6.2 (a)].

On using sharpener,the length of pencil decreases and cannot be obtained back [Fig. 6.2 (b)].

Some common changes are given in Table 6.1. Which of these changes are reversible or irreversible?

Tick (✓) in the appropriate Reversible or Irreversible column in Table 6.1.

Think and Answer

Q.1. Observe the height of students of class 5th and of class 8th. Is the change in height a reversible or irreversible change?

Q.2. Is burning of candle reversible or irreversible change?

Physical and Chemical Changes

Physical Change : Physical change is a temporary change in which no new substance is formed and chemical composition of the original substance remains the same. During this change physical properties like colour, shape, size, state, etc. may change. Therefore, we can say that Physical change is a reversible change.

3 : To understand physical change.

Material Required : Coloured clay, Aluminum foil.

Table 6.1 : List of reversible and irreversible changes.

Change	Reversible	Irreversible
Melting of ice		
Blowing of balloon		
Ripening of mango		
Stretching of rubber		
Cooking of food		
Milk to paneer		
Tearing of paper		
Growth of plants		
Folding a paper		
Burning of candle		

(a) Clay toys

(b) Ball of aluminum foil

Fig. 6.3 Physical changes

Procedure : Take some coloured clay and make any shape like toys, birds etc. Similarly, take an aluminum foil and form a ball out of it [Fig. 6.3].

Conclusion : Change in shape of clay and forming ball of aluminum foil are physical changes.

Think and Answer

Q.1. Which type of change is involved in tearing of paper?

Q.2. Which type of change is involved in melting of ice to water?

Chemical changes

A chemical change is a permanent change in which new substances are formed whose physical and chemical properties are completely different from those of the original substance. Therefore chemical change is a irreversible change.

Activity 4 : To study chemical change.

Material required : Incense stick, match box.

Fig. 6.4 Burning of incense sticks

Procedure : Take an incense stick. Lit it with match stick.

Conclusion : The incense stick gives pleasant smell and get reduced to ashes. This change is a chemical change.

Activity 5 : To Demonstrate chemical change.

Material required : Iron nails, beaker, water.

Procedure : Take a beaker. Fill it with water. Put some iron nails in it. keep them for few days (fig. 6.5).

Fig. 6.5 Rusting of iron nails

Conclusion : The iron nails get coated with some rusty material. This change is a chemical change.

Think and Answer

Q.1. What type of change is observed in formation of paneer from milk.

Q.2. Name the change involved in formation of wax from burning of candles ?

Expansion and Contraction

Changes can be brought about by heating or cooling certain substances. Metals like iron, gold and silver soften on heating and can be molded into different shapes and sizes. Thus on heating metals expand and on cooling they come back to their original sizes.

Expansion

Expansion is the increase in the dimension of a body when subjected to high temperature and high pressure. For example blowing of balloon, stretching of spring.

When expansion is due to increase in temperature it is called as **thermal expansion.**

Contraction:

Contraction is the opposite of expansion that is decrease in dimension of the body due to low temperature and high pressure.

Activity 6 : To study expansion and contraction.

Materials required : Burner, match box, stand, ball and ring apparatus.

Fig. 6.6 Ball and ring apparatus

Procedure : Take a ring and ball apparatus.The ball should easily comes out of the ring. Take a burner. Lit it with match stick and heat the ball. Try to pass the ball through the ring. Leave the ball aside until it cools down. Now try passing the ball through the ring.

Conclusion : You will observe that upon heating the ball expands and doesn't pass through the ring. While on cooling, it contracts and can again easily pass through the ring.

Think and Answer

Q.1. Have you seen Bunsen Burner in the shop of goldsmith? What is its purpose there?

Q.2. When you put clinical thermometer in your mouth, why do Mercury in the thermometer rises and why it falls down when you take it out? (noted that Mercury is a metal which is liquid at room temperature)

Other examples

1. Tools used in agriculture (fig. 6.7) such as plough, leveler, spade etc. made on the basis of expansion and contraction of metal.

The iron blades of these tools have a ring into which the wooden handle is fixed. Normally the ring is slightly smaller in diameter than the wooden handle. While fixing the handle, the ring is heated, which slightly increases its size due to expansion. Now the wooden handle can be fixed easily in the ring. On cooling, the ring attains its normal size due to contraction. Thus the wooden handle fixes tightly.

2. Fixing of metal rim on a wooden wheel of a cart.

The metal rim used is slightly smaller in diameter than the wheels. On heating the rim expands and can easily lie on the wheel. When the rim cools, it contracts and fits tightly onto the wheel (fig. 6.8).

Fig. 6.7 Agricultural tools

Fig. 6.8 cart wheel with metal rim

Key Words

- Agricultural tools
- Bunsen burner
- Candle
- Chemical change
- Clay
- Contraction Expansion

- Fast change
- Goldsmith
- Irreversible change
- Non-periodic change
- Periodic change
- Physical change
- Rim
- Reversible change
- Rusting of iron
- Slow change
- Thermal expansion
- Wheel of a cart

Summary

1. Change refers to the difference which occurs in colour, shape, size or position of things around us.
2. Some changes are slow while some are fast.
3. Some changes can be reversed and some cannot be reversed.
4. A change in which we get back the initial substance by reversing the action is called reversible change.
5. A change in which we cannot get back the initial substance by reversing the action is called irreversible change.
6. Physical change is a change in which no new substance is formed.
7. Chemical change is a change in which new substance is formed.
8. Expansion is the increase in the dimension of a body on increasing the temperature.
9. Contraction is the opposite of expansion. It means decrease in the dimension of a body on decreasing the temperature.

Exercise

1. Fill in the blanks.

a. A new substance is always formed in _____ change.

b. Melting of ice is _____ and _____ change.

c. Burning of paper is _____ change.

d. On heating, metals _____ .

e. Change that is repeated after regular interval of time is known as _____

2. Write true or false:

a. Converting milk into paneer is a reversible change.

b. Rusting of iron is a slow change.

c. Metals contract on heating.

d. Melting of snow from hills is a natural change.

e. Burning of cracker is a fast change.

3. Match the Column A with column B.

Column A		Column B	
a.	Freezing of water	a.	Non periodic
b.	Milk to curd	b.	Physical and reversible
c.	Burning of a matchstick	c.	Periodic
d.	Earthquake	d.	Fast
e.	Change of season	e.	Chemical

4. Choose the correct answer

(i) Cooking of food is which change:

1) Physical 2) Fast

3) Reversible 4) Irreversible

(ii) Which of the following change is non periodic?

1) Heart beat 2) Earthquake

3) Occurrence of day and night 4) Motion of pendulum

(iii) Which of the following expand on heating?

1) Wood 2) Paper

3) Metal 4) Cloth

(iv) Rusting of iron is which type of change

1) Reversible 2) Slow

3) Periodic 4) Fast

(v) Growth in plants and animals is which type of change

1) Slow 2) Reversible

3) Chemical 4) Periodic

5. Very short answer type questions.

(i) What are changes?

(ii) Define slow and fast changes with examples.

(iii) Give two examples of reversible change.

(iv) Why iron rim is made slightly smaller than the wooden wheel?

(v) Give two examples of chemical change.

6. Short answer type questions.

(i) Give difference between periodic and non-periodic changes with examples.

(ii) Give difference between reversible and irreversible changes with examples.

(iii) Why a candle reduces in size on burning?

(iv) Give difference between physical and chemical changes with examples.

7. Long answer type questions.

(i) What is expansion? Define thermal expansion. Explain with two examples.

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CHAPTER - 7 Getting to Know Plants

All of you might have seen variety of plants in school garden or nearby parks. Do all have same colour, height, habitat, shape and structure? No, Some plants have flowers while others do not have. There is a wide range of plants from tiny grass to big banyan tree. However, in spite of this huge variety, all plants have some common parts for performing specific functions. The structure of a plant is divided into two parts : root system and shoot system. The root system is below the ground. This system includes roots. Roots hold the plant in soil so that it doesn't fall over. The shoot system is above the ground and has stem, leaves, flowers and buds. The shoot system conducts substances up and down the plant. The root system absorbs nutrients from soil. Both root and shoot system can store food.

We can classify plants on the basis of the colour, shape or size of their parts. You are familiar with the parts of a flower. Can you label the parts of a plant? (Fig. 7.1) Let us study the features of plants so that we can classify them easily.

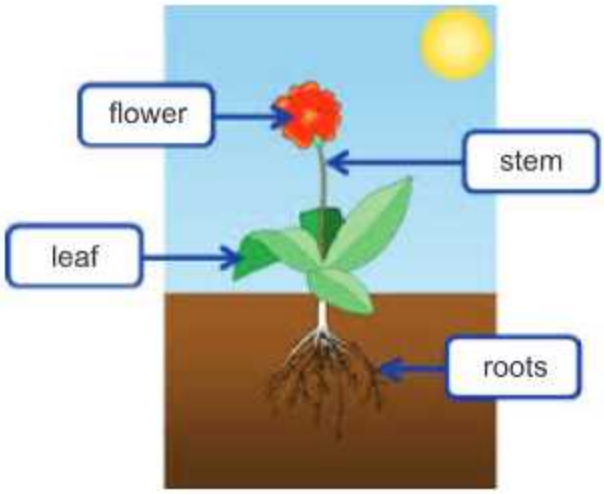


Fig. 7.1 Parts of a plant

7.1 DIFFERENT TYPES OF PLANTS

There are many ways of classifying flowering plants. Plants can be classified on the basis of their height and kind of stem. Based on these characteristics, plants are of following three types :-

(a) Herbs
(b) Shrubs
(c) Trees

(a) Herbs : Herbs are small plants (less than one meter in height) with soft, green stems, which may not have many branches. Examples: wheat, rice, maize, grass, tulsi. (Fig. 7.2 (a))

Fig. 7.2 (a) Herb-Wheat

Some herbs have weak stem that cannot stand upright and spread on ground. Such plants are called **creepers**. Examples: pumpkin and watermelon. (Fig. 7.2 (b))

Fig. 7.2 (b) Creeper-Pumpkin

Some plants with weak stem that cannot stand erect and take support on nearby objects to climb on them are called **climbers.** Examples: money plant and grapevine.(Fig. 7.2 (c))

Fig. 7.2 (c) Climber- Money plant

(b) Shrubs : Shrubs are medium -sized plants(1-3 meter in height) with hard stem, which branches near the base .Examples: rose and lemon.(Fig. 7.2 (d))

Fig. 7.2
(d) Shrub-Rose

Fig. 7.2
(e) Tree-Mango

(c) Trees : Trees are tall and large plants (more than 3 meters in height). They have strong stem called trunk which usually branches in upper part. Examples: mango, neem and banyan (Fig. 7.2 (e))

DO YOU KNOW

You will be surprised to know that banana plant is not a tree, it is a herb.

Fig. Banana Plant

Activity 1 : To know about types of plants.

Take a walk in your school and your nearby park. Study the plants.

Note down the names and features of each plant.

S.No.	Characteristics	Example Lemon	Plant 1 (.....).	Plant 2 (.....)	Plant 3 (.....)
1.	Height (short/medium -sized/tall)	Medium - sized			
2.	Colour of the stem (green/brown)	Brown			
3.	Thickness of the stem (thin/thick)	Thin			
4.	Hardness of the stem (soft/hard)	Hard			
5.	Branching pattern (no branching/near base/upper part much above the ground)	Near base			
6.	Category of plant (herb/shrub/tree)	Shrub			

You can add many more plants to this list.

Think and Answer

Q.1. Rose plant is a _____.

Q.2. Mango plant is a _____.

Q.3. Wheat plant is a _____.

7.2 PARTS OF A PLANT

The plants have different parts. Each part of a plant has a specific function to perform. On the basis of structure, a plant is divided into two parts: root system and shoot system.

7.2.1 The Root system

The underground part of the plant is called root system. Plants have two types of roots- **tap root** and **fibrous root.**

A. Tap Root : This is the main root which grows vertically downwards from the radical and gives off small lateral roots.The main root is also known as **primary root** and its branches are known as **secondary roots**. Radish, neem, mango, gram etc. have tap roots. (Fig. 7.3 (a))

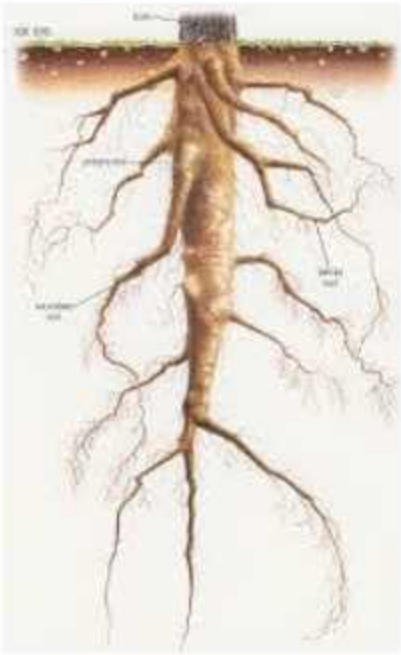
B. Fibrous Root : These roots don't have any main root. Fibrous root has a bunch of roots shooting from the base of stem and grows downwards in the soil. Grass, maize, sugarcane, wheat, banana etc. have fibrous roots. (Fig. 7.3 (b))

Functions of Roots

1. Roots anchor the plant in soil so that it doesn't fall over.
2. Roots absorb water and minerals from soil.
3. Some roots store food material also e.g. beetroot and turnip.
4. Roots prevent soil erosion.

DIFFERENCE BETWEEN TAP AND FIBROUS ROOT

S.NO.	TAP ROOT	FIBROUS ROOT
1.	Penetrate deep into soil.	Fibrous roots are Shallow and don't penetrate deeply as into soil.
2.	Have a long main (primary) root.	Do not contain any main root.
3.	The roots are of different thickness.	The roots are of same thickness.
4.	Found in plants which have reticulate venation in their leaves.	Found in plants which have parallel venation in their leaves.



(a)

(b)

Fig. 7.3 (a) Tap root (b) Fibrous root

Activity 2 : To observe tap root and fibrous roots.

Try to complete the table with the help of your teacher

S.NO.	NAME OF THE PLANT	TYPE OF ROOT
1	Carrot	
2	Grass	Fibrous root
3	Radish	Tap root
4	Turnip	
5	Wheat	
6	Millet	
7	Oak	

Activity 3 : To demonstrate that roots are necessary for absorption of water and minerals from soil.

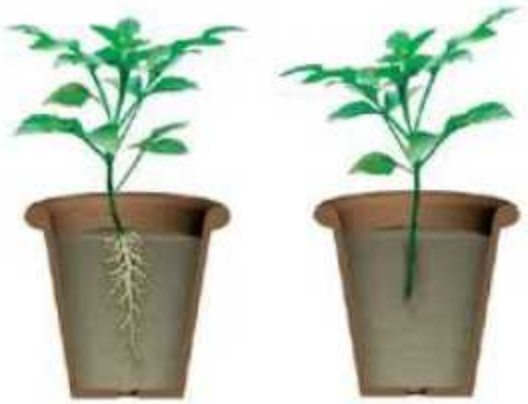
Material required : Two pots filled with soil, two weed plants,water and a pair of scissors.

Procedure:

1. Label the pots as A and B.
2. Pull out two small weeds of nearly the same height.
3. Plant the first weed in pot A .
4. Cut off the roots of second weed with the help of scissors and plant it in pot B.
5. Regularly water them and provide them proper sunlight and air. Observe after a week.

Observation : Plant in pot A remains healthy and keep growing and that in pot B wilts.

Conclusion : Roots are essential for the absorption of water and minerals from the soil.



(a) (b)

Fig. 7.4 (a) Pot A -Weed plant with roots (b) Pot B -Weed plant without roots

Think and Answer

Q.1. ..... help in absorption of water and minerals from the soil.

Q.2. Why does plant in pot B, wilt ?

Activity 4 : To observe that roots hold the plant in soil.

Material required : A plant (Preferably a weed).

Method : Try to pull some plants (Preferably weeds) from ground.

Observation : Plants are not easily uprooted.

Conclusion : Roots anchor (to hold) the plant in the soil.

Think and Answer

Q.1. It is not easy to pull out a plant from the soil because it has strong .....

(a) Roots (b) Flower

(c) Stem (d) Leaves

7.2.2 The Shoot system

The portion of a plant above the ground is called shoot system. It includes leaves, buds, stem and flowers.

(a) STEM

Stem forms the main axis of the plant. The stem of a tree is called trunk. It bears **nodes** and **internodes**. The place where the branches and leaves arise on the stem is called the **node**. The region between the two adjacent nodes is called **internode**.

The small outgrowths on the stem are called **buds**.

Functions of Stem

1. The stem keeps the plant upright.
2. The stem also conducts water and minerals from root to the upper parts of the plant.
3. Transport the products of Photosynthesis from leaves to other parts of plant
4. Some stems also store food material e.g. potato, ginger, turmeric, etc.

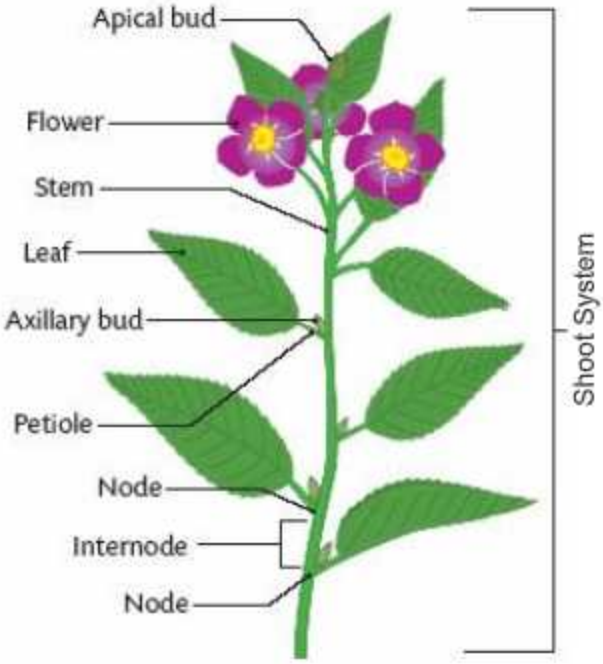


Fig. 7.5 Parts of a stem

Activity 5 : To show that stem always grow upwards.

Material required : A potted plant.

Method : Take a potted plant. Now place this pot horizontally for a few days.

Observation : You will notice that stem grows vertically upwards.

Conclusion : Stem always grow upwards.

Fig. 7.6 Showing stem growing upward against gravity

Think and Answer

Q.1. ..... always grows upwards.

Activity 6 : To show that stem helps in the conduction of water.

Material required : A stem with white flowers (White Balsam or any other plant), red food dye.

Method :

1. Fill the vase with water
2. Add few drops of red ink in vase.

Fig. 7.7 (a)

3. Dip stem in vase and leave for some time. (Fig. 7.7 (a)
4. Observe the colour of flower after some time.

Fig. 7.7 (b)

Observation : The white flowers show specks of red colour. [Fig. 7.7 (b)]

Conclusion : Stem conducts water.

Think and Answer

Q.1. Why white flower of balsam plant show specks of red colour ?

(b) LEAF

The leaf is a flat, thin and green structure which arises from the node of the stem. The green colour of leaves is due to the presence of chlorophyll. **Chlorophyll** is a green-coloured pigment which help in photosynthesis. The leaves of different plants differ in shape, size and colour.

Parts of a leaf : The leaf is attached to the stem by means of a short stalk called **petiole**. The flat, green, expanded portion of the leaf is called leaf-blade or **lamina**. The end of the lamina joining the petiole is called **leaf base**.

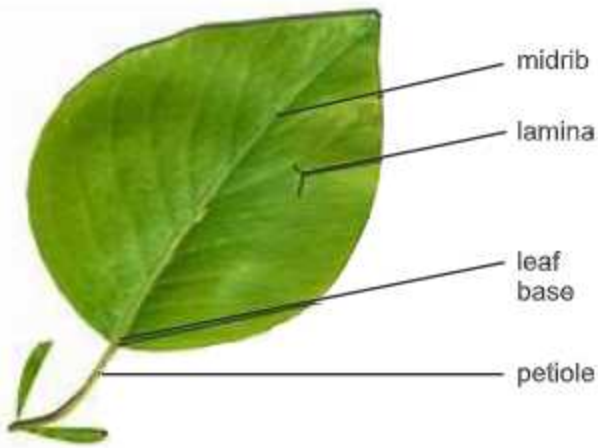


Fig. 7.8 Parts of a leaf

Venation : You must have seen lines on the leaf, these are called veins. You can see a thick vein in the middle of some leaves. This vein is called the **midrib**. The arrangement of veins in a leaf is called **venation**.

Venation is of two types. When veins form a network like structure, such leaf venation is called **Reticulate venation** e.g. leaves of banyan, mango, rose plant.When the veins run parallel to each other, such leaf venation is called **Parallel venation**, e.g. leaves of banana, wheat, grass, etc.

(a)

(b)

Fig. 7.9 Types of venation
(a) Parallel and (b) Reticulated

There are many small pores on the surface of a leaf called **stomata**. It helps in exchange of gases. Loss of water vapour from plants through stomata is called **transpiration**. A major portion of transpiration happens through stomata.

Functions of Leaves:

1. Leaf prepares food from carbon dioxide and water; in the presence of chlorophyll and sunlight. This process is called **Photosynthesis.**
2. Leaves have numerous stomata which help in exchange of gases.
3. The plants give out extra amount of water through stomata. This process is called **transpiration.**
4. Some leaves are modified to perform other functions- protection (thorns in opuntia) reproduction (bryophyllum).

Activity 7 : To demonstrate transpiration in plants through leaves.

Material required : A healthy potted plant, one polythene bag.

Fig. 7.10 Transpiration

Method:

1. Take a healthy potted plant.
2. Enclose one of its branches in a transparent polythene bag.
3. Close the mouth of the bag with string.
4. Observe the plant after some time.

Observation : You will find a few droplets of water inside the bag.

Conclusion : Plant loses water by transpiration through leaves.

Think and Answer

Q.1. What are stomata?

Q.2. Define transpiration.

(e) Flower

Flower is the most beautiful, attractive and colourful part of a flowering plant. It is the reproductive part of a plant. We can identify plants by their flowers. The flower is attached to the stem by stalk called **pedicel**.

Parts of a flower

Sepals : The outermost green leafy structures are the sepals and collectively called **Calyx.** Calyx protect the flower in bud stage.

Petals : The bright coloured leaf-like structures, next to the sepals, are called **Petals**. Petals attract insects and help in reproduction. Petals are collectively called **Corolla**.

Stamens : They are found just inside the petals of the flower. Stamen is the male part of flower. Each stamen consists of a thin stalk called **filament** and two-lobed head called **anther**. The anther produces **pollen grains** and takes part in reproduction.

Pistil : It is the female part of flower. It is a flask- shaped structure in the middle of flower. It is further divided into :-

(i) Ovary : The lower broader portion of the pistil is called ovary. It contains the **ovules** which take part in reproduction.

(ii) Style : The narrow middle portion of the pistil is called **style**.

(iii) Stigma : The sticky end at the top of the style is called stigma.

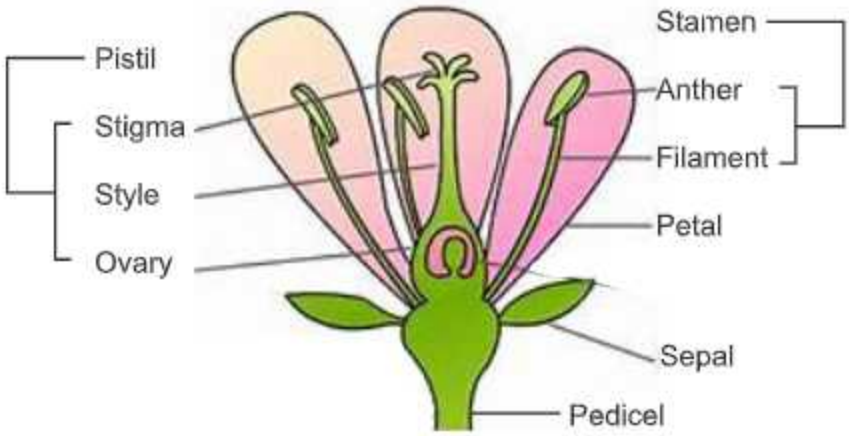


Fig. 7.11 Parts of a flower

Activity 8 : Collect some flowers, examine the structure and complete the table.

Description	Flower 1	Flower 2	Flower 3	Flower 4
No. of Sepals	5			
No. of Petals	5			
No. of Stamens	10			
No. of Pistil	1			
Colour of Petals	Purplish			
Name of flower /plant	Pea flower			

We have studied some features and functions of leaves, stems, roots and flowers. We will learn about fruits and seeds in higher classes.

Key Words

- **Root system :** The underground part of a plant consisting of roots.
- **Shoot system :** The part of a plant above the ground.
- **Petiole :** The stalk of a leaf, which joins the leaf to the stem.
- **Lamina :** The flat green portion of a leaf.
- **Pedicel :** The stalk of a flower.
- **Nodes :** The points on a stem where the leaves arise.
- **Internodes :** The portion on a stem between two nodes.
- **Venation :** The arrangement of veins in a leaf.
- **Axil :** An angle a leaf makes with the stem.
- **Transpiration :** Loss of water from the leaf.
- **Stomata :** Tiny pores on the surface of leaves.
- **Stamen :** The male part of a flower.
- **Pistil :** The female part of a flower.

Summary

- Plants are usually grouped into herbs, shrubs, trees, and climbers based on their height, stems and branches.
- The stem bears leaves, flowers and fruits and divided into nodes and internodes.
- A leaf is attached to the stem by soft and thin petiole.

- The pattern of veins on the leaf is called venation. It can be reticulate or parallel.
- Leaves give out water vapour through the process of transpiration.
- Green leaves make their food by the process of photosynthesis using carbon dioxide and water in the presence of sunlight.
- Roots are mainly of two types: tap root and fibrous roots.
- Plants having leaves with reticulate venation have tap roots while plants having leaves with parallel venation have fibrous roots.
- The stem conducts water from roots to the leaves (and other parts) and food from leaves to other parts of the plant.
- The parts of a flower are sepals, petals, stamens and pistil.
- Stamen represents the male reproductive organ, while pistil is the female reproductive organ.

1. Fill in the blanks.

a. _____ roots do not have any main root.

b. The arrangement of veins in a leaf is called _____.

c. _____ is the female part of the flower.

d. The stem of a tree is called _____.

2. Write true or false:

a. Loss of water from leaves is called transpiration.

b. Chlorophyll is responsible for the green colour in leaves.

c. The portion of stem between two internodes is called node.

d. Stamen is the female reproductive part of a flower.

3. Match the Column A with column B.

A		B	
1.	Root	(a)	protects the flower in bud
2.	Climber	(b)	absorbs water
3.	Sepal	(c)	keeps the plant upright
4.	Stem	(d)	money plant

4. Choose the correct answer.

(i) Mango plant is a

(a) Herb (c) Shrub

(b) Tree (d) Root

(ii) Photosynthesis takes place in

(a) Stem (c) Root

(b) Pistil (d) Leaves

(iii) The points on the stem from where leaves grow are called

(a) Buds (c) Nodes

(b) Axiles (d) Internodes

(iv) The process of losing water by leaves is known as

(a) Absorption (c) Transpiration

(b) Photosynthesis (d) Anchorage

EXERCISE

5. Very short answer type questions.

(i) What is the flat green portion of a leaf called?

(ii) What is venation? Write its different types.

(iii) What is calyx ?

6. Short answer type questions.

(i) What is the difference between tap root and fibrous root?

(ii) Write the main functions of leaves.

(iii) What are creepers? Give one example.

7. Long answer type questions.

(i) What are the different parts of a leaf? Explain with labelled diagram.

(ii) Draw the diagram of a flower and describe its parts.

E6V6R1

CHAPTER - 8

Body Movements

Carefully observe your surroundings while sitting in your classroom. You will observe the various types of movements there. Some students are moving their fingers to write something, some are moving their lips, tongue and jaws to speak, some are moving their hands and arms to hold books and some are moving their whole body while going to teacher. Even you are also moving your head and neck to see around. Do you notice any difference in these types of body movements?

All these movements can be grouped under two categories. Some students are moving their body parts while sitting at a place whereas some are moving themselves from one place to another. Such movement from one place to another is called locomotion. Movement of body parts and locomotion are two important properties of living organisms.

Movement is a change in the position of any part of body of an organism.

Locomotion is movement of whole body of an organism from one place to another Plants are generally fixed to ground. They do not show locomotion, but they show movements. For example leaves of 'Touch me not' plant fold up when touched by hand. (Fig 8.1)

Fig 8.1 Movement in 'Touch me not' plant

Animals show locomotion by different means. Walking by man, swimming by fishes, running by horse, crawling by snake, jumping by grasshopper and flying by birds are different modes of animal locomotion. (Fig. 8.2)

A. Walking man | B. Running Horse | C. Swimming Fishes | D. Flying Birds

Fig 8.2 Locomotion in animals

Animals move from one place to another in search of water, food, shelter and protection from enemy. Have you ever thought, how it happens? How animals are able to move their body parts? Which structure of our body help us in movements?

We need bone and muscles to move our body parts. All the bones in our body make a framework to give support to body. This framework is called **skeleton**. To understand the various movements of Human body let's take a look at Human skeleton.

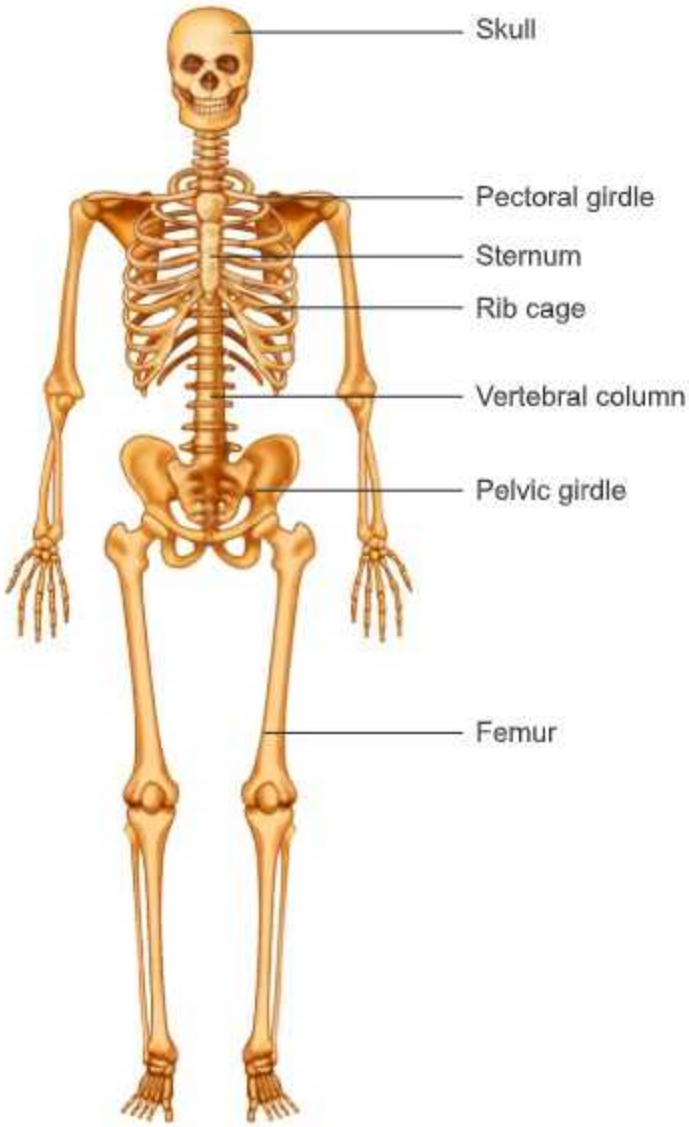


Fig 8.3 The Human Skeleton

8.1 THE HUMAN SKELETON

Human skeleton comprises of **bones** and

cartilages. Bones are hard and rigid whereas cartilage is smooth and flexible. **Cartilage** is found between joints and in some elastic organs like ear lobe and nose.

Do you know the number of bones in Human body?

Human body has 300 bones at the time of birth. Many of them later fuse together and an adult Human body is left with total of 206 bones.

All the bones can be studied under following four categories.

8.1.1 Skull

It comprises of bones of face and head (Fig. 8.4). All the bones of skull are fixed and cannot move except that of lower jaw. Skull encloses and protects the important organ of body, the brain.

Fig 8.4 Human Skull

8.1.2 Backbone or Vertebral Column

The Backbone forms the main axis of skeleton. It runs from base of skull to lower back. It is made up of 33 bones called vertebrae (singular-vertebra). which are joined to each other to from vertebral coloumn or back bone. These joints in a back bone help us in bending and twisting our back (Fig 8.5).

Fig 8.5. The Vertebral Column

Activity 1 : Ask your friend to touch his toes without bending his knees. Now touch the back of his neck and move your fingers downward on the back of your friend. What you feel is backbone. You will feel that it comprises of many small bones called **vertebrae**.

8.1.3. Rib Cage

There are 12 pairs of thin flat and curved bones called ribs. These are attached to vertebral column at back and Breast bone **(Sternum)** in front. The last two pairs of ribs are not attached to sternum. The rib cage protects important organs including heart, lungs and kidneys.

Activity 2 : Take a long breath and hold it up for a little while. Now touch your chest region, gently press it and move your finger up and down on chest. You will feel few ridges there. What you feel , are ribs. Try to count as many ribs as you can.

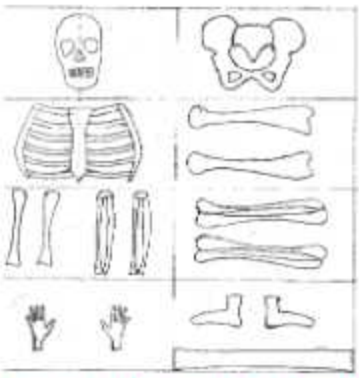
8.1.4. Limbs

There are two pairs of limbs-forelimbs (Arms) and hind limbs (Legs). The bones of arm are attached to main axis of body by shoulders (Pectoral girdles) and bones of legs are attached to main axis of body by hip bones (Pelvic girdles). **Thigh bone (Femur) is the longest bone in human body.**

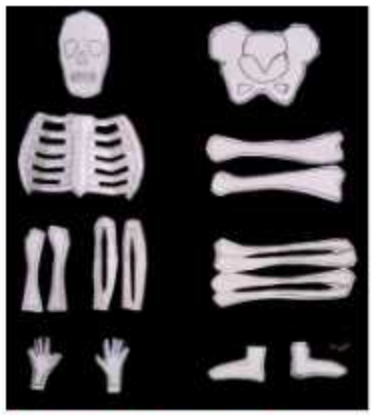
Activity 3 : Play and Learn.

Material Required : Plain paper, scissors, pencil, glue.

Method : Take a plain paper. Divide it into eight equal rectangular parts. Now draw different parts of skeleton including skull, rib cage, backbone, forelimbs and hind limbs as shown in fig 8.6. Cut all the parts with scissors. Paste different parts with glue as shown in step 3. Write names of different bones on paper skeleton. Skeleton is ready to play.



Step 1 : Draw the skeleton



Step 2 : Cut into pieces

Step 3 : Paste the parts

Step 4 : Play with skeleton

Fig 8.6 Making a paper skeleton

Think and Answer

Q.1. What are the small bones present in backbone called?

Q.2. Which bones can be felt in our Chest region?

Table 8.1 Movement in Human body

BODY PART	MOVEMENT		
	Rotates Completely	Rotates Partially	Bends
Head			
Neck		Yes	
Back			Yes
Arm			
Elbow			
Fingers			
Leg	Yes		
Knee			
Ankle			
Toes			

8.2 BODY MOVEMENTS AND JOINTS

Let's now study the various movements in human body.

Activity 4 : To Study the movements in different parts of body.

Method : Try to move the various parts of your body and try to find the answer to questions like, Which body part rotate completely? Which body part rotate partially?, Which body part do not move at all?, Which body part bends?. Note down your observations in table number 8.1

Conclusion : You will find that you are able to move few parts of your body very easily in all directions (Arm) whereas some parts move only in one direction (fingers). Why it happens so? To get the answer let's perform one more activity.

Activity 5 : To know about the points where bones join?

Material Required : Wooden scale, rope/ribbon.

Method : Ask your friend to tie the wooden scale with your arm and leg as shown in Fig. 8.7.Now try to bend your elbow and knee one by one. Can you bend your arm and leg now?

Fig 8.7 Wooden scales tied to arm and leg

Observation : You are unable to move the tied parts.

Conclusion : From this activity it can be concluded that a single bone cannot be bent. We are able to bend or rotate our body only at those points where bones join together. Such points are **called joints.**

Think and Answer

Q.1. When you tie a scale with your arm, are you able to bend your elbow?

Q.2. Name the points where two parts of body are seen to be joined together.

8.2.1 Joints and their types

Joint is a place where bones join with each other. Bones are connected together by elastic tissue called **ligament.**

Joints are of two types

1. Fixed Joints : The joints where no movement of bones is possible are called fixed joints. For example the joints in skull are fixed joints [Fig. 8.8 (a)].

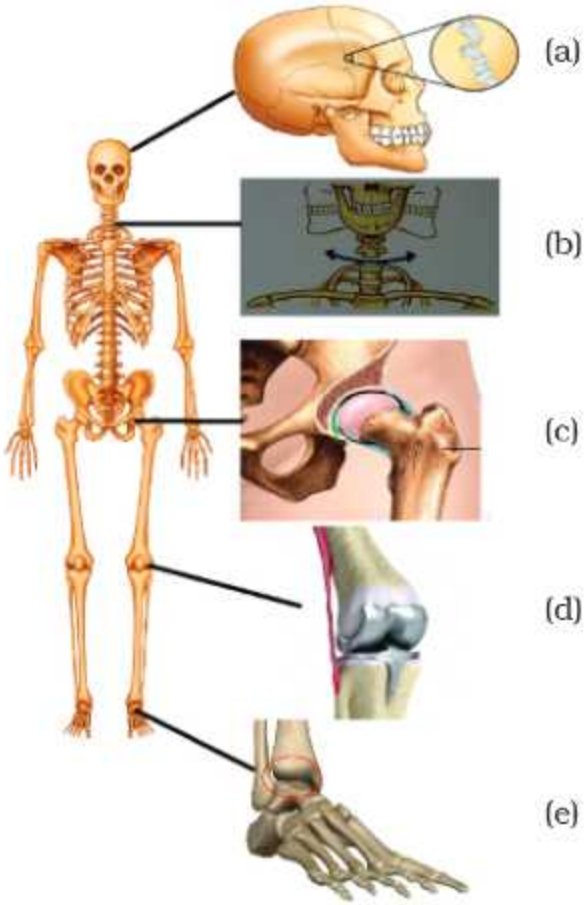


Fig 8.8. Human Skeleton showing various joints

2. Moveable Joints : The joints where movement of bones is possible are called moveable joints. these are categorised into following four types:

(a) Ball and socket Joint : In this joint a ball like rounded end of one bone fits into socket like cavity of another bone as shown in fig. 8.8 (c). It allows the movement of bones in all the directions.

Activity 5 : To make a model of ball and socket joint.

Material Required : 2 Plastic balls, pencil, cutter.

Method : Take a plastic ball. Make a hole in it. Take a pencil and push it into hole made in plastic ball. Take another ball slightly larger than the previous one. Cut it from centre to make two hollow spheres. Put the ball with pencil into half hollow sphere and try to rotate it in various directions (fig 8.9). This works as ball and socket joint.

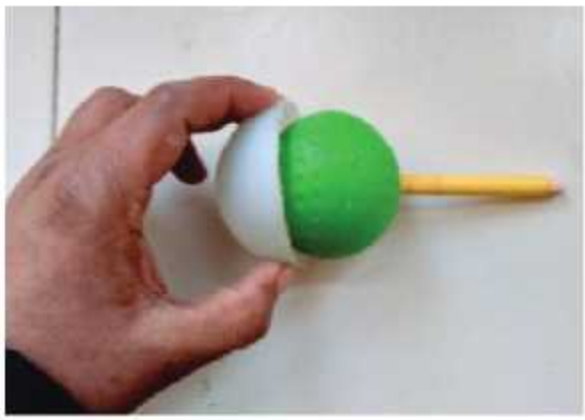


Fig 8.9 Model of ball and socket joint

This joint is present between arm and shoulder. Can you name another such joint present in body? Discuss your answer with the teacher.

(b) Pivot Joint : In this joint one bone is like a bony cylinder and other is like a ring. The cylinder rotates inside the ring or ring rotates outside the cylinder. The joint where our neck joins the head is a **pivot joint** (fig 8.8 (b)). It allows the movement of head backward, forward, left and right.

(c) Hinge Joint : This joint is like hinge in door. It allows movement of bones only in one direction that is up and down or back and forth.

Activity 6 : To make a model of Hinge joint.

Material Required : Cardboard, Pencil, paper Cutter, Scissors.

Method : Make a cylinder with cardboard. Attach a pencil to cylinder by piercing the cylinder at centre as shown in fig.8.10. Make a hollow half cylinder with cardboard slightly larger than the previous one (You can cut the hollow cylinder like Shuttle box or PVC pipe from centre to make half cylinder). Now keep the rolled up cylinder inside the hollow half cylinder.

Fig 8.10 (a) Model of Hinge joint

Fig 8.10 (b) Model of Hinge joint

Try to move the rolled up cylinder in various direction. You will observe

only back and forth movement. This is a model of hinge joint. Such joints are present in fingers, knees and toes [Fig 8.8 (d)]. Can you name another such joint present in body? Discuss the answer with your teacher.

(d) Gliding Joint : This joint allows bones to glide over each other providing only a little movement in all directions. Joint between wrist bones and between ankle bones are gliding joints (Fig 8.8 (e)].

Think and Answer

Q.1. Move your arm at shoulder. Are you able to move it in various directions? If yes name the type of joint present there.

Q.2. Move your arm at elbow. Are you able to move it in various directions? If yes name the type of joint present there.

8.2.2 Muscular System

Muscular system is responsible for movement of human body. We have learned that our skeleton is made up of many bones, joints and cartilages. We are able to move our bones only at the points where bones are joined together but bones alone cannot move by themselves. Bones need the help of a specialised tissue called muscles to move. Muscles are attached to bones with the help of strong fibrous tissue called **tendon**. Muscles always work in pairs. For example when we bend our arm the muscles of upper side contracts to pull the arm up and those of lower side get relaxed at this time. When we straigten our arm again muscles of lower side of arm contracts and those of upper side relaxes (Fig 8.11).

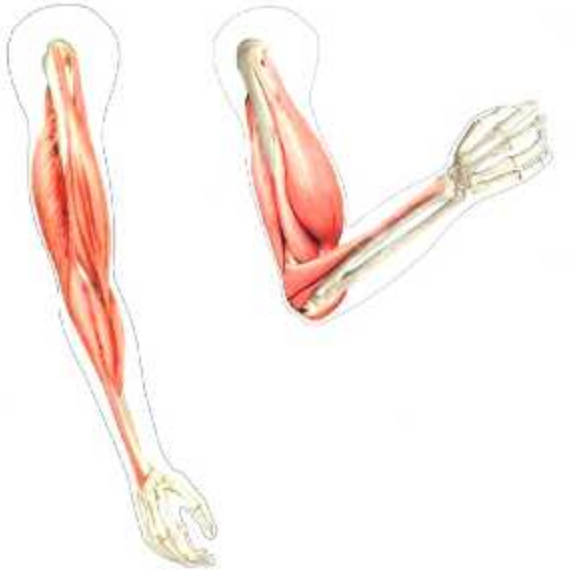


Fig 8.11 Muscles work in pairs

8.3 GAIT OF ANIMALS

Gait is the pattern of movement of limbs of animals. Different animals use different gait depending on the type of skeletal system present in their body. In this chapter we will discuss the mode of locomotion in earthworm, cockroaches, snail, birds, fish and snake.

8.3.1 Locomotion in Earthworm

Earthworms do not have bones. Body is long, cylindrical, narrow and segmented. Earthworm moves with the help of muscles.

To move forward, it first extends front part of body, keeping the rear part fixed to ground. Then it fixes its

front part to ground and releases the rear part which contracts and moves ahead. By repeating such muscular contractions and expansions, it moves through the soil (Fig 8.12).

Fig 8.12 Locomotion in Earthworm

8.3.2 Locomotion in Snail

Snail has a hard shell but this shell does not help in locomotion. Snail moves with the help of large sticky muscular foot. The muscles in foot enable the snail to move by regular contractions and relaxations (Fig 8.13).

Fig 8.13 Locomotion in Snail

Besides, the foot secretes a slimy substance called mucus which reduces the friction between foot and ground.

8.3.3. Locomotion in Cockroach

A cockroach can walk, climb and fly. (Fig 8.14). The middle part of its body has three pairs of legs, which enable it to walk or run. There are adhesive pads at the end of legs which enable it to climb. There are two pairs of wings which enable it to fly over short distances.

Fig 8.14 Cockroach

8.3.4 Locomotion in Birds

Birds can fly in air, walk/run on ground and some can swim in water. Their forelimbs are modified into wings, which help in flight. Besides this streamlined shape of their body hollow and light weight bones help them during flight (Fig 8.15).

Fig 8.15 A bird during flight

Birds keep their hind limbs close to body which reduces resistance from air. Birds walk on ground with their hind limbs. Birds which swim in water have webbed feet, which help them to paddle and swim in water (Fig 8.16)

Fig. 8.16 Webbed feet in birds

8.3.5 Locomotion in Fish :-

The shape of fish is somewhat like that of boat. The head and tail of fish are smaller than the middle part of body. The body tapers at both ends. This body shape is called **streamlined.**

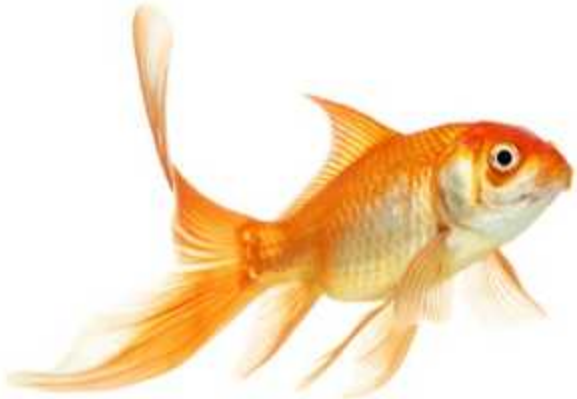


Fig 8.17 Locomotion in Fishes

The fish forms a curve as shown in fig. 8.17. Fish produces regular jerks by making such curves and pushes the body forward .The body movement is further helped by fins present in body. These fins help them to maintain balance and change directions while swimming.

8.3.6 Locomotion in Snake:-

Snakes do not have legs. They move by creeping on their belly.

Fig 8.18 Locomotion in Snake

The snake moves by turning its body into several loops on alternate sides. Each loop of snake gives it a forward push by pressing against the ground (Fig 8.18) Snakes do not move in straight line, they move in wave like manner.

Key Words

- **Cartilage :** Smooth, thick and flexible tissue found in joints.
- **Joints :** Points where bones meet.
- **Breast Bone :** Long, flat bone named sternum present at the centre of chest.
- **Ligament :** Strong, flexible tissue which connects two bones.
- **Tendon :** Strong, fibrous tissue which connects a bone with muscle.
- **Gait :** Pattern of movement of limbs in animals.

Summary

- Movement is change in position of one part of body whereas locomotion means moving the whole body from one place to another.
- Human skeleton comprises of 206 bones and few cartilages. The bony skeleton comprises of the bones of skull, backbone, ribs and limbs.
- Bones are connected to each other at joints by ligaments.
- Bones need the help of muscles to move which are attached to bones by tendon.
- Gait is the pattern of movement of limbs of animals. Different animals use different gait.
- Earthworm moves by regular contractions and expansions of body using muscles. Snail moves by muscular foot.
- Cockroach can walk by three pairs of legs, can fly by two pairs of wings and can climb by adhesive pads at the end of legs.
- Birds have streamlined body, hollow bones and forelimbs modified into wings which enable them to fly in air.
- Fish swim by making curves on alternate sides of body.
- Snakes move by turning their body into several loops on alternate sides of body.

Exercise

1. Fill in the blanks.

a. The points where bones meet are called _____ .

b. Human skeleton is made up of _____ and cartilages.

c. Skull protects _____ of body.

d. Earthworm can extend or shorten its body by using its _____.

e. Knee joint is an example of _____ joint.

2. Write true or false:

a. Rib cage is conical structure made up of 12 pairs of ribs.

b. Cartilages are harder than bones.

c. Bones do not need the help of muscles to move.

d. A streamlined body is one in which middle part of body is larger than head and tail part.

e. Snakes move very fast in a straight line.

3. Match the Column A with column B.

	A		B
1.	Ball and Socket Joint	a.	Skull bones
2.	Immoveable Joint	b.	Fingers
3.	Hinge joint	c.	Wrist bones
4.	Pivot Joint	d.	Shoulder
5.	Gliding Joint	e.	Movement of Head

4. Choose the correct answer.

(i) Which of the following organ is protected by rib cage

a. Heart b. Brain

c. Eyes d. Ear

(ii) Snail moves with the help of

a. Shell b. Bones

c. Muscular foot d. Cartilage

(iii) Fish maintains its balance in water and change its directions with the help of

a. Head b. Gills

c. Fins d. Body scales

5. Very short answer type questions.

(i) Name the longest bone in human body?

(ii) Name the type of joint where arms join the shoulder.

(iii) What is the difference between movement and locomotion?

(iv) Give an example of an organism which can walk, climb and fly.

6. Short answer type questions.

(i) Why we need a pair of muscles to move a bone?

(ii) How does earthworm move?

(iii) How does the body of a bird help it in flight?

7. Long answer type questions.

(i) Explain different types of joints present in human body.

(ii) Explain the locomotion in Fish.

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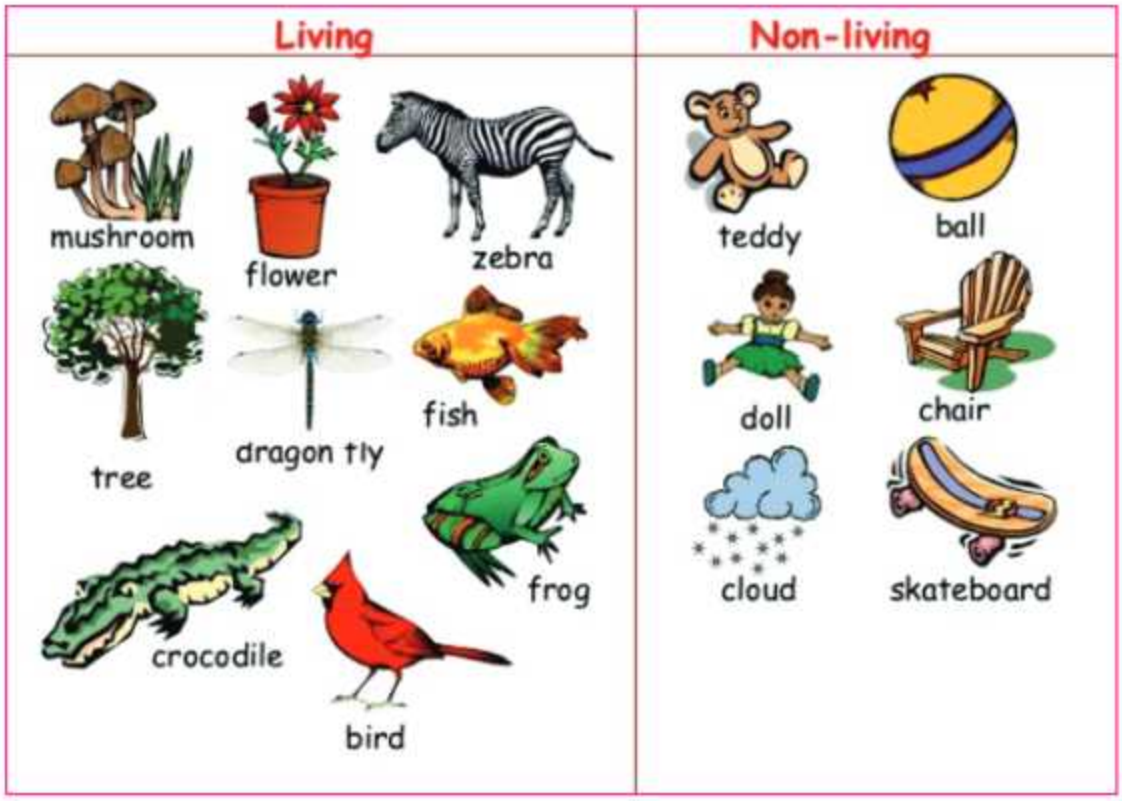
CHAPTER - 9 The Living Organisms And Their Surroundings

Life exists everywhere on earth. You will find different types of plants and animals on different regions of the earth.There are trees like pine,oak and animals like beer in cold climate of Himalayas. There are animals like camel, goat and plants like cactus in warm climate of Rajasthan, even sea has life in the form of fishes, whales, sharks etc. Although all these living beings look different from one another, yet they have certain common characteristics which differentiate them from non living beings.

Let's make a list of different living and non living objects in our daily life. There are animals like frog, fish, cow, dog, zebra, cat, birds, insects and things like water, air, soil, ball, chair, doll, tables etc. But which things out of these things are said to be living and why? What are the characteristics which make them living?



Difference between living and non-living beings

S.No.	Characteristics	Living Beings	Non- Living Beings
1	Movement	Living beings show movement of parts of their body.	Non-living beings never move on their own effort.
2	Growth	Living beings grow.	Non-living beings do not show any growth.
3	Reproduction	Living beings reproduce.	Non-living beings do not reproduce.
4	Sensitivity	Living beings can feel.	Non-living beings can not feel.
5	Respiration	Living beings respire.	Non-living beings don not respire.
6	Excretion	Living beings excrete waste materials.	Non-living beings do not excrete waste material.
7	Nutrition	Living beings need food.	Non-living beings do not need food.

Let's study about the characters which differentiate living beings from non living things.

9.1 Characteristics of the living beings

a. All living beings are made up of cells : A wall is made up of bricks, so bricks are the units of construction. Similarly, all living organisms are made up of small repeating units called **Cell**. Some organisms are made of only one cell these are called **unicellular organisms** e.g. Amoeba, Paramecium etc. The living things made up of large number of cells are called **multicellular organisms** e.g. human beings, cat, new born baby.

b. All living beings can grow : Growth is the fundamental character of all living organisms. A baby grows into an adult; you might have seen pups of dogs growing into adults. Plants also grow. Small seedlings grow into plants. Notice few plants in your school's garden and observe them for few days. You will find that plants are growing in size. So, growth is a common feature of all living organisms.

c. All living beings need food : All living organisms need food to carry

out their daily activities. Food is the main source of energy for living beings to perform their basic life processes.

d. All living beings respond to stimulus : Living things respond to immediate and long term changes in their environment. Such changes in environment that make us respond to them are called **stimulus.** We must have seen ants around a sweet substance. In this case fragrance of sweet substance is a stimulus and movement of ants towards it is **response**.

e. All living beings have definite life Span : The duration of life for which a living thing lives, is called its life span. Some organisms like tortoise live for more than hundred years and some insects live only for few days or few months.

Average life span of some organisms

Organism	Average life span
Bacteria	20 minutes
Housefly	1-4 years
Horse	25-30 years
Dog	15-18 years
Lion	20-25 years
Man	80-100 years

f. All living beings reproduce to produce new organisms : All living things produce their young ones by reproduction. Some animals such as birds lay eggs and young ones come out of the eggs. Some animals such as dogs and cats give birth to their young ones.

Plants also reproduce. Most of plants reproduce with the help of seeds. When a seed is sown, it grows to a new plant. Some plants reproduce by means of roots, stem or leaves.

g. All living beings respire : They respire to produce energy in their bodies. When we breathe in we take oxygen. Oxygen combines with food to produce energy, carbon dioxide and water vapour. The process of taking in oxygen, combining with food and throwing out carbon dioxide and water vapour is called **respiration**. Plants take carbon dioxide through stomata.

h. All living beings excrete wastes : The process by which waste products are removed from the body of organisms is called **excretion**. During digestion, respiration, some waste products are produced. Our body expels out these wastes in the form of urine, faeces, sweat and exhaled air. Plants exchange gases through the stomata, which are present on leaves.

i. All living beings show movements : Animals move from one place to another in search of food. They protect themselves from their enemies and natural calamities etc by moving away. Animals also swim, crawl, run or fly. Plants do not move from one place to another. They show movement in some of their parts. They show small movements such as the opening and closing of flowers etc.

9.2 Habitat and adaptations

9.2.1 Habitat

The place where living beings live is called their habitat. In its habitat an organism finds food, water, air, shelter, comfort, safety and suitable condition for breeding and survival. Habitat has particular physical conditions and also has its own special type of vegetation. There are different types of habitats such as forest, sea- shores, desert, lakes etc. Plants and animals live in specific habitats. Cactus plant grows and survives well in hot and dry areas of deserts. So, habitat of the cactus plant is desert.

Let us try to find out the habitats of different Organisms

Organism	Habitat	Organism	Habitat
Cactus	Desert	Camel	_____
Fish	_____	Tiger	_____
Lotus	_____	Rose plant	_____

9.2.2 Components of habitat

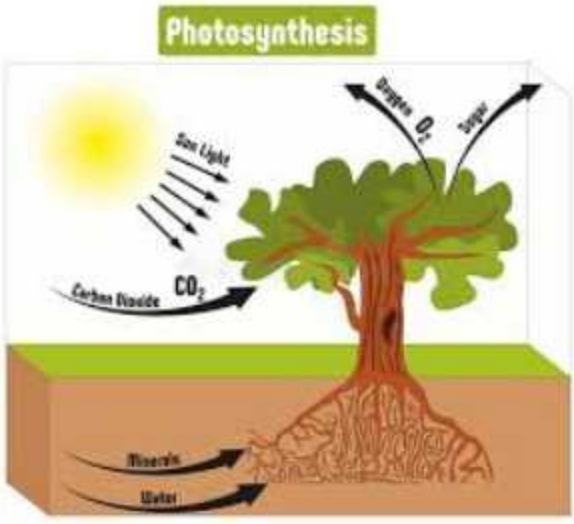
A habitat is the sum total of biotic and abiotic components.

A. Biotic components

Living things like plants, animals, human beings and micro -organisms in a habitat are the biotic component of the environment.

Types of the Biotic components: On the basis of food habits, living organisms can be divided into four categories -

(i) Producers : Organisms that can manufacture their own food are called producers. For example, green plants make their own food by the process of photosynthesis.



(ii) Consumers : Organisms that cannot manufacture their own food but consume food prepared by green plants or other organisms are consumers. They are of three types :

a) Primary consumers or Herbivores : The animals that get their food directly from plants are called Herbivores e.g. elephant, deer, cow, and goat, etc.

Goat

Cow

b) Secondary consumers or Carnivores : They eat primary consumers e.g. snake, frog, lizard, etc.

Snake

Frog

c) Tertiary consumers : They eat secondary consumers e.g. lion, tiger, leopards, etc.

Lion

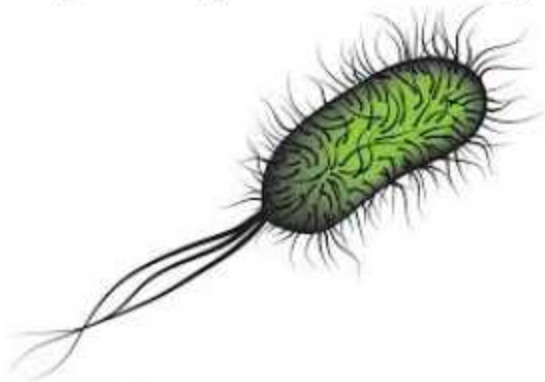
Leopard

(iii) Scavengers : Some animals feed on dead animals and help us in keeping our environment clean. e.g. vultures, dogs, kites, crows.

Vulture

Dog

(iv) Decomposers : The micro-organisms which feed on the dead bodies of plants and animals and break them into simple substances are called decomposers e.g. bacteria and fungi.



Bacterium

Fungi

B. Abiotic components

The word abiotic means non - living. The non - living components of a habitat like the rocks, soil, air, water, sunlight and temperature etc. are called abiotic components of that habitat.

(i) Air : Both plants and animals require oxygen to stay alive. Animals take in oxygen present in air and release carbon dioxide. Green plants take in carbon dioxide during photosynthesis and give out oxygen. Air also serves as a medium of pollination in plants.

(ii) Soil : Soil contains water, air, and living organisms. Soil provides nutrients to plants like minerals and water.

(iii) Sunlight : Plants make their food with the help of sunlight. All animals depend directly or indirectly on plants for their food.

(iv) Water : Water is essential for life. The bodies of all plants and animals contain large amounts of water.

(v) Temperature : All living organisms can survive only within a specific temperature range.

9.2.3 Types of Habitat

There are three main kinds of habitat:

1. Terrestrial habitat (land)
2. Aquatic habitat (water)
3. Aerial or arboreal habitat (air or tree)

1. Terrestrial habitat : (Terra means land). The organisms that live on land are called terrestrial organisms and their habitat is called terrestrial habitat e.g. desert, grassland, mountain and forest.

2. Aquatic habitat : (Aqua means water). The organisms that live in lakes, ponds, rivers and oceans are called aquatic organisms and their habitats are called aquatic habitats e.g. saline water habitat: oceans, seas, certain lakes etc.

Fresh water habitat: rivers, ponds, lakes.

Aquatic habitat

3. Aerial or Arboreal habitat : It is the living place of organisms which mostly live in air. Most birds and winged animals are arboreal in habit. Organisms are adapted for aerial existence as no organism is born in air.

Arboreal habitat

9.2.4 Adaptations in organisms

The ability of living things to adjust themselves to their surroundings is called **adaptation**. Adaptations are the modifications of a part of the complete body of an organism that enables it to perform special functions and help it to face a particular environmental condition.

A. Adaptations in plants

Plants have adaptations to survive in different areas. These adaptations might make it very difficult for the plant to survive in a different place. This explains why certain plants are found in one area, but not in another.

1) Plant adaptations in desert

Plants living in dry or desert area are called **xerophytes** like cactus. Desert

Some Cacti

plants, have some adaptations like very long roots, small leaves or spines and wax coated stem to conserve water.

2) Plant adaptations in water : Plants that live in water are called **hydrophytes**. Some hydrophytes live completely under water e.g. hydrilla and some float on surface e.g. lotus. They have adaptations like poorly developed roots, stems are flexible and leaves are wax coated.

Lotus

Hydrilla

B. Adaptations in animals

Adaptations in animals enable them to find food, protect themselves from extreme conditions or escape from predators.

1. Animal adaptations in desert : Camel is called ship of the desert. Camel has no sweat glands and it excretes very little urine to reduce water loss. A camel has one or two humps on its back. This hump stores fat as reserve food. It has very thick skin to bear the heat of desert. Its toes are broad and padded which are suitable for walking on hot and loose sand.

2. Animal adaptations in water : Aquatic animals include both freshwater and marine forms. Fish and whales are the example of aquatic animals.They have streamlined body to reduce resistance due to water. Fins in fishes and flippers in whales help them in swimming. Ducks have webbed feet for swimming. They have an air bladder that helps them to float on water.

(a) Webbed feet

(b) Streamlined body of fish

3. Adaptations for flight in birds: In aerial organisms bones are hollow, feathers are present and forelimbs are modified into wings for flying.

Birds

4. Adaptations in animals living in very cold areas : Animals like penguin and polar bears live in very cold areas. These animals have thick skin or have a thick fur to protect them from extreme cold. Yalks have long hair which keep them warm. Some animals go into a state of long sleep during winter for survival. This winter sleep is called **hibernation** e.g. frogs, lizards.

Key Words

- **Life Span :** The duration of life for which a living being lives.
- **Habitat :** The place where living being a live.
- **Producers :** Organisms that can manufacture their own food.
- **Consumers :** Organisms that cannot manufacture their own food and consume food prepared by other organisms.
- **Scavengers :** Animals which feed on dead animals.
- **Decomposers :** Microorganisms which feed on dead plants and animals and break them into simple substances.
- **Adaptation :** The ability of living things to adjust themselves to their surroundings.
- **Hibernation :** Long winter sleep of animals.

Summary

- All living beings have some common characteristics - They need food, respond to stimulus, they respire, excrete, grow, reproduce and show movements.
- The place where a living being live is called its habitat. A habitat has two components - biotic and abiotic.
- Organisms that can manufacture their own food are called producers. Organisms that cannot manufacture their own food and consume food prepared by other organisms are called consumers. Animals which feed on dead animals are called as scavengers.
- Microorganisms which feed on dead plants and animals and break them into simple substances are called decomposers.
- The ability of living things to adjust themselves to their surroundings is called Adaptation.

1. Fill in the blanks.

a. The respiratory organs of fish are _____ .

b. Environment consist of _____ and _____ component.

c. Sunlight is _____ component of a habitat.

d. Animals that live on land are called _____.

e. All _____ beings show growth and reproduction.

2. Write True or False:

a. Cactus carry out photosynthesis using their stems.

b. A camel's hump stores food and water.

c. All green plants are consumers.

d. Biotic components consist of water, air and soil.

3. Match the column A with column B:

A		B	
1.	Main source of energy on earth	(a)	Plants or animals
2.	Arboreal	(b)	Waxy coating on stem
3.	Cactus	(c)	Monkey
4.	Biotic components	(d)	The sun

4. Choose the correct-answer :

(i) Abiotc components include.

(a) Air, water, plants (c) air, water, soil

(b) Plants and animals (d) soil, plants, water

(ii) Cactus is a _____

(a) Xerophytes (c) Decomposer

(b) Hydrophytes (d) Herb.

(iii) _____ have a streamlined body.

(a) Earthworms (c) Tigers

(b) Fishes (d) Polar bears

(iv) Organisms living in water are called _____ animals.

(a) Aquatic (c) Terrestrial

(b) Xerophytes (d) Aerial

EXERCISE

5. Very short Answer type Questions:

(i) Define habitat.

(ii) Define adaption.

(iii) Give two examples each of terrestrial and aquatic animals.

(iv) What are the producers?

(v) What are biotic components?

6. Short Answer type Questions:

(i) Define scavengers and decomposers.

(ii) What are two adaptations of fish?

(iii) Which animal is called 'ship of desert'? Write its two features.

(iv) What is Hibernation ? Give one example.

7. Long Answer type Questions:

(i) Write short notes on

(1) Producers (2) Consumers (3) Decomposers.

(ii) Briefly describe the various types of habitats.

(iii) Distinguish between living and non-living things.

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Motion and Measurement of Distances

CHAPTER - 10

How far is your home from school? Who cover more distance while coming to school ? Either You or your friend? These questions are related to your daily routine. We will try to find the answers in this chapter.

10.1 Need of Measurement of Distances

In day to day life, we have to move from one place to another for our daily works. To reach the destination, we need to cover some distance, as you do while coming to school from your home. Before moving towards destination, we have to estimate the length of distance to be covered. According to that we can choose the mean of transport for travelling. Short distances can be covered on foot. To cover longer distances, in our surrounding we can see many means of transport from cycle to airplane. Neil Armstrong used rocket to reach the moon. So let's find How distances are measured? And how they are expressed?

10.2 Measurement of Distances

Distance is measurement of length between two points. First of all we will see how ancient people use to measure the length. It was found that hand span, length of foot step, length from elbow to finger or the length of foot were used by ancient people to measure the length.

Here we will use our hand span and foot step (ancient method) for measuring lengths.

1 : Measurement of width of teacher table with hand span.

Material required : A teacher table or any other table, group of students etc.

Procedure : Work in group and each of you do an activity one by one. Place your hand span at one end of the table (selected for Activity) and go on counting the hand spans up to other end of table as shown in Fig. 10.1(a). It is possible that while measuring the width you may find some part remains to be measured as it is smaller than your hand span. Use your figures to measure that length as shown in fig 10.1(b). Repeat this activity with the help of each member of group. Record your

observations from all group members in table 10.1

Fig 10.1 (a)

Fig 10.1 (b)

Fig. Measurement wtih hand span

Table 10.1 Measuring width of teacher table

S.No	Name of Student	Number of hand spans	Number of fingers	Width of table in form of hand spans and fingers

Suppose one student counts 7 hand spans and 4 fingers while measuring the width. Then width of table will be expressed as 7 hand spans and 4 fingers.

When we will analyze the values of width recorded in table 10.1, we will see different values of width of same table. This is because each student may have different length of their hand span. You may also see the difference between the length of hand span of your teacher and you.

Conclusion : That hand span is just an estimation of length to be measured.

Let us measure the length of your classroom by another ancient manner that is by foot step.

Activity 2 : Measurement of length of your classroom with foot step length.

Material required : Classroom, group of students.

Procedure : Work in group and each of you do activity one by one. Stand at one end of classroom. By counting the foot steps go to the other end of room along with its length as shown in fig 10.2

It may be possible that while measuring the length you may find some part remains to be measured as it is smaller than your foot step length. Then measure this remaining length in same manner as we measured in activity 10.1. Repeat this activity with the help of each member of group. Record your observations from all group members in table 10.2

Fig 10.2 : Measurement with foot step length

Table 10.2 Measuring length of classroom with foot steps

S.No.	Number Student	Number of foot steps	Number of hand spans	Number of fingers	Length of classroom in form of foot steps, hand spans and figures

Suppose one student counts 12 foot steps, 5 hand spans and 3 fingers while measuring the length. Then length of room will express as 12 foot steps, 5 hand spans and 3 fingers.

When we analyze the values of length recorded in table 10.2, again we will see different values of lengths of same room. This is because each student may have different length of their foot steps. You may also see the difference between the length of foot step of your teacher and you.

Conclusion : Foot step is just an estimation of length to be measured.

Do it under guidance of your teacher. If you come to school on foot, you can measure the distance covered by you in form of foot steps and compare it with your friend's observation. But keep in mind about your security while moving in streets or on road.

10.3 Need of Standard Units of Measurements

Measurement means the comparison of an unknown quantity with some known quantity. **This known fixed quantity is called a unit.** The result of a measurement is expressed in two parts. One part is a number. The other part is the unit of the measurement. For example, if in Activity 10.1, the width of table is found to be 7 hands, then 7 is the number and 'hand span' is the unit selected for the measurement. Similarly, if in activity, length of the room is found to be 12 foot steps then 12 is the number and 'foot step' is the unit.

Now, study all the measurements recorded in Table 10.1 and 10.2. You will observe that it shows the different values of same length which is measured. Because length of hand span and foot step varies from person to person. Another example of this variation is shown in fig10.3. When you share your measurement using your hand span or foot steps with others. They will not be able to understand how big the actual length is, unless they know the length of their own hand span or foot step. So these units cannot be used as standard units of measurement.

Fig 10.3 Person to person variation of length of hand span

Therefore, some standard units of measurement are needed that do not change from person to person.

10.4 Standard Units of Measurements

In ancient times, people used their body parts like hand span, foot step length, length from elbow to the finger tip and fist etc. for measurements. They used these units for their trading or other daily life activities like measuring lengths or distances between different locations. But we have concluded that in our practical life these units cannot be used as standard units of measurement as they vary from person to person.

This difficulty was recognised, that's why in 1790 a standard unit of measurement called the metric system was introduced by French. Later this system was accepted by the scientists all over the world. This system was used all over the world and known as **international System of Units or SI units**. The SI unit for length is metre. A scale of 15 cm in your geometry box is example of it. You might have seen a 30 cm ruler or a meter bar in hands of a cloth merchant for measuring cloth. Few examples are shown in fig.10.4 (a) & (b).

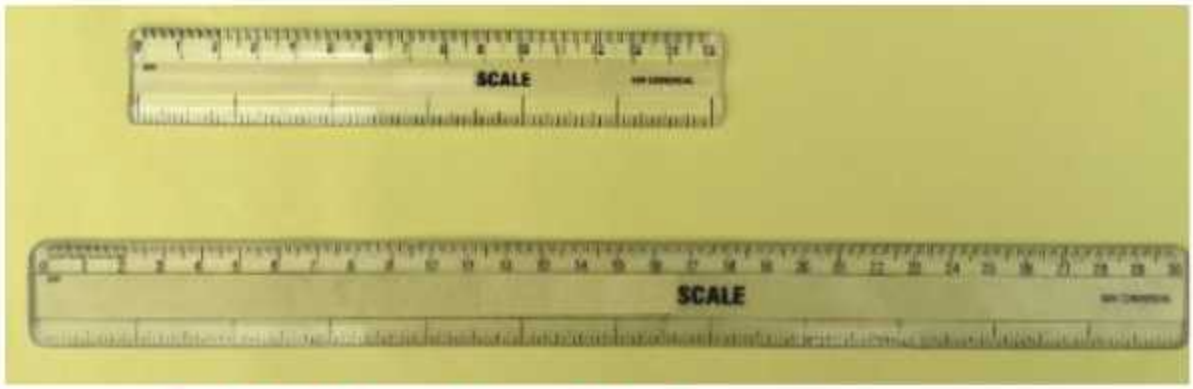


Fig 10.4 (a) Different types of Length measuring instruments

Fig 10.4 (b) Different types of Length measuring instruments

The symbol for metre is m. Each metre (m) is further divided into 100 centimetres (cm) and each centimetre is further divided into 10 millimetres (mm) so that

$$1\text{m} = 100\text{ cm}$$

$$1\text{ cm} = 10\text{ mm}$$

For a very long distances, instead of metre a bigger unit called kilometre (Km) is used.

The relation of metre with kilometre is given below.

$$1\text{ km} = 1000\text{ m.}$$

You might have seen some sign boards or milestones along the side of roads showing distances of different cities (Fig 10.5 a, b).

In our daily life we measure so many lengths according to our requirements. For example you might have seen a carpenter with his measuring tape. He used it to measure the lengths of door, table or any other thing to repair or to be constructed new. A cloth merchant measures the cloth with his meter bar. All of them require correct measurement of length.

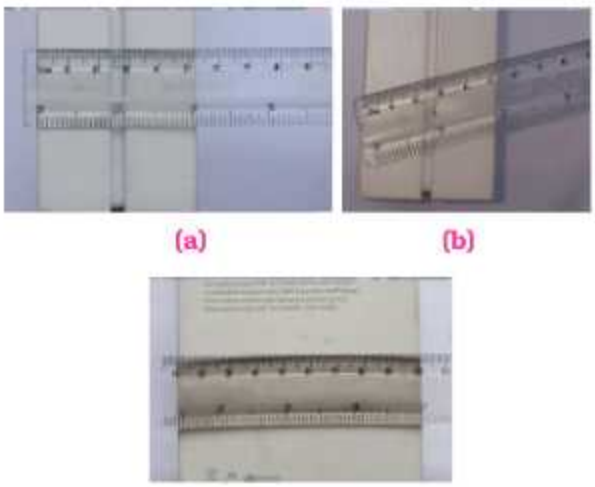
Fig 10.5 (a) Sign board

Fig 10.5 (b) Milestone on road side

In motor vehicles, odometer is fitted to measure the distance covered by the vehicle. With the help of odometer of motor vehicle, you can measure the distance between your home and school while travelling in it.

Now let's see how we can measure length correctly using a scale. Suppose there is a small box made of cardboard and we want to measure its dimensions. Take a scale. Place it's zero on one edge of the box and see on which reading of scale the other end coincides as shown in figure below (Fig. 10.6). The scale must be parallel to the length which is being measured as shown in fig 10.6 (a).The reading of scale coinciding the other edge of box will be the value of length being measured. The length will be expressed by combination of this value and unit of the measuring scale. It may be in centimetre or metre.

Fig10.6 (b) shows the wrong way of measuring, as scale is not kept parallel to the length of box.



(a) (b)

(c)

Fig 10.6 Measurement of length

Sometimes one end of scale may be damaged or zero of scale is not clear, then to complete reading, 1.0 or 2.0 cm is used as first reading. The second reading of other end is then recorded (fig 10.6(c)). The difference of first reading from second reading will be the length or breadth of the box.

Correct Position of eye : Another important factor in measurement is the position of our eye during the measurement. In figure given below, during measurement the position of our eye must be position B. It is wrong to see from A or C positions. Because, if we see from position A then reading will appear more than the actual reading and if we see from position C the reading will appear less than the actual reading. So correct position of eye must be at B. (fig 10.7).

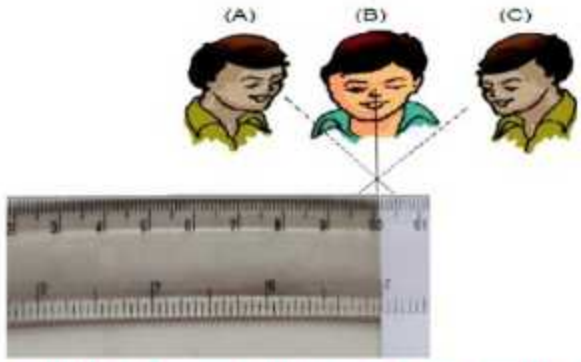


Fig 10.7 Correct position of eye during measurement

10.6 Measuring the Length of a curved Line

We cannot measure the length of a curved line directly by using a meter scale. We can use a thread to measure the length of a curved line.

Activity 3 : To Measure the length of a curved line.

Material Required : Thread, meire scale, chart, geometry box.

Procedure : Take a chart. Draw a curve line on it.Take two points A

and B on it as shown in fig10.8. Now we have to measure the length of curved line from A to B. Take a thread. Make a knot on the thread near one of its ends. Place this knot on the point A. Now, place a small portion of the thread along the line, keeping it tight using your fingers and thumb. Hold the thread at this end point with one hand. Using the other hand, stretch a little more portion of the thread along the curved line.

Go on repeating this process upto other end B of the curved line. Make a knot on the thread where it touches the end B. Now stretch the thread along a meter scale. Measure the length between the knots. This gives the length of the curved line AB.

Fig 10.8 Measuring length of a curved line

We have seen that we need lot of care to ensure the correct measurement of distances and lengths and that is why we need some standard units and devices with which we measure these distances and can convey our results to others.

Think and Answer

Q.1. The length of a curved line can be measured by a metre scale directly.(True/False)

Q.2. The Metre is standard unit of length. (True/False)

10.7 Moving Things Around Us

Motion : When an object changes its position as compared to its surrounding with the passage of time, that object is said to be in motion. You can see many moving objects in your surrounding. Suppose you are watching your friend who is walking in playground. Now start counting (1, 2, 3 and so on) and compare his position with surrounding with every count. You will see, that as you count your friend is continuously changing his position as compare to his surrounding. So your friend is in motion. We can see many moving things around us like vehicles, birds, animals and people. We can see the movement of sun, moon and stars in sky. Now lets see whether all these motions are of same type?

10.8 Types of Motion

Different types of motions are given below that we generally observe in our daily life.

1. Linear motion
2. Circular motion
3. Periodic motion

Linear motion : The motion of an object in a straight line is called **linear motion**. A moving car or bus on straight road or a train running on track, an athlete running on a 100 metre straight track are all examples of linear motion (fig. 10.9). A soldier while moving in a parade is also an example of linear motion.

Athlete on track

Train on rail track

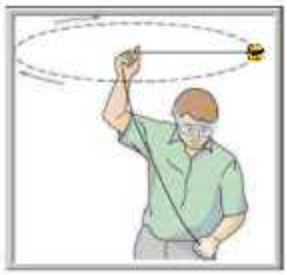
Car on straight road

Fig 10.9 Examples of linear motion

Circular Motion : Motion of an object along a circular path is called **circular motion**. Motion of wings of a fan [fig. 10.10 (a)] and hands of a clock are examples of circular motion [fig. 10.10 (b)]. Suppose, if there is any mark on the wings of a fan. When we switch on the fan and wings start moving then that mark will be in circular motion. When a stone which is tied with a thread is whirled by our hand that stone moves in circular motion [fig. 10.10 (c)].

(a) Wings of a fan

(b) Hands of Clock



(c) Whirled Stone

Fig 10.10 Examples of circular motion

Periodic motion : When an object repeats its motion after fixed interval of time its motion is called **periodic motion**. Many of you may have enjoyed the swing. The motion of a swing is the best example of periodic motion [fig. 10.11 (a)]. In a sewing machine we can observe different types of motion. The wheel of machine is in circular motion. The needle is moving up and down that is, it repeats its motion so it is periodic motion. The cloth which is being stitched is in linear motion [fig. 10.11(b)].

(a) Motion of Swing

(b) Motion of needle of sewing machine

Fig 10.11 Examples of Periodic motion

Key Words

- Circular motion
- Distance
- Measurement
- Motion
- Periodic motion
- Linear motion
- SI units
- Units of measurement

Summary

- Different modes of transport are used to go from one place to another.
- In ancient times, people used length of a foot, the length of a finger, the length of a foot step as units of measurement. This caused confusion and there a need to develop a uniform system of measurement arose.
- Now, we use International System of Unit (SI unit). This is accepted all over the world.
- Metre is the unit of length in SI unit.

Exercise – 1

1. Fill in the Blanks.

a. One metre is _____ cm.

b. Five kilometre is _____ m.

c. Motion of a child on a swing is _____.

d. Motion of the needle of a sewing machine is _____.

e. Motion of wheel of a bicycle is _____.

2. Write true or false.

a. Handspan or foot step are standard units of measurement.

b. Standard unit of length is metre.

c. Motion of train on railway track is an example of linear motion.

d. Length of a curved line can be measured by a scale.

e. Motion of hands of a clock is a circular motion.

3. Match the following.

1.	Metre	(a)	Periodic Motion
2.	Circular Motion	(b)	Length
3.	1 Km	(c)	Linear Motion
4.	Train on track	(d)	Hands of Clock
5.	Swing	(e)	1000m

4. Choose the correct-answer :

(i) In motor vehicles which of the following is used for measuring the distance covered by the vehicle ?

(a) Speedometer (c) Odometer

(b) Thermometer (d) None of these

(ii) A student want to take the measurements of a brick, for this purpose which unit he should use ?

(a) Kilometre (b) Meter

(c) Centimetre (d) Hand span

(iii) The motion of wings of a moving fan is .....

(a) Circular Motion (b) Linear Motion

(c) Both (a) and (b) (d) None of these

(iv) Which of among is False ?

(a) 1000 m = 1 km (b) 100 mm = 1 cm

(c) 100 cm = 1 m (d) 10 mm = 1 cm

5. Very Short Answer Questions

(i) Name some means of transport used in ancient time?

(ii) Give two examples of periodic motion?

6. Short Answer Questions

(i) Give two examples of transport used on land, water and air.

(ii) What is distance?

(iii) Arrange the following lengths in their increasing magnitude:
1 metre, 1 centimetre, 1 kilometre,1 millimetre.

(iv) Write the similarities and differences between the motion of a bicycle and a ceiling fan that has been switched on.

(v) The distance between Radha's home and her school is 3250 m. Express this distance into km.

6. Long Answer Questions

(i) Describe what precautions should be taken while measuring length or breadth of an object.

(ii) How many types of motion are there? Give examples for each type.

(iii) Write an activity for measuring the length of a curved line?

(iv) Why handspan or foot steps cannot be used as standard units of measurement?

W5Y3K9

Light, Shadows and Reflections

CHAPTER - 11

Introduction

We all have eyes and with the help of these eyes we see many objects of different sizes and shapes. We see cars, cycles, trees, colourful and beautiful flowers and our best friends too. We can see the board on which our teacher writes to teach us. Now, let us think whether our eyes alone are sufficient for the purpose of seeing objects.

Let us assume that we are in a completely dark room. Can you see objects lying in dark room? You will find it difficult. Once the room is illuminated then you can easily detect the presence of other objects in the room. That means you can see the objects only in the presence of light. Without light, things cannot be seen.

Hence we can say that **light** is a form of energy that enable us to see all things around us. Now there are various sources of light like sun, moon, stars, CFL, LED, tube-lights, candles etc. (fig. 11.1).

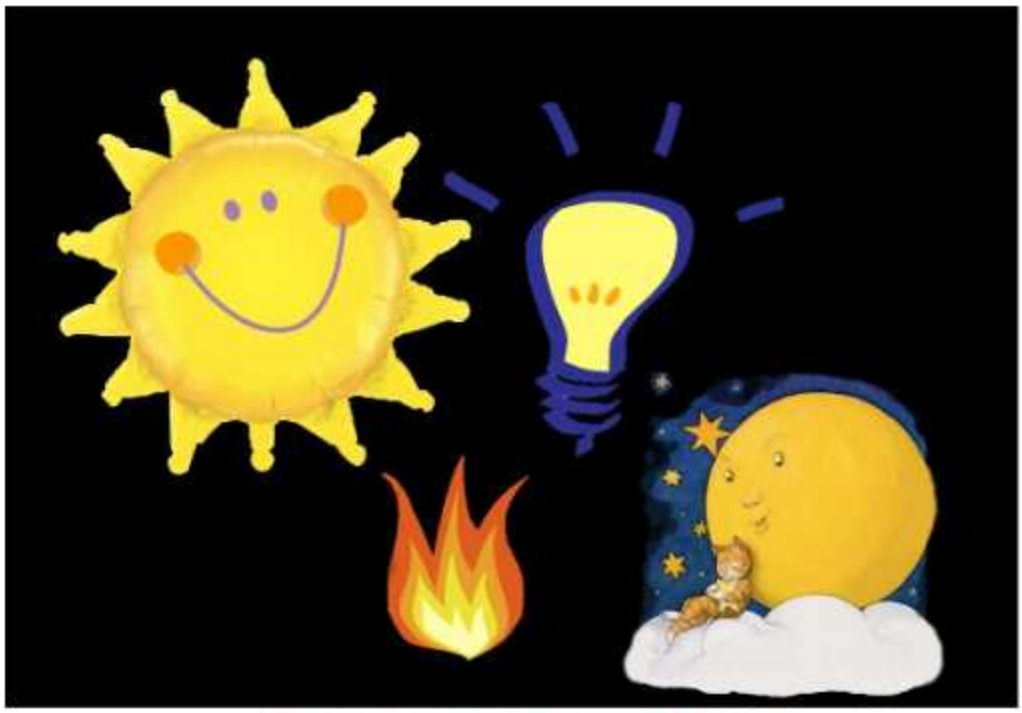


Figure 11.1 various sources of light

Light sources are broadly classified into two types :

1. Natural sources of light
2. Artificial sources of light.

Light sources like sun, stars, firefly (jugnu) are natural sources and light sources like CFL, candles, LED are called artificial or man-made sources of light. Light sources like the sun, candle that give out or emit light of their own are called **luminous objects**. Objects like moon, which do not emit light of their own , are called **non-luminous objects**.

We have now understood that we can see objects in the presence of light. But how can we see an object? We see these object when light from a light source falls on them and then travels towards our eye.

11.1 Transparent, Opaque and Translucent Objects

Let us do an activity to understand the concept of transparent, opaque and translucent objects.

Activity 1 : To distinguish transparent, opaque and translucent objects.

Material required : Glass sheet, single sheet of paper or a tissue paper and a card board.

Procedure : Try to look at something like a tree or a bench which are far away from you through each of these objects (Fig. 11.2).

Observation : The object is clearly seen through glass sheet, partially through tissue paper or sheet of paper and but cannot be seen through card board.

Figure 11.2 Observing objects through different materials

Conclusion : The reason is light from a far away object is able to travel to your eye, through some of the objects and thus making them visible to you whereas through some objects light cannot pass through to reach your eyes and therefore such objects cannot be seen.

On this basis materials are classified into three categories.

Objects or materials, that allow light to pass through them (almost) completely are known as **transparent objects**. Example Glass sheet, air, water etc.

Objects or materials, that do not allow light to pass through them (almost) completely are known as **opaque objects**. Example cardboard, wood, metal, rubber etc.

Objects or materials, that allow light to pass through them partially are known as **translucent objects.**

Example tissue paper, thin cloth etc.

Think and Answer

Q.1. Classified different objects depending on whether an object allows light to pass through it completely, partially or not at all.

Q.2. Classify the objects given in following table as transparent, opaque or translucent.

Object/ material	Transparent/ opaque/ translucent
Water	
Tissue paper	
Stone	
Air	
Book	
Mirror	
Thin cloth	

11.2 What are Shadows?

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

Material required : Piece of a pipe or a long rubber tube, candle, Match stick.

Procedure : Take a piece of a pipe or a long rubber tube. Light a candle and fix it on a table. Now see the candle through one side of pipe. The candle will be visible to you [fig. 11.3 (a)].

Bend the pipe a little while you are looking at the candle [Fig. 11.3 (b)]. Is the candle visible now? No, now the candle is not visible to you.

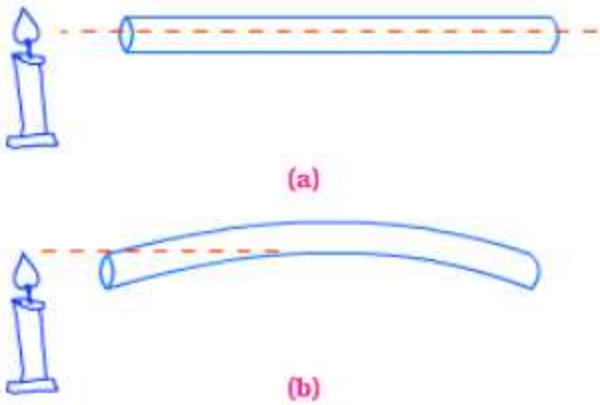


Figure 11.3 To see lighted candle through pipe

Conclusion : The reason is that light rays coming towards our eye through pipe is stopped due to bend. Since pipe is made up of opaque material, so light can not pass through it. Hence light can not reach our eye, due to which candle is not visible to us. This suggests that light travels along a straight line.

Think and Answer

Q.1. Light travels in _____ line path.

Q.2. Light cannot pass through _____ material.

When we hold an opaque object in the sunlight or in light, slightly above the ground or before a wall, a dark patch or region is formed whose shape is similar to opaque object. This dark patch is called **shadow.**

In Fig 11.4 a child is observing his shadow in sunlight. It should be noted that size of shadow may be longer or shorter than opaque object.

Figure 11.4 Formation of shadow

Can you see your shadow in a dark room or at night when there is no light? No, there will be no shadow. For shadow formation, we require three things:

I. A source of light.

II. An opaque object.

III. The screen (may be a wall or ground) to obtain the shadow.

We can understand the need of screen to obtain shadow by following activity:

Activity 3 : To show that screen is compulsory for the formation of shadow.

Material required : A torch and a large sheet of cardboard.

Procedure : This is an activity that you will have to do in the dark. In the evening, go out in an open ground with few friends. Hold the torch close to the ground and shine it upwards so that its light falls on your friend's face. You now have light that is falling on an opaque object. If there were no trees, building or any other object behind your friend, you would not see the shadow of your friend's head. This does not mean that there is no shadow. Actually the light from the torch is not able to pass through his body to the other side.

Now, ask another friend to hold the cardboard sheet behind your friend and put torch light from front side on the face of your friend. The shadow now seen on the cardboard sheet (Fig. 11.5).

Figure 11.5 A Shadow obtained on cardboard sheet

Conclusion : Thus, the shadow can be seen only on a screen. The ground, walls of a room, a building, or other such surfaces act as a screen for the shadows you observe in your daily life.

Think and Answer

Q.1. For shadow formation, how many things are required?

Q.2. A shadow is observed, on a screen, when an _____ object comes in-between screen and a source of light.

Hence the phenomenon of formation of shadow explains that light ordinarily propagates in straight lines(this property also known as rectilinear propagation of light). Shadows are formed because light moves along a straight line path, and not able to bend its path around large obstacles.

Figure 11.6 different shadow puppets

Shadows give us some information about shapes of objects. Sometimes, shadows can also mislead us about the shape of the object. Fig. 11.6 shows few shadows that we can create with our hands but which appear to be shadows of different animals and birds.

Activity 4 : To study factors on which size and colour of shadow depends.

Material required : A torch, cubical shaped body.

Procedure : Send a beam of light from a powerful torch over some cubical shape as shown in fig.11.7 to obtain its shadow on ground. Now move the torch towards and then away from cubical shape. Observe what happens? You will notice that size of shadow changes. When torch is closer to cubical shape, shadow is small and when it is away, shadow is large in size.

Use cubical shapes of different colours for obtaining shadows, like chalk box, books, copies, tiffin box of different colour. You will find that in every case shadows are always black.

Conclusion : So from above activity we conclude that:

1. The size of shadow of a given opaque object depends on relative position of source of light and the opaque object.
2. Shadow of opaque object is always black irrespective of colour of opaque object.

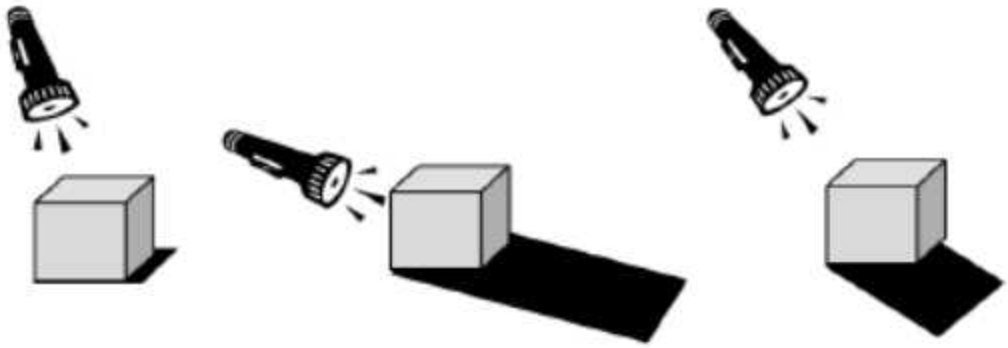


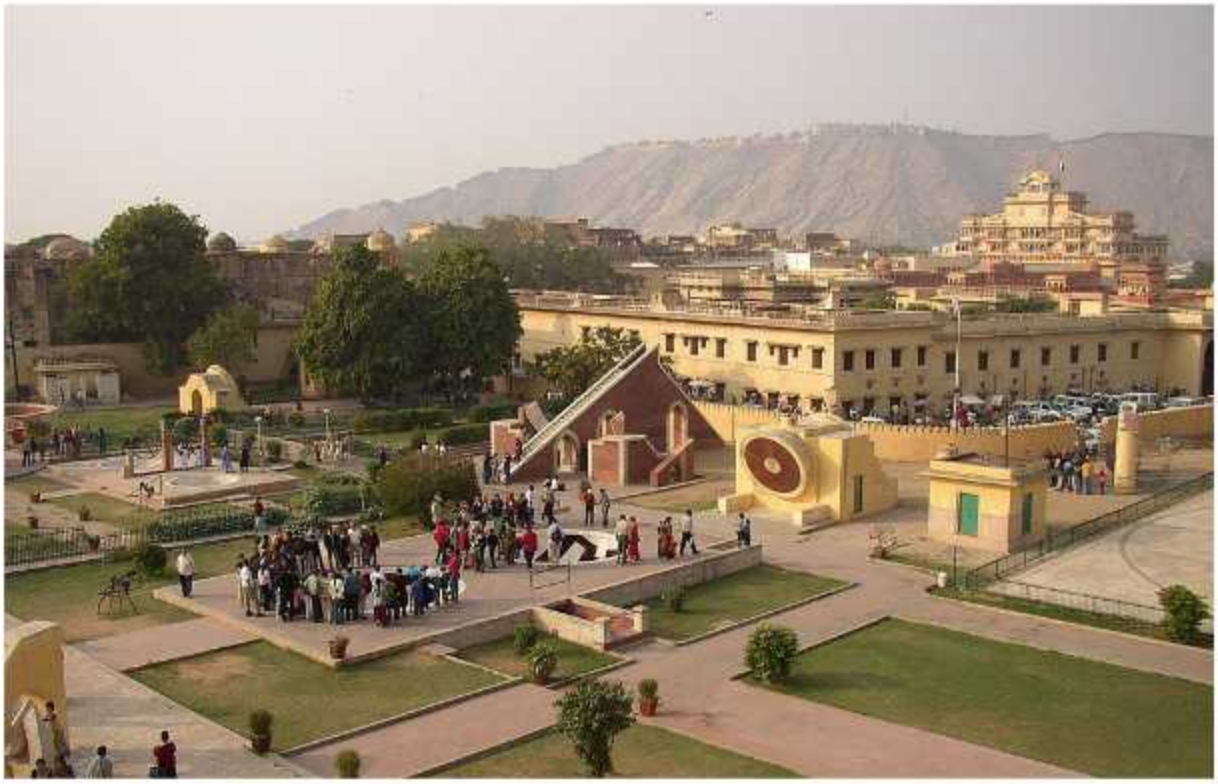
Figure 11.7 Change in size of shadow

Think and Answer

Q.1. The size of shadow of a given opaque object depends on relative _____ of source of light and the opaque object.

Q.2. What may be the colour of opaque object, shadow will always be _____. (black/white)

In the same way the position of sun affects the position and length of the shadow formed. This phenomenon has been used in sundial (a device used to tell the time of a day in earlier times.)



 # A view of Jantar Mantar Jaipur which features many instruments along with the world's largest stone sundial. (The Vrihat Samrat yantra is a sundial that can give the local time to an accuracy of 2 seconds.) It is a UNESCO World Heritage Site.

The solar eclipse(suraj grahan) shown in fig 11.8 and lunar eclipse (chandar grahan) shown in fig 11.9 are also the examples of formation of shadow in nature.

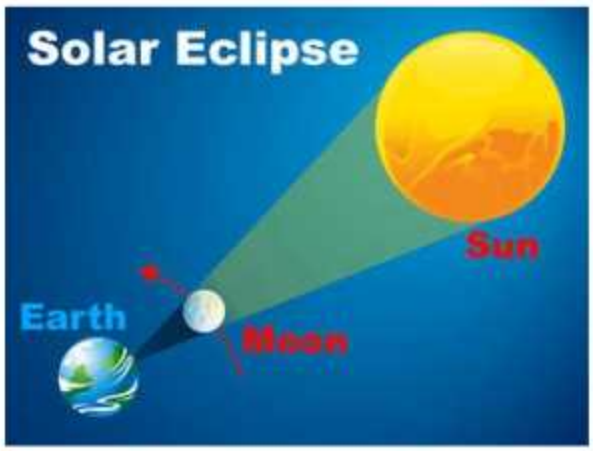


Figure 11.8 Solar Eclipse

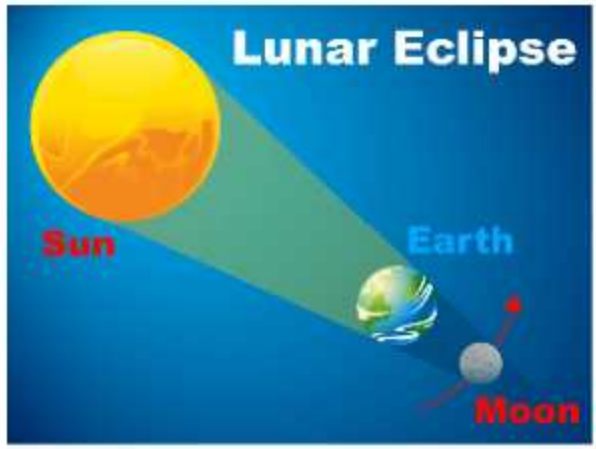


Figure 11.9 Lunar Eclipse

11.3 Pinhole Camera

A pinhole camera is a simple camera without a lens but with a tiny aperture (the so-called pinhole). Light from a scene passes through the pinhole and projects an inverted image on the opposite side. The pinhole camera is an application of property of light that travels in straight line path.

Let us construct a pinhole camera.

Activity 5 : To construct a pinhole camera.

Material required ; two cylindrical cardboard boxes or tubes (one having smaller diameter than other), tracing or butter paper, aluminium foil, sharp needle, gum, rubber bands, a black cloth or black chart paper for covering the head of observer and the pinhole camera.

Procedure : Take two cylindrical cardboard tubes, one having smaller diameter than other, so that one can just slide into another with no gap in between them. Cover one of the open sides of the smaller tube with a tracing paper. This tracing paper will act as a screen. Use an aluminium foil over one of the opening of the large tube so as to completely cover it. With the help of sharp needle or pin, make a clean hole in the centre of the aluminium foil. Slide the smaller tube inside the larger tube having a hole in such a way that the side with the tracing paper is inside. Your pin hole camera is ready for use (fig. 11.10).

By Holding the pinhole camera, look through the open face of the smaller tube. You should use a piece of black cloth to cover your head and the pinhole camera. Now, try to look at some distant objects like a tree or a building through the pinhole camera. Make sure that the objects

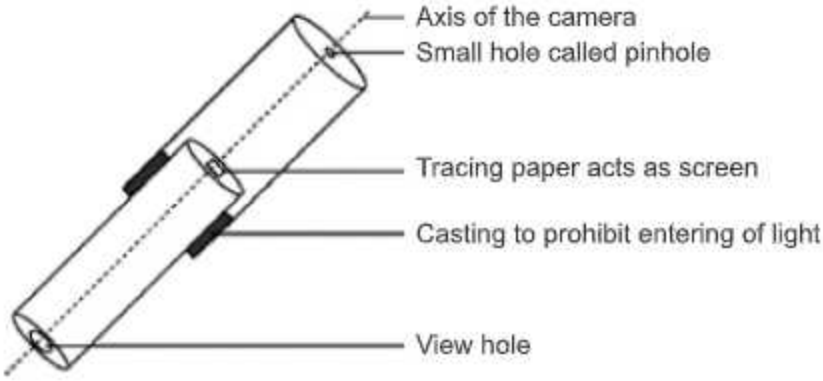


Figure 11.10 Pin hole camera

you wish to look at through your pinhole camera are in bright sun shine. Move the smaller box forward or backward till you get a clear picture on the tracing paper (also called screen) pasted at the other end.

Look at the vehicles and people moving on the road in bright sun light through your pinhole camera.

The pictures seen in the camera show the colours of the objects on the other side and the images are inverted and diminished (as shown in fig. 11.11). This is so because light (ordinarily) propagates in straight line paths.

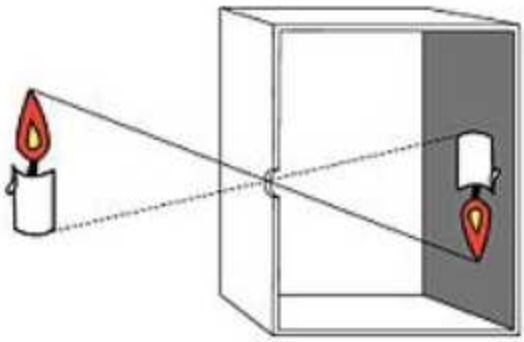


Figure 11.11 Inverted image in pin hole camera

We can also create the image of the Sun, with our pinhole camera. For this we need a slightly different set up. We just need a large sheet of cardboard with a small pin hole in the middle. Hold the sheet up in the Sun and let its shadow fall on a clear area. You will see a small circular image of the Sun in the middle of the shadow of the cardboard sheet.

Look at these pin hole images of the Sun when an eclipse is visible from your location. Adjust your pin hole and screen to get a clear image before the eclipse is to occur. Look at the image as the eclipse begins. You will notice a part of the Sun's image gradually becoming darker as the eclipse starts.

Never ever look directly at the Sun. That could be extremely harmful for the eyes.

There is an interesting pinhole camera in nature. Sometimes, when we pass under a tree covered with large number of leaves, we notice small patches of sun light under it (Fig. 11.12). These circular images are,

in fact, pin hole images of the Sun. The gaps between the leaves, act as the pin holes. Though these gaps are of irregular shapes but we can see circular images of the Sun.

Figure 11.12 Nature's pin hole camera

Think and answer

Think and Answer

Q.1. Pin hole camera is based on the fact that in ordinary conditions light travel in _____ path.

Q.2. The images formed by pin hole camera is _____ and _____ .

11.4 Mirrors and Reflections

We all use mirrors at home. You look into the mirror and see your own face inside the mirror. What you see is a reflection of your face in the mirror. We also see reflections of other objects that are in front of the mirror. Sometimes, we see reflections of trees, buildings and other objects in the water of a pond or a lake (fig. 11.13)

When light falls on (a polished) surface, it is seen to change its direction of propagation. This

Figure 11.13 Images of trees, mountain in lake

phenomenon is called reflection of light. This is just like a ball bouncing back when hit on a floor or a wall.

Reflection of light is of two types

(i) Regular reflection

(ii) Irregular reflection

Regular reflection

When light is allowed to fall on polished or shining surfaces like plane mirror or shining metal sheet, these surfaces reflect light in a well defined regular manner. Such reflection is known as regular reflection. Due to such reflection we get a glare or a blinding effect in our eyes. Even we can see an image of the object in such surfaces.

Activity 6 : To observe reflection of light.

Material required : A plane mirror.

Procedure : Take a plane mirror and go in sun. Choose a place in school where there is sunlight in one region and shade in other. Stand in sun with mirror facing towards sun. Adjust the position of mirror in sun

so that a bright spot or patch is visible in shade (fig. 11.14). You may get the bright region in sun also but can see bright spot better in shade and can easily be recognised. The patch of light is due to regular reflection of light falling on mirror from sun.

Figure 11.14 Regular Reflection of sun light

This activity also suggests that a mirror changes the direction of light that falls on it. You can do this activity by using a torch and plane mirror in classroom or laboratory.

Think and Answer

Q.1. A mirror does not change the direction of light that falls on it. (true / false)

Q.2. A polished or shining surface like plane mirror produces _____ reflection.

Activity 7 : To study that mirror changes the direction of light that falls on it.

Material require : A plane mirror, a comb, a torch, a dark coloured sheet of paper, a cardboard sheet.

Procedure : Fix a comb on one side of a cardboard sheet and fix a mirror on the other side as shown in Fig. 11.15. Place a dark coloured sheet of paper between the mirror and the comb. Keep this in sunlight or project a beam of light from a torch through the comb on the mirror. we get a pattern similar to as shown in Fig. 11.15.

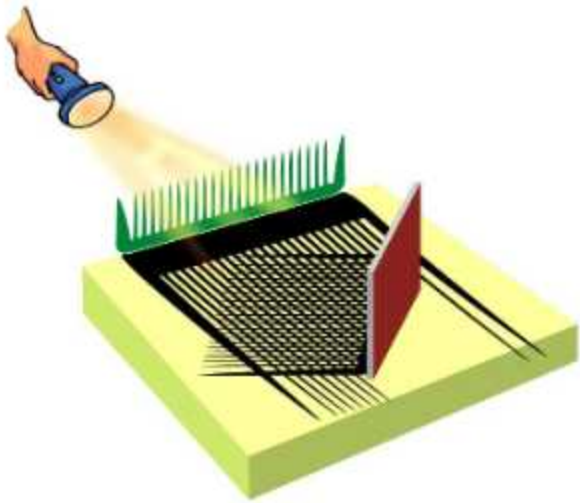


Figure 11.15 Change in path of light during reflection of light

Conclusion : This activity suggests that due to reflection, mirror changes the direction of light that falls on it.

Point to remember

We know that the moon is non-luminous object. Do you know what is the source of light, it emits? The source of moon's light is the sun. It reflects the light that falls on its surface, from the sun.

Irregular reflection

The reflection of light from ordinary rough surfaces like book, clothes etc. takes place in an irregular diffused manner (fig. 11.16). Such a reflection is known as irregular or diffused reflection. In such reflections there is no glare in any particular direction. This is very important phenomenon for us as it enables us to see various objects around us. Due to this phenomenon rooms are lighted up during day time though no direct sunlight enters the room.

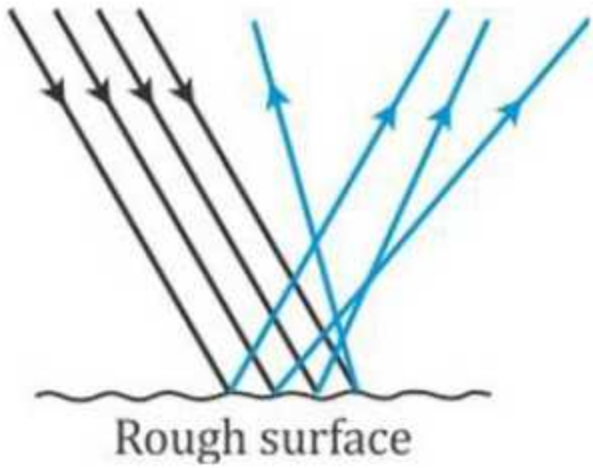


Fig. 11.16 Irregular reflection

Key Words

- Luminous
- Opaque
- Transparent
- Shadow
- Solar Eclipse
- Obstacle
- Mirror
- Translucent
- Pinhole camera
- Reflection
- Lunar eclipse
- Rectilinear

Summary

- Light is a form of energy that enables us to see all the things around us.
- A source of light can be either natural or artificial.
- Light always (ordinarily) propagates along a straight path.
- Opaque objects do not allow light to pass through them.
- Transparent objects allow light to pass through them and we can see through these objects clearly.
- Translucent objects allow light to pass through them partially.
- Shadows are formed when an opaque object comes in the path of light.
- Pinhole camera can be made with simple materials and can be used to obtain the image of the Sun and brightly lit objects.
- Mirror reflection gives us clear images.

EXERCISE

1. Fill in the blanks.

a) An object that allow light to pass through them partially are known as _____ object.

b) Light source like the sun that emit light of their own are called _____ objects.

c) Never ever look directly at the Sun because it could be exiremely _____ for the eyes.

d) The change in direction of propagation of light when light allowed to fall on polished surface is called _____ of light.

e) Due to _____ phenomenon rooms are lighted up in day time though no direct sunlight enters the room.

2. Write true/false.

a) Moon is a luminous object. (true/ false)

b) We can clearly see through transparent material. (true/ false)

c) Shadow of opaque object is always black. (true/ false)

d) Light doesn't travel in straight line path. (true/ false)

e) Due to reflection of light, rooms are lighted up during day time though no direct sunlight enters the room. (true/ false)

3. Match the following.

1.	Natural sources of light	a.	Light moves along a straight path
2.	CFL,LED and tube light	b.	Opaque object
3.	Rectilinear propagation of light	c.	Shadow cast by a heavenly body
4.	Eclipse	d.	Man-made sources of light
5.	Cardboard, wood and metal	e.	Sun, stars and firefly

4. Choose the correct answer.

(i) Objects, like moon, which do not emit light of their own, are called

a) Luminous objects
b) Non-luminous objects
c) Absorbers of light
d) Reflectors of light

(ii) An object, through which we can see partially, but not very clearly, is

a) A rubber ball
b) A sheet of plane glass
c) A sheet of tracing paper
d) A compact disk

(iii) When sun (during evening)is behind an object, the size of its shadow in comparison to that of the object would be

a) Smaller
c) Larger
b) Almost zero
d) Equal

(iv) The image, formed by a pinhole camera, is

a) Inverted and diminished
b) Inverted and enlarged
c) Erect and enlarged
d) Erect and diminished

(v) For shadow formation, we require :

a) An opaque object
b) A source of light
c) The screen to obtain the shadow.
d) All of the above

5. Very short answer questions.

(i) State the type of path that light ordinarily follows while going from one point to another.

(ii) Fishes do not cast shadow in water. Why?

(iii) State the relative position of sun, earth and the moon during solar eclipse.

(iv) In a completely dark room, if you hold a mirror in front of you, will you see a reflection of yourself in the mirror?

(v) Two identical bed sheets, of pink and grey colour are hanging on a rope under the sun. What would be the colour of shadow of these two bed sheets?

6. Short answer questions.

(i) What is regular reflection?

(ii) Why shadow in afternoon is smaller than shadow formed in the morning?

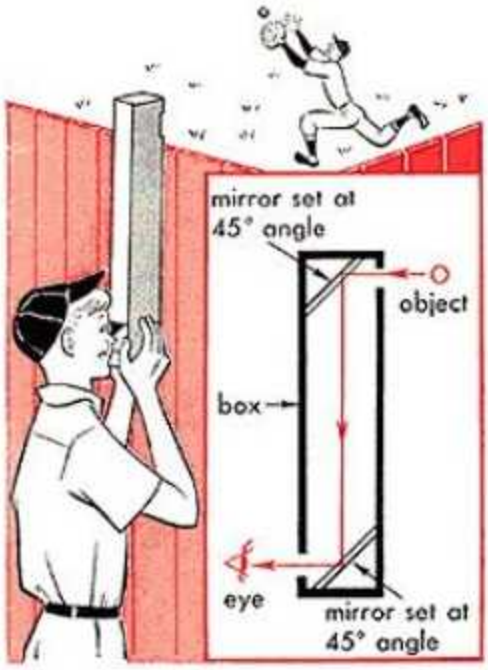
7. Long answer questions.

(i) Using suitable diagrams show that size of shadow formed, depends on relative position of the source of light and the opaque object.

(ii) Using diagram, show the formation of image by pinhole camera.

SUGGESTED ACTIVITIES

1. You can make a simple periscope by placing two mirrors in a 'Z' shaped box as shown



A periscope is an instrument for observation over, around or through an object, obstacle or condition that prevents direct line-of-sight observation from an observer's current position.

2. Take a comb in your right hand. Bring it closer to your hair. Now look at yourself in the mirror. You will see your face, grinning at you. Wait, try and find out which is the hand holding the comb, in your mirror reflection. Is it the right hand or the left? You were holding it in your right hand, isn't it? While a pin hole camera seems to be giving us upside down images, a mirror seems to be turning right hand into left hand and the left into right hand. This phenomenon is called **lateral inversion**.

C1Q5G4

CHAPTER - 12

Electricity and Circuit

We all are familiar with the use of electricity for many purposes which makes our tasks easier. We need different types of electric lamps or tube-lights to light up our homes. We listen to music and see cartoons on television. During summer , we keep our homes cool by using fans and coolers. These all appliances works by using electricity. Electricity is perhaps the most convenient and widely used form of energy. We cannot imagine our life without electricity. Do you know, from where we get electricity?

A power station provides us with electricity. However, the supply of electricity may fail or even it may not be available at some places. If electricity supply fails during night there will be complete darkness around us. In such situations, a torch is sometimes used for providing light. How we get light from torch?

The answer is, that torch has a bulb that lights up when it is switched on. Where does the torch get electricity from?

12.1 Electric cells

Electricity to the bulb in a torch is provided by the electric cell. Electric cells are also used in alarm clocks, wrist watches, transistor radios, cameras and many other devices. The most common cells that we uses in electric torches, clocks etc are called **Dry Cells**. Have you ever carefully looked at an dry cell? You might have noticed that it has a small metal cap on one side and a metal disc on the other side (Fig. 12.1). Did you notice a positive (+) sign and a negative (-) sign marked on the dry cell?

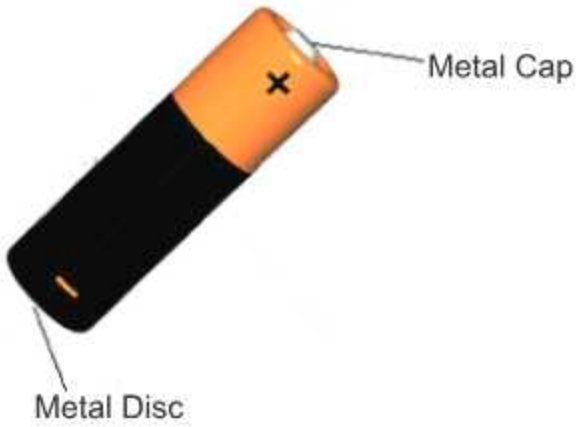


Figure 12.1 An Electric Cell

The metal cap is the positive terminal of the electric cell. The metal disc is the negative terminal.

So in this way, like dry cell, all electric cells have two terminals; a positive terminal and a negative terminal. There are chemicals stored

inside an electric cell which produces electricity. When the chemicals in the electric cell are used up, the electric cell stops producing electricity. The electric cell then has to be replaced with a new one.

Let us try to put electric cells in a torch. How will you know if cells have been inserted properly? In the torch, the positive terminal of one electric cell is connected to negative terminal of the next electric cell as shown in fig. 12.2. If the electric cells are not put in correct order, the torch would not work.

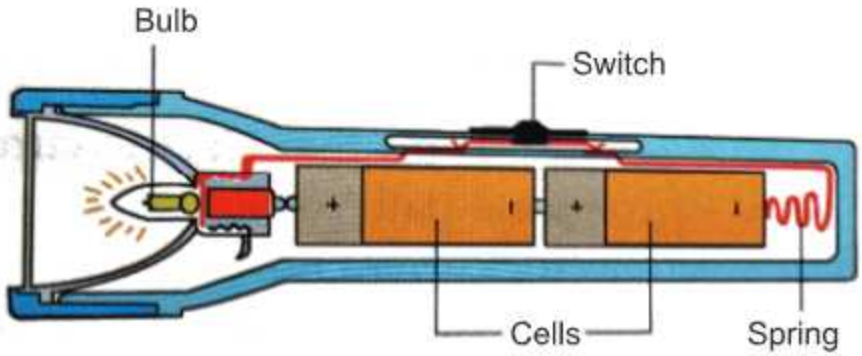


Figure 12.2 An electric Torch

A combination of electric cells is called a battery. A combination of electric cells, which we use in an electric torch, forms an electric battery.

In present time electric cells and batteries are available in different sizes and shapes. An electric cell that we use in wrist watches seems like a button and are called **button cells** (fig. 12.3).

Figure 12.3 A Button Cell

Electricity can be dangerous if not handled properly. Carelessness in handling electricity and electric devices can cause severe injuries and sometimes even death. Hence, you should never attempt to experiment with the electric wires and sockets. You might have seen the danger sign shown on poles, electric substations and many other places. It is to warn people. Also remember that the electricity generated by portable generators is equally dangerous. Use of electric cells is safe for all activities related to electricity.

12.2 Electric Bulb

An electric bulb or simply a bulb is a device which provides light when electricity is passed through it. A bulb has an outer case of glass that is fixed on a metallic base [Fig.12.4]. What is inside the glass case of the bulb? To know this let us do an activity.

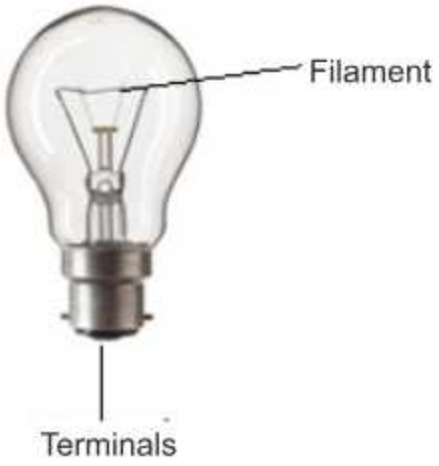


Figure 12.4 An Electric Bulb

Activity 1 : To observe the filament of bulb and its function.

Material required : A torch bulb, a torch.

Procedure : Take a torch bulb and look inside it. You will find a thin wire fixed in the middle of the bulb [fig. 12.5]. When you put this bulb in the torch and switch the torch on, the bulb starts glowing. Now observe which part of the bulb is glowing.

Observation : You will observe that thin wire fixed in the middle of glass bulb gives off light. This thin wire is called the **filament of the bulb.**

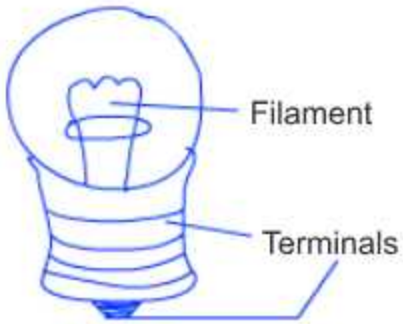


Figure 12.5 A Torch Bulb

The filament is fixed to two thicker wires, which also provide support to it, as shown in Fig. 12.5. One of these thick wires is connected to the metal case at the base of the bulb. The other thick wire is connected to the metal tip at the centre of the base. The base of the bulb and the metal tip of the base are the two terminals of the bulb. These two terminals are fixed in such a way that they do not touch each other. The electric bulbs used at home also have a similar design. One main point of difference here is that the two metallic contacts are both around the base of the bulb.

The electric bulb is filled with an inert gas like argon. This gas helps to save the filament from burning out in oxygen that is present in normal air.

Now a days LED(Light Emitting Diode) [Fig 12.6] based lamps are increasingly used as these have long life, consume very little power and are eco-friendly. We can also use CFL (Compact Florescent Lamp) [fig. 12.7]

for lighting purposes. They also consume less power as compared to electric bulb. But LED is preferred over CFL as CFL are not eco-friendly.

Figure 12.6 Light Emitting Diode

Figure 12.7 Compact Florescent Lamp

Think and Answer

Q.1. The part of bulb which produces light is called _____ .

Q.2. The electric bulb has _____ terminals.

12.3 A Bulb Connected to an Electric Cell and Electric Current

Let us try to light up electric bulb using an electric cell as shown in figure 12.8.

Connect positive terminal of cell to one terminal of bulb and negative terminal of cell to other terminal of the bulb. The electric bulb starts glowing. This is because electricity from electric cell flows through electric bulb through connecting wires. On passing electric current through an electric bulb, Filament gets heated up and starts emitting light. This flow of electricity through a wire or an appliance or a device is called **electric current**. The direction of flow of current is taken from positive terminal of cell to its negative terminal through the wires connecting the device (in this case a bulb), and the cell.

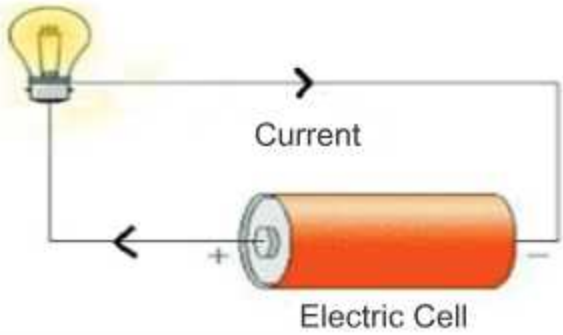
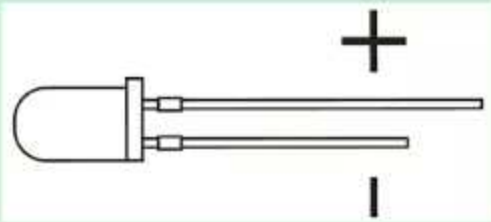


Figure 12.8

In present time torch bulb is not available in the market. So you can also choose small LED bulbs available in the market. While using LED bulbs polarity of its terminals must be kept in mind because it will not glow when connected with wrong polarity.



We have now understood why electrical appliance or devices have two terminals. The current enters the device through one terminal and leaves it through other terminal.

12.4 An Electric Circuit

Note that in the arrangements shown in Fig. 12.9, the two terminals of the electric cell are connected to two terminals of the bulb through a switch and the bulb glows. Such an arrangement is an example of an eleciric circuit. So an **electric circuit** provides a complete path for electricity to pass (current to flow) between the two terminals of the electric cell.

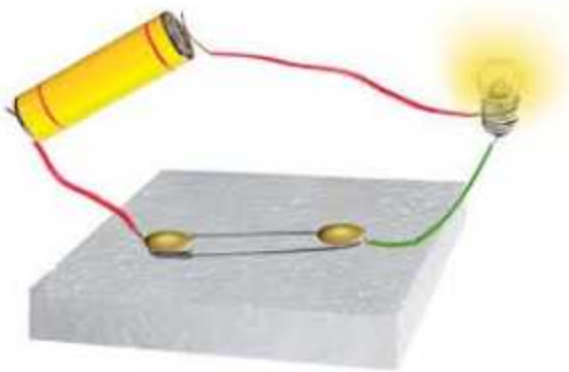


Figure 12.9

We need a minimum of three elements or parts to complete an electric circuit. These are :

- A source of electricity (cell/ battery)
- A path for flow of electric current (connecting wires)
- A device or appliance (bulb, fan etc.)

The bulb glows only when current flows through the electric circuit.

Sometimes an electric bulb does not glow even if it is connected to the cell. This may happen if the bulb is **fused**. Do you know what is a fused bulb?

A **fused bulb** is that which doesn't glow on passing electricity through it. An electric bulb may fuse due to many reasons. One of the reason for a bulb to fuse is a break in its filament. A break in the filament of an electric bulb means a break in the electric circuit between the terminals of the electric cell. Therefore, a fused bulb does not light up as no current can pass through its filament.

Activity 2 : To study different arrangement of electric cell and bulb.

Material required : A torch bulb, a dry cell, connecting wires, rubber bands.

Procedure : Take a torch bulb and a piece of wire. Remove the plastic covering at the two ends of the wire. Now, connect the wires fixed to the bulb with those attached to the cell in six different ways as has been shown in Fig. 12.10 (a) to 12.10 (f) For each arrangement, find out whether the bulb glows or not.

Observation and conclusion : You will observe that bulb will glow only in first and last arrangement and not in other arrangements. The basic reason is that electric circuit is not complete in the arrangements in

Figure 12.10 (a)

Figure 12.10 (b)

Figure 12.10 (c)

Figure 12.10 (d)

Figure 12.10 (e)

Figure 12.10 (f)

which bulb does not glow. In first and last arrangement electric circuit is complete, hence the bulb glow.

12.5 Electric Switch

Electric switch is a component of electric circuit that can start or stop the flow of current as and when required. The switch has two positions ON and OFF. In ON position, it completes the electric circuit and makes the current flow. Whereas in OFF position it breaks the electric circuit and stops the flow of current.

Electrical switches come in many different sizes and shapes as shown in figures 12.11.

Figure 12.11 Electrical Switches

Also the buttons on calculator, remote control and computer keyboards are also types of switches.

Activity 3 : To make a switch.

Material required : Two drawing pins, a safety pin (or a metallic paper clip), two wires and a small sheet of a wooden board.

Procedure : Insert a drawing pin along with wire into the ring at one end of the safety pin and fix it on the wooden board as shown in Fig. 12.12. Make sure that the safety pin can be rotated freely. Now, fix the other drawing pin along with wire on the wooden board in a way that the free end of the safety pin can touch it. The safety pin fixed in this way would be your switch in this activity.

Figure 12.12 An Electric switch

Now, make a circuit by connecting an electric cell and a bulb with this switch as shown in Fig.12.13. Rotate the safety pin so that its free end touches the other drawing pin. You will observe that bulb glows. This is because the safety pin covered the gap between the drawing pins and

Figure 12.13 : An electric circuit

made both touch each other. In this position the switch is said to be **'on'** as shown in Fig. 12.14. The material of the safety pin allows the current to pass through it. This completed the electric circuit. Hence, the bulb glows.

Figure 12.14 An electric switch in 'on' position

Now when you move the safety pin away, the bulb does not glow because the safety pin was not in touch with the other drawing pin. The circuit was not complete as there was a gap between the two drawing pins. In this position, the switch is said to be **'off'** as shown in Fig. 12.12.

Think and Answer

Q.1. What is the function of electric switch?

Q.2. In an electric circuit the circuit break when switch is _____ in position.

12.6 Electric Conductors and Insulators

In making electric circuits we use metal wires to make a circuit. Suppose we use a cotton thread instead of a metal wire to make a circuit. Do you think that the bulb will light up in such a circuit? In order to understand it let us do following activity.

Activity 4 : To check materials that allow the current to pass through them.

Material required : A torch or LED bulb, connecting wires, a dry cell. (or disconnect the switch from the electric circuit you used for Activity-3 This would leave you with two free ends of wires as shown in fig. 12.15.

Procedure : Bring the free ends of the two wires close, to let them touch each other. The bulb lights up. This is because by connecting wires, electric circuit gets completed and current is allowed to pass. You can now use this arrangement(it may be called as conduction tester) by touching portion A and B of it across any material or object to test whether that given material or object allows current to pass through it or not. Make sure that the two wires do not touch each other while you are doing so. Make list of your observations in table given below.

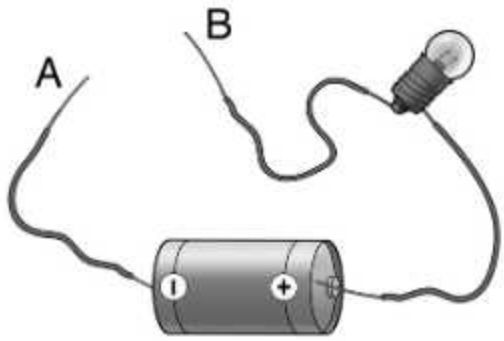


Figure 12.15

Table : List of objects that allows on do not allows the flow of current.

Serial no.	Object/material used	Bulb glows/ does not glow
1	Pencil lead	Bulb glows
2		
3		
4		
5		
6		
7		

Conclusion : The bulb does not glow when the free ends of the wires are in contact with some of the materials you have tested. This means that these materials do not allow the electric current to pass through them. On the other hand, some materials allow electric current to pass through them, which is indicated by the glowing bulb.

Materials which allow electric current to pass through them are **conductors** of electricity and the materials which does not allow electric current to pass through them are **insulators** of electricity.

Conductors and insulators are equally important for us. Electric wires, switches, electrical plugs and sockets are conductors. On the other hand, rubber and plastics are used for covering electrical wires, plug tops, switches and other parts of electrical appliances, which people might touch are made up of insulator materials.

Practically all metals are good conductor of electricity. So electric wires are made up of metals like copper, aluminium etc. Silver metal is the best conductor of electricity. Because silver is expensive so it is not used for making wires.

Materials like rubber, wood, plastic, Bakelite etc. are insulators. So electrician use rubber gloves while repairing an electric appliance. It prevents them from electric shocks. Normal air is also good insulator.

Caution : Your body is a conductor of electricity. Therefore, be careful when you handle an electrical appliance. We must not touch any naked electric wire or working appliance with wet hands or bare feet.

Key Words

- Bulb
- Electric current
- Switch
- Electricity
- Electric circuit
- CFL
- Conductors
- Filament
- Terminal
- Battery
- Fused bulb
- Electric cell
- Insulator
- Dry cell
- Button cells
- LED

Summary

- Electric cell is a source of electricity.
- An electric cell has two terminals: one is called positive (+ ve) terminal while the other is called negative (–ve) terminal.
- An electric bulb has a filament that is connected to its terminals.
- An electric bulb glows when electric current passes through it.

- An electric circuit provides a complete path for electricity to pass between the two terminals of the electric cell.
- In a closed electric circuit, the electric current passes from one terminal of the electric cell to the other terminal.
- Switch is a simple device that is used to either break the electric circuit or to complete it.
- Materials that allow electric current to pass through them are called conductors.
- Materials that do not allow electric current to pass through them are called insulators.

EXERCISE

1. Fill in the blanks.

a) A device that is used to break or make an electric circuit is called _____

b) An electric bulb glows when _____ flows through it.

c) _____ are the materials through which electric current can pass.

d) Current cannot pass through _____.

2. Write true or false.

a) Electric current can flow through metals.

b) Instead of metal wires, a jute string can be used to make a circuit.

c) Electric current can pass through a pencil lead.

d) When chemicals in dry cell are used up, it stops working.

e) LED based lamps are eco-friendly.

3. Match the column:-

1.	Button cell	(a)	
2.	Dry cell	(b)	
3.	LED Bulb	(c)	
4.	Electric Switch	(d)	

4. Choose the correct answer

(i) Battery is a combination of

a. Conductors b. Insulators

c. Electric cells d. Filaments

(ii) The basic electric circuit needs to have

a. Only a source of electric current

b. Only a few conducting wires

c. Only a device or appliance

d. All the above

(iii) On passing current through an electric bulb, bulb starts emitting light because its

a. Filament starts emitting light and then gets heated up

b. Thick connecting wires start emitting light and then get heated up

c. Filament gets heated up and then starts emitting light

d. Thick wires get heated up and then starts emitting light

5. Very short answer questions.

(i) What is electric cell?

(ii) What is electric current?

(iii) What is electric circuit.

6. Short answer questions.

(i) Why should we dry our hands before touching an electric appliance or a switch?

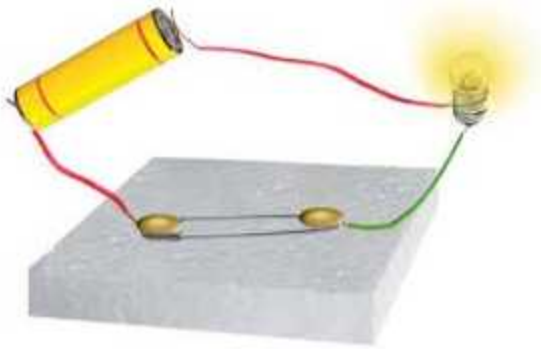
(ii) A student while performing an experiment in the science lab, connected an electric bulb to an electric cell through an electric switch. He noticed that the bulb does not glow when the electric switch was set in its ON position. Mention any two reasons for this observation.

(iii) Distinguish between the terms conductors and insulators of electricity. Give two examples of each type.

(iv) Explain why the bulb would not glow in the arrangement shown at below.

(v) Tools, like screw drivers and pliers, used by electricians have handles made up of plastic, rubber, wood. Why?

(vi) Match the labels with the correct parts of the circuit given below :



Provides Electric Current	A Device used for Making/Breaking a Circuit	Device which Lights up

7. Long answer questions.

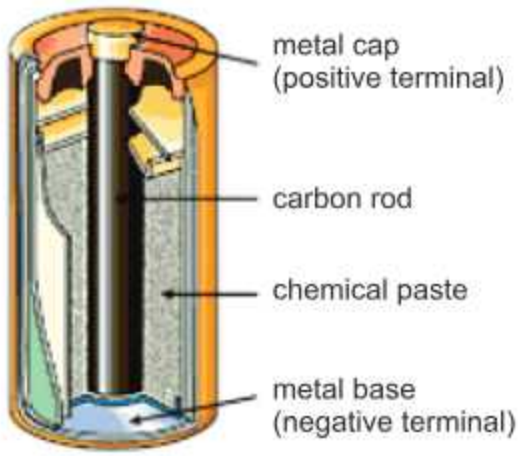
(i) Using the "conduction testes" on an object it was found that the bulb begin to glow. Is that object conductors or insulator. Explain.

(ii) The handles of the tools like screw drivers and pliers used by electrician for repair work usually have plastic or rubber covers on them. Can you explain why ?

Project : To Observe Different Components of a Dry Cell.

Take an old dry cell and try to cut it with edged knife or blade along its length. On cutting completely you will observe its different components. Try to recognise the following parts.

1. Carbon rod (try to enquire about the material of rod and find out whether you have anything made of this material in your bag)
2. Chemical paste
3. Positive terminal
4. Negative terminal



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CHAPTER - 13

Fun with Magnets

Imagine the situation that your packet of iron nails has fallen into a sandy surface and nails are spread all over the sand. You want to collect them quickly. What thing will you use to collect them easily? In this situation

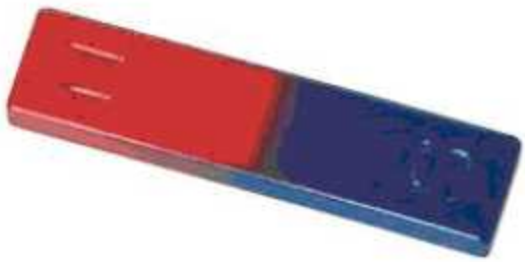

Fig 13.1 Magnet

a magnet (fig. 13.1) will be the best thing that will make your task easy. Because it will attract the iron nails even from sand too.

You might have also seen some magnets around you. These may be in stickers that remain attached to iron surfaces like almirahs or the catchers fixed in the doors or windows to restrict their unnecessary movement. In some pin holders, the pins seem to be sticking to the holder. The buckles of wallets or purses also contains magnets. In some mobile covers and geometry boxes, the lid fits tightly when we close it even without a locking arrangement. Such all things contain magnets fitted inside them (fig13.2).

Door Catcher

Purse

Pin Holder

Mobile Cover

Fig 13.2 Things Containing Magnets

How Magnets were Discovered?

There is a very interesting story behind the discovery of the magnet. It is believed that there was a shepherd named Magnes, who lived in ancient Greece. He used to take his herd of sheep and goats to the nearby mountains, for grazing. He would take

a stick with him to control his herd. At one end of the stick there was a small piece of iron attached to it. One day while sitting on a rock, he was surprised to find that he had to pull hard to free his stick from that rock. He felt as if the stick was being attracted by the rock.

Figure 13.3 Magnetite

Actually that rock was a natural magnet and it attracted the iron tip of the shepherd's stick. It is said that this is how natural magnets were discovered. It is believed that such rocks were given the name magnetite (fig. 13.3) after the name of that shepherd. Magnetite contains iron. Some people believe that magnetite was first discovered at a place called Magnesia.

Therefore, a magnet is a substance which attracts iron and iron made things towards it. There are also some other metals like Nickel and Cobalt which are attracted by the magnet.

Magnetite is a natural magnet. After the discovery of Natural Magnet the process of making magnets from pieces of iron was discovered. **A man made magnet is called Artificial magnet.** Now a days artificial magnets are manifactured in different shapes. For example, bar magnet, ring magnets, horse-shoe magnet, cylindrical or a ball-ended magnet. A few magnets are shown in figure 13.4.

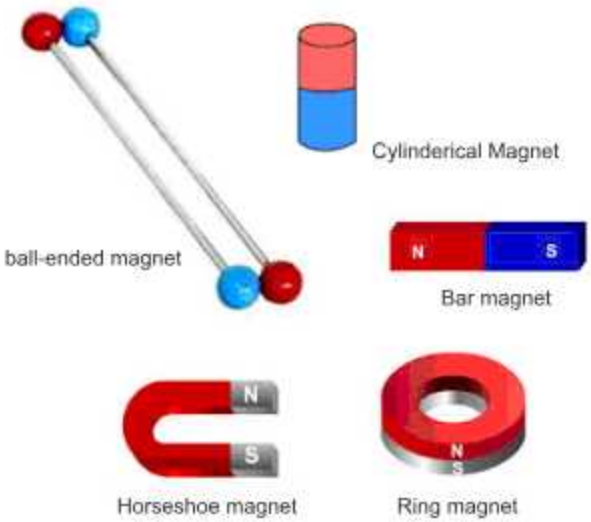

Fig 13.4 Different types of magnets

Activity 1 : A paper clip hanging in air by effect of magnet.

Material Required : Bar Magnet, Plastic glass, Thread, Paper Clip made of iron, Stand with Clamp and Paper.

Procedure : Take a bar magnet. Place it in plastic glass. Fix the glass in the clamp of stand as shown in fig 13.5. Cover the glass with paper to hide the magnet. Tie paper clip with one end of the thread and fix the other end of thread to the base of stand. Adjust the length of thread in such a manner that due to attraction by magnet clip it seems flying in air but not touching the bottom of the glass as shown in fig 13.5. So here paper clip is hanging in air due to attraction by the magnet.

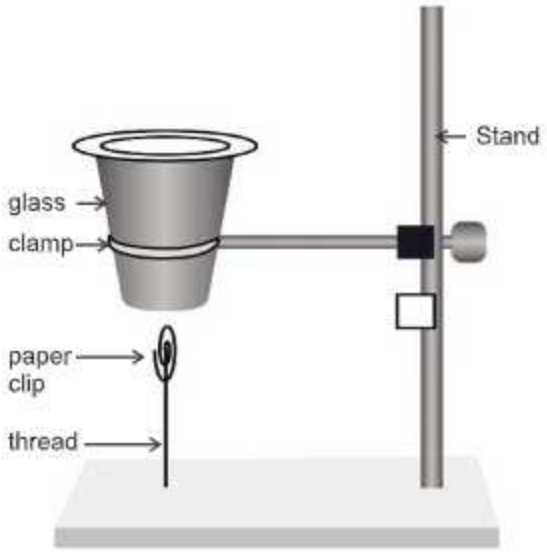

Fig. 13.5 Paper Clip hanging in air due to attraction of magnet

13.1 Magnetic and Non-Magnetic Materials :

Activity 2 : To separate magnetic and non magnetic materials.

Material Required : Bar magnet, pen, pencil, divider from geometry box, drawing pins, key, scale, paper pins and paper clips.

Procedure : Collect few things from your classmates (mentioned in material required). Now take a bar magnet and touch each thing turn by turn with it. We will observe that few things are attracted towards the magnet but some are not. Record the observation in table 13.1

Conclusion :

1. The materials which are attracted towards magnet are called **magnetic materials**.
2. The materials which are not attracted towards magnet are called **non magnetic materials.**

Think and Answer

Q.1. Materials attracted by a magnet are called _____ (Magnetic / Non-magnetic).

Q.2. Materials not attracted by a magnet are called _____ (Magnetic / Non-magnetic).

Table 13.1 List of object attracted or not attracted by magnet

S.No.	Name of object	Material by which object is made of (Plastic/Iron/Wood etc.)	Attracted by magnet (Yes/No)
1	Scale	Plastic	No
2			
3			
4			
5			

13.2 How to find the Geographical Directions of earth?

Let us find approximate geographical directions of earth. Early in the morning, stand with your face pointing towards sun. Now your face will be towards east direction of the earth and the direction behind you will be the West direction of the earth. North will be on your left side and South will be on your right side. Now these are four geographical directions of earth. During night it is difficult to find these directions in a unknown place. Here magnet will help us.

Magnet has a great property to stay in North-South direction when suspended independently. Let us perform an activity to understand this property.

Activity 3 : A freely suspended bar magnet always comes to rest in North-South direction.

Material Required : Bar magnet, thread and stand.

Procedure : Take a bar magnet. Tie thread at the middle of magnet so that it remains balanced while hanging freely. Now take a stand and suspend the magnet with it as shown in fig 13.6. Allow magnet to come to rest. Take care that the magnet can move freely in all directions. Also there should not be magnetic material near the magnet. We will observe that magnet comes to rest in North-South direction. Rotate the magnet in other directions and note the final direction in which it comes to rest.

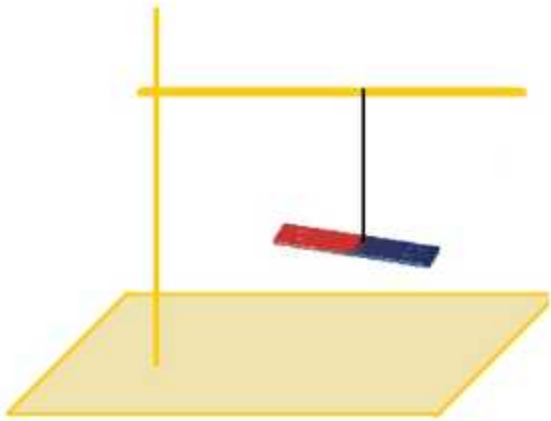

Fig 13.6 A freely suspended bar magnet always comes to rest in North-South direction.

Conclusion : You will observe that a freely suspended bar magnet always comes to rest in North-South direction.

Think and Answer

Q.1. A freely suspended bar magnet always points towards direction:

(a) North-South

(b) East-West

In activity 3 we have concluded that a freely suspended bar magnet always comes to rest in North- South direction. The end of magnet pointing towards North direction of earth is called **north pole** of the magnet whereas the other end is called **south pole**. Thus a magnet has two poles. All magnets have two poles whatever their shape may be. Usually, north

(N) and south (S) poles are marked on the magnets. This property of the magnet is very useful for us. For centuries, travellers have been making use of this property of magnets to find directions. It is said that in old days, travellers used to find directions by suspending natural magnets with a thread, which they always carried with them.

Magnetic Compass

Magnetic compass is a device to find the geographical directions on earth. It is made of small circular box. (box should be made of non magnetic material like aluminium or plastic) covered with a transparent glass or plastic sheet. A magnetised needle is pivoted inside the box, which can rotate freely. One end of needle is marked with red colour for identification of its north pole (fig 13.7). This is practical application of the north-south staying property of a magnet.

Fig 13.7 Magnetic Compass

It also has a dial which is marked with directions. At a place where we want to find the direction, the compass is placed and the needle is allowed to come to rest. According to the position of needle the compass is rotated to place the north and south of the dial at the ends of needle.

Poles of magnet cannot be separated : The interesting fact about magnet is that we cannot separate the two poles of a magnet. That means poles always exit in pair. If we break a bar magnet from its middle, both pieces will have its own North Pole and South Pole as shown in fig. 13.8.

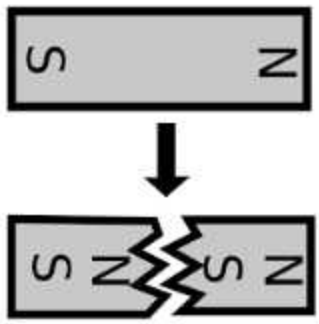

Fig 13.8 Poles of magnet cannot be separated

13.3 Position of Poles of Bar Magnet

Now let us perform an activity to find the position of magnetic poles in a bar magnet.

Activity 4 : To Locate the position of magnetic poles.

Material Required : Bar magnet, Iron filling, paper sheet.

Procedure : Take a bar magnet and some iron fillings. Now spread iron filings on a sheet of a paper and then put the bar magnet on the filings. We will observe that iron filings are attracted by magnet but most of the

iron filings are sticking on the both ends of the magnet as shown in figure 13.9. This activity shows that the poles of a bar magnet are near its ends.

Fig 13.9 Iron filings sticking to a bar magnet.

Conclusion : Poles of a bar magnet exist near its ends.

Think and Answer

Q.1. The poles of a bar magnet are _____ to its ends. (near/far)

Q.2. Bar magnet has _____ poles.

13.4 Make Your Own Magnet

We can make our own magnet in a very simple way. In following activity we will make our own magnet.

Activity 5 : Make your own magnet.

Material Required : Iron needle, Bar magnet, small pins.

Procedure : Take a bar magnet and a iron needle. Place the needle on a table. Start rubbing the needle with any pole of magnet in circular path as shown in fig.13.10.Repeat this process about 35 to 45 times with same pole. We will find that the needle has become a magnet too. We can check it by bringing needle near to small pins.Pins will be attracted by the needle.

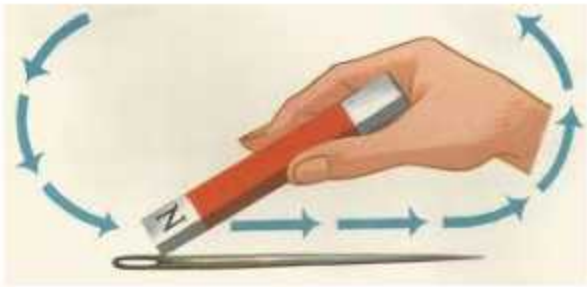

Fig 13.10 Making your own magnet

Conclusion : An iron needle can be converted into magnet by rubbing it with bar magnet.

Repeat the above activity by using Iron nail or small iron strip

Activity 6 : Make Your Own Compass.

Material Required : Magnetic Needle, Empty plastic bottle with cap, water and paper cutter.

Procedure : Take a cap of waste empty bottle. With the help of your teacher cut the bottle and take its bottom part as a container. Fill it with water. Instead of this a glass or beaker can also be used. Now take that magnetic needle made in activity 5 and pass it through the cap of the bottle as shown in the figure 13.11(a).

Place this cap in the middle of water filled in the container so that the ends of needle do not touch the walls of container. We will observe that

the needle will align itself in North-South direction like a compass. Again rotate the cap and let it come to rest. We will observe that needle is again pointing towards North-South direction.

(a) (b)

Fig 13.11 Making own compass

Conclusion : We have made our own Magnetic Compass.

Think and Answer

Q.1. Magnetic compass is a device to find the _____ of earth. (directions / time)

13.5 Attraction and Repulsion Between Magnets:

Activity 7 : Attraction and repulsion between magnets.

Material Required : Two bar magnets, four or five round pencils.

Procedure : Take two bar magnets having N and S poles marked. Take four or five wooden pencils. Place pencils on the surface of the table keeping them side by side. Then place one of the magnets on the pencils as shown in fig 13.12 .These pencils will act as rollers for this magnet. Take second magnet and bring its N end close to S end of first magnet. We will observe they attract each other and will stick to each other. Separate them and then bring S end of second magnet close to S end of first magnet. We will observe that they will repel each other.

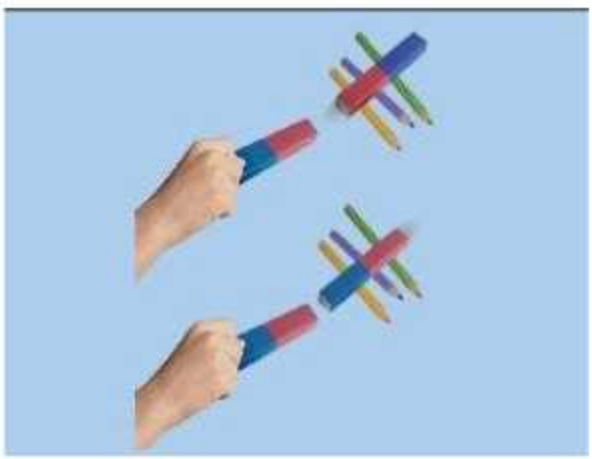

Fig 13.12

Conclusion : Opposite poles or unlike poles of magnets attract each other while similar poles or like poles repel each other.

Think and Answer

Q.1. Like poles of two magnets _____ each other.
(Repel, Attract)

Q.2. Unlike poles of two magnets _____ each other.
(Repel, Attract)

How to Store Magnets

For the safety of magnets keep bar magnets in pairs so that their unlike poles should be in same side joined by an iron piece. Keep a non-magnetic material like wood or plastic in between two magnets (fig. 13.13). By these precautions the magnets will retain their magnetic properties for longer time.

Keep magnets away from memory devices like CDs, memory card, mobile, Pen drive, computer and all other memory devices because magnets can erase their memory.

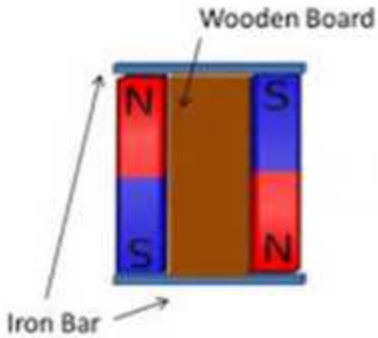

Fig 13.13 Storing the magnets

Fig 13.14 Memory Devices

Some Cautions : Magnets are very useful in our daily life. But to save their magnetic properties following care should be taken while handling them [fig. 13.15 (a), (b), (c)].

(i) Don't hammer the magnet [fig. 13.15 (a)]

(ii) Keep away the magnet from heat. [fig. 13.15 (b)]

(iii) Don't throw magnet from height. [fig. 13.15 (c)]

(a) Hammering

(b) Heating

(c) Throwing

Fig 13.15 Magnets lose their property on hammering, heating and by dropping or throwing.

Key Words

- Magnet
- Magnetite
- North Pole
- South Pole
- Like Poles
- Unlike Poles
- Natural Magnet
- Artificial Magnet
- Compass

Summary

- Magnetite is a natural magnet.
- Man made magnets are called Artificial Magnets.
- Materials like iron, nickel and cobalt are attracted towards magnet. These are called magnetic materials.
- Materials like plastic, glass and wood are not attracted towards magnet are called non-magnetic materials.
- Each magnet has two magnetic poles that are North pole and South pole.
- A freely suspended magnet always aligns itself in N-S direction.
- Unlike poles of two magnets attract each other whereas like poles repel one another.

Exercise

1. Fill in the Blanks.

a) Magnetite is _____ magnet.

b) Plastic is not a _____ material.

c) A magnet has _____ poles.

d) The poles of a bar magnet are at its _____ .

e) _____ is used for finding directions on earth.

2. Write true or false.

a) Poles of a magnet can be separated.

b) A magnet does not attract glass material.

c) Magnet can damage memory devices.

d) Magnetic compass always point towards East-West direction.

e) Magnets lose their property on hammering.

3. Match the Columns.

	Column A		Column B
1.	Wood	(a)	Repel
2.	Iron	(b)	Natural Magnet
3.	North pole-North pole	(c)	Non-magnetic material
4.	Magnetite	(d)	Attract
5.	North pole-South pole	(e)	Magnetic material

4. Choose the correct answer.

(i) Non-magnetic material is

(a) Iron (b) Needle

(c) Paper (d) None of them

(ii) Which can be converted into magnet

(a) Eraser (b) Iron Nail

(c) wooden bar (d) None of these

5. Very Short Answer Questions

(i) Write name of any two things used in our daily life that contains magnet?

(ii) When a bar magnet placed on iron filings, where the filings will be attracted more?

(iii) What is a Artificial Magnet?

(iv) Write any two properties of magnet?

6. Short Answer Questions

(i) What is a magnet? Name the poles of magnet?

(ii) Give three reasons by which a magnet loses its property?

(iii) What is a compass? For what purpose it is used?

(iv) What are magnetic and non-magnetic materials? Give examples?

7. Long Answer Questions

(i) How will you make your own magnet from a given strip of iron? Describe.

(ii) Give some uses of magnets in our daily life?

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CHAPTER - 14

Water

Water is essential for all living organisms. Without water life is not possible. Water is found all over the earth. About three-fourth of the earth's surface is covered with water. Water is found in oceans, ponds, rivers and lakes. Oceans hold about 97.41% of the total water. This water is saline in nature. We cannot use this water. Fresh water is only 2.59%. Out of this, some part is present in glaciers in the form of ice and some portion exists as ground water. Water is also present in air in the form of water vapours (fig. 14.1).

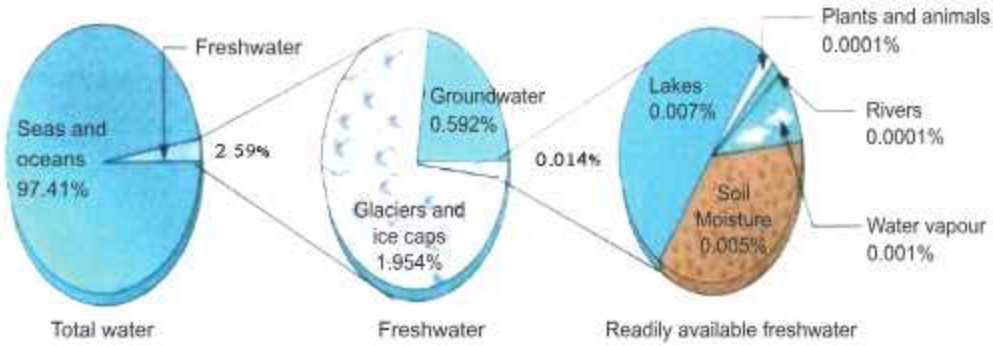

Fig 14.1 Water on earth

14.1 Sources of Water

There are two main sources of water i.e. surface water and ground water. Surface water is found in lakes, rivers, wells and reservoirs. Ground water is present below the surface of earth. Ground water is the largest source of useable water storage. Therefore, it is called as safe drinking water. It is a source of recharge for lakes, rivers and wetlands. It is used for irrigation to grow crops. It is an important component in many industrial processes (fig. 14.2).

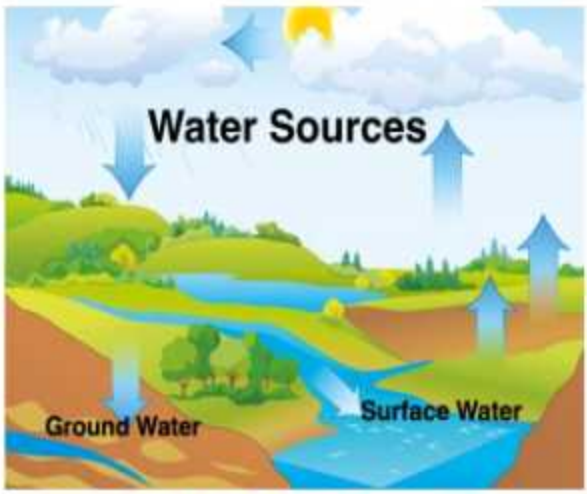

Fig 14.2 Water Sources

Moreover, our food contains lot of water. Percentage of water in some common food items is as shown below in Table 14.1

Table 14.1 Percentage of water in some common food items

Food	Percentage of water
Cooked Rice	65%
Apple	87%
Milk	88%
Tomato	90%
Green Vegetables	90%
Water Melon	92%
Cucumber	95%

14.2 Uses of water

A person can live without food for several weeks but can not live without water even for few days. The body of all plants and animals contain large amount of water. Water plays a vital role in human body in getting rid of body wastes.

Some important points about water are:

- About 70% of human body consists of water. We take water through food and drinks while loses it in the form of urine and sweat.
- Water helps to control our body temperature. It evaporates from the surface of our body in the form of sweat and takes away lot of heat which results in cooling.
- Water is also important for plants.
- Besides being essential for life, water is useful in many other ways such as cooking, washing, agriculture, industries, generation of electricity and transportation.
- Water even maintains the temperature of Earth.

1 : To estimate the quantity of water used.

Material required : Mug (1L), Bucket

Procedure : Fill a bucket of water in the morning. Whenever you use the water during the day for various activities such as brushing, bathing, drinking, washing hands, etc., note down the number of mugs of water used for these purposes. Similarly, note down the amount of water used for drinking, washing hands, cleaning utensils in school. Note down your observations in the table given below. (Table 14.2)

Table 14.2 : Amount of water used for daily activities

Purpose	Amount of water used (in Litres)
Drinking	
Brushing	
Bathing	
Cleaning Utensils	
Washing hands	
Toilets	
Total Water Used	

Conclusion : While doing the above mentioned activity, you can avoid wastage of water and find ways to save it.

Think and Answer

Q.1. Does every person use same quantity of water every day?

14.3 States of Water

Water exists in three states i.e. Solid, Liquid and Gas. All three states of water are present in our natural environment.

Solid : Glaciers, icebergs, snow and frost [fig. 14.3 (a, b)].

Liquid : Rain, dew and water droplets from clouds (fig. 14.4)

Gas : Water vapours, fog, steam and clouds (fig. 14.5)

Fig 14.3 (a) Glacier (b) Iceberg

Fig 14.4 (a)Rain (b) Dew drops

Fig 14.5 (a) Fog (b) Clouds

These three states can be interconverted. The phenomenon of change of water from one state to another and then back to the original state is called as the **interconversion**. This can be shown in fig 14.6.

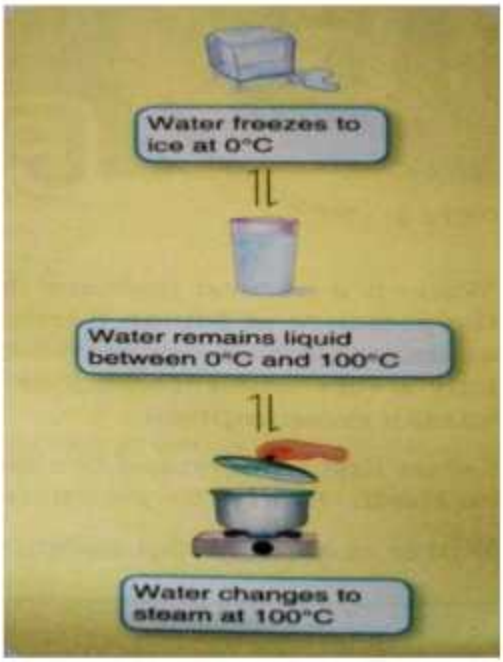

Fig 14.6 Interconversion of three states of water

When you heat ice, it melts and changes to water. This process of conversion of solid into liquid state is known as **melting**. When you keep the water in refrigerator, it changes to solid ice. This process of conversion of liquid to solid is known as **freezing.**

Further, water on heating starts boiling and changes into vapours. These vapours are in form of gas. This process of conversion of liquid to gas is known as **evaporation or vapourization**. On the otherhand, these vapours on cooling changes back to liquid. This process is known as **condensation.**

Activity 2 : Inter-conversion of three states of water.

Material required : Ice cubes, two beakers, spirit lamp, wire gauge, tripod stand.

Procedure : Take some ice cubes in a beaker. Keep it in room for some time. After sometime ice cubes melts to form water. Now, beaker containing water is placed on wire-gauge kept on tripod stand. Heat the beaker containing water by using spirit lamp. Observe steam coming out of boiling water. Cover the beaker with watch glass. Stop heating. Observe vapours collected on watch glass.

Conclusion : All the three states of water are reversible and interchangeable. Ice on heating changes to liquid, and liquid on heating changes to steam. Similarly, steam on cooling changes to liquid, and liquid on cooling changes to ice.

Think and Answer

Q.1. What happens to ice-cream when it is taken out of the refrigerator?

Q.2. What is the state of ice-cream?

14.4 Evaporation

It is a process in which water on heating changes to vapour state. The rate of evaporation increases with the increase of temperature and surface area. You must have observed wet clothes dry faster on a sunny day than

on a rainy day because water gets evaporated faster when temperature is higher.

Activity 3 : Evaporation of water in clothes.

Fig 14.7 (a) Drying clothes in sunlight

Fig 14.7 (b) Drying clothes inside room

Requirements : Wetclothes, sunny day.

Procedure : Take two wet cloth pieces. Place one in sunlight and keep the other inside the room. Observe the two clothes after every 15-20 minutes.

Conclusion : The cloth kept in direct sunlight dries faster than the cloth kept inside the room because greater the temperature, faster the evaporation.

Think and Answer

Q.1. What happens when you spill water on the floor in hot summer days?

Q.2. Why cow dung cakes are kept in sunlight?

During the daytime all the air surrounding us gets heated. This warm air provides heat for evaporation of water. Thus, evaporation takes place from all open surfaces present on Earth. In sunlight, evaporation takes place faster. On heating evaporation takes place even faster.

14.5 Water lost by plants

Plants need water to grow. Some part of this water is used to prepare food in leaves while remaining water is released by plants into air through the process of **transpiration** (transpiration is a process by which water is evaporated from plants) (fig. 14.8)

Fig 14.8 Loss of water in plants

Leaves of plants have small pores known as **stomata**. More than 90%

of water transpired from plants through these stomata.

14.6 Water cycle

It is a cyclic process. Water is circulated between the earth and the atmosphere.There are four main steps in water cycle namely evaporation, condensation, precipitation and collection.

In the presence of sunlight, water from water bodies like oceans, lakes, rivers, etc., evaporates in the form of vapours. This process is known as **evaporation**. As we go higher in atmosphere air becomes cooler and cooler. At certain height the air becomes so cool that the water vapours present in it condenses.As a result condensed water vapours float in air and cloud formation takes place. When clouds get heavier, water falls back to earth in form of rain and snow. Rain and snow that comes from cloud is known as **precipitation**. This water is collected back in water bodies. The circulation of water in this manner is known as Water cycle (fig. 14.9). This also maintains the supply of water on earth.

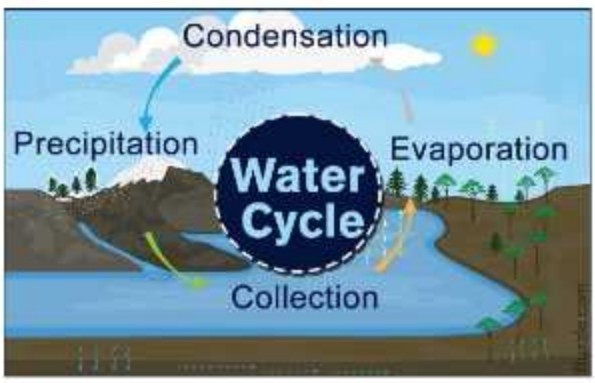

Fig.14.9: Water cycle

Activity 4 : To understand condensation of water.

Material required : Glass, water, cloth, ice cubes.

Procedure : Take a glass-half filled with water. Wipe the glass from the outside with a clean piece of cloth. Add some ice into the water. Observe outer surface of the glass.

Conclusion : Water droplets will appear on the outer surface of glass (fig. 14.10). This is because the water vapours present in air get condensed on coming in contact with the cool surface of the glass.

Fig.14.10: Water droplets on outer surface

Think and Answer

Q.1. Why do we observe water droplets outside water bottle when taken out from a refrigerator?

Other examples.

- Dew on leaves of grass on winter morning.
- Fogging of windshield or rear window of a car.
- Fog that comes out of your mouth when it is cold outside.

14.7 Floods

Our agriculture is totally dependent upon rain.Rain brings relief after hot summer days.In our country most of the rainfall occurs during the monsoon season. Monsoon season means rainy season. Sometimes this rain is so heavy that it causes destruction in the form of flood. An overflow of large amount of water beyond its normal limits is known as **Flood**. It is a natural disaster. Flood is caused by over flow of rivers and oceans to their banks. It is also caused due to accumulation of excessive water in the region (fig. 14.11).

Fig.14.11: Flood

Effects of Flood

- Many people and animals die during floods.
- Many more are injured and made homeless.
- Water supply and electricity are disrupted.
- Wide spread of communicable diseases.
- The environment also suffers.
- During floods roads, bridges, farms, houses and automobiles are destroyed.

In August 2018, severe flooding affected the south Indian state of Kerala due to unusually high rainfall during the monsoon season. It was the worst flood in Kerala.

14.8 Drought

A period when there is little or no rain is called **drought**. A drought is a period of dryness than normal conditions. This result in shortage of water. A drought can last for months or years. It has many effects on the surrounding land and weather conditions. It has devastating effect on community (fig. 14.12).

Fig 14.12: Drought

Effects of Drought

The soil continues to lose water and becomes dry.

- Farming, irrigation, drinking use of water are normally effected.
- Plant and animal life are effected.
- In drought ponds become dry and level of water in wells goes down.

14.9 Conservation of water

With rising population,the demand of water is increasing day by day. Fresh clean water is available in limited amount. The water available in seas and oceans is salty in nature which cannot be used for human consumption. So it is the need of an hour to conserve water and use it carefully. **Conservation of water means a careful and economic use of water.** We must conserve water as it is an important natural resource. We need to think of various ways to avoid its wastage. Some ways to conserve water are as follows

Ways to conserve water

a. Use bucket during bath

b. Turn off the tap while brushing teeth.

c. Turn off the tap while washing hands.

d. Use bucket to wash car or scooter.

e. Repair the leakage in pipes and taps.

f. Recycling of water : We can start this even in our houses. For example, water used in cleaning utensils, cloths can be, used to water plants in the garden instead of throwing into drains.

g. Rain water harvesting.

h. **Drip irrigation method for irrigating fields :-** In drip irrigation water is allowed to go slowly to the roots of plant instead of filling up the entire field with water.By drip irrigation method water goes directly to roots. Advantage of drip irrigation is that water and other nutrients are directly delivered to the plants as shown in fig (14.13).

Fig 14.13 : Drip Irrigation

14.10 Techniques of Rainwater harvesting

Rainwater harvesting is a technique which involves collection and storage of rain water and its reuse. It is one of the simplest and oldest method of self-supply of water.

Following are the techniques of rainwater harvesting:

1. **Roof top rain water harvesting :** In this system the rainwater is collected on the roof of the house or building. It is then stored in storage tank through pipes. This can be used for irrigation, car washing, watering plants, bathing livestock and flushing toilets etc. (fig. 14.14).

Fig.14.14: Rainwater harvesting

2. To allow water to go into the ground directly from the roadside drains that collects rainwater.This then seeps into the soil to recharge or refill the ground water.

Benefits of rainwater harvesting

- Reduce water bills.
- Provide alternate supply of water.
- Restore ground water.

Key Words

- Drought
- Clouds
- Precipitation
- Flood
- Conservation
- Water cycle
- Interconversion
- Oceans
- Evaporation
- Condensation
- Surface water
- Ground water
- Drip Irrigation
- Water vapour

Summary

- Surface water and ground water are two main sources of water.
- Water is used for many purposes like drinking, washing clothes, cleaning utensils, irrigation, industry, generation of electricity, etc.
- Water exists in three states i.e. solid, liquid and gases.
- Water on heating changes into vapours, this is known as evaporation.
- As you go higher up, the air gets cooler and cooler. At a certain height air becomes so cool that the water vapours present in air condenses to form clouds.
- Condensation is the process by which water vapour in the air is changed into liquid.
- Precipitation is any form of water falling from the sky. It may be in form of rain, snow, etc.
- Very low rainfall over a prolonged period is called drought. It leads to shortage of water.
- Rainwater harvesting is a collection and storage of rainwater into natural reservoirs or tanks for reuse.

Exercise

1. Fill up the blanks.

a) The process of changing of water into its vapour is called _____ .

b) The process of changing water vapour into water is called _____ .

c) No rainfall for a year or more may lead to _____ in that region.

d) Excessive rains may cause _____ .

e) Three states of water are _____, _____ and _____.

f) In plants, transpiration takes place through _____.

2. Write True or False.

a) Ice on cooling changes to steam.

b) Evaporation of water takes place in sunlight.

c) We should not repair the pipe having leakage.

d) Water in ocean is fit for drinking.

e) Drip irrigation method is useful for farming.

3. Match the following:

1.	Water conservation	a.	Solid form of water
2.	Snow	b.	Sunny day
3.	Precipitation	c.	Rainwater harvesting
4.	Evaporation	d.	Ground water
5.	Fresh water	e.	Rain from clouds

4. Choose the correct answer:

i) How much part of earth is covered with water?

a) two third c) half

b) one third d) three fourth

ii) Fog appearing on a cold winter morning is the result of

a) condensation c) evaporation

b) precipitation d) none

iii) Which of the source of water is not used for drinking

a) river c) ocean

b) dam d) lake

iv) Process of conversion of gas to liquid is called

a) evaporation c) melting

b) condensation d) boiling

v) About how much percentage of water is present in human body:

a) 60% c) 70%

b) 80% d) 90%

5. Very short answer type:

(i) What are two main sources of water?

(ii) What is the advantage of drip irrigation?

(iii) What is the effect of temperature on evaporation?

(iv) Differentiate between ground water and surface water.

(v) What is transpiration?

6. Short answer type:

(i) Explain floods and its effects.

(ii) Define condensation. Give two examples?

(iii) Explain formation of clouds.

(iv) Write three ways to conserve water.

(v) What is drought and what are its effects ?

7. Long answer type:

(i) Explain the uses of water?

(ii) Explain water cycle with diagram.

(iii) Why there is need to conserve water? Write technique of rain water harvesting.

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CHAPTER - 15

Air Around Us

Air is present all around us **Air is present above ground, in the soil and some amount dissolved in water**. Air is very important for survival of human beings, animals and plants. We use air for breathing. We can live without food or water for few days but cannot live without air. Try to hold your nose for few minutes, you feel uncomfortable. We cannot see air but we can feel it when it moves. Moving air is called **wind**.

The moving air helps us to fly a kite and makes our clothes dry faster. The farmer separate husk from wheat grain during winnowing by the moving air. Wind help us in many ways like moving of wind mills, generation of energy, pollination, cooling of temperature etc. But sometime when it blows at high speed, it can cause damage by uprooting trees, roof tops and damaging buildings.

Activity 1 : To make a Firki.

Material required : Paper, Pin.

Precedure : Take a square piece of paper and put daigonal markings on it. Cut along the lines to some distance and bend over the corners. Push a pin through the centre and you can make firki. Move it by either blowing air from your mouth or under fan.

Figure 15.1 Firki

Activity 2 : To show that air occupies space.

Material required : A balloon.

Procedure : Take a balloon. Hold a ballon in your hand and bring it to your mouth. Then fill air in it with your mouth. The balloon blows. we will see air occupies space in the balloon.

Figure 15.2

Fact : When air is squeezed into smaller space, it is said to be compresed. The air inside the rubber tube is compresed and exerts pressure on the tyre. This enable smooth movement of the vehicles.

15.1 What is air made up of ?

The layer of air surrounding the earth is called atomsphere. This atomsphere extends up to many kilometres above the surface of the earth. It is mixture of many gases like oxygen, carbondioxide, nitrogen etc. It contains a layer of ozone gas in the upper layer that prevents harmful ultraviolet rays of the sun from reaching the earth.

Composition of Air

Nitrogen	-	78%
Oxygen	-	21%
Carbondioxide	-	0.03%

The remaining is dust, smoke, watervapour etc. The composition of air changes from place to place and season to season. For example the air, contains more water vapour during rainy season and more pollutant in a congested area.

Let us discuss some major compoments of air like oxygen, carbon-dioxide, nitrogen, water vapour, dust, smoke.

Oxygen (O_2)

Oxygen is essential for all living beings on the earth as it is needed for respiration by all organism. Terrestrial plants and animals takes oxygen from atmosphere whereas soil animals takes oxygen from the air present in the pores of soil. Aquatic plants and animals take in oxygen dissolved in water. Oxygen is also required for burning. Burning can only occur in the pressure of oxygen.

Activity 3 : To show that oxygen supports burning.

Material required : Two candles, Jar, Match stick.

Procedure : Take two candles of the same size and place them on a table.

Light the candles and cover only one of them with an inverted jar. After some time you will see the candle inside the inverted jar blows out while the other candle keeps on burning.

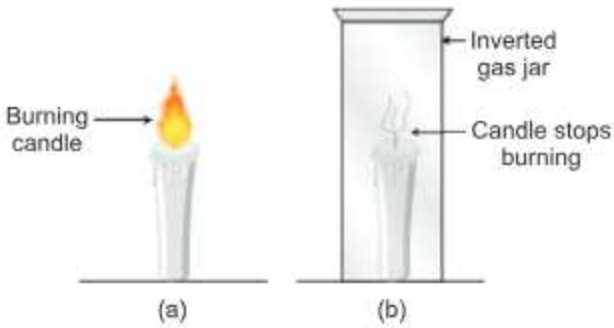

Figure 15.3

Conclusion : When oxygen in the inverted jar is used up, the candle blows out. This shows oxygen gas helps in burning of the candle.

Carbondioxide

It is an important constituent of air. It is much less abundant than oxygen and nitrogen. Carbondioxide is essential for Photo-synthesis. Photosynthesis is a process by which plants prepare their own food. Carbondioxide is produced during respiration of animals.

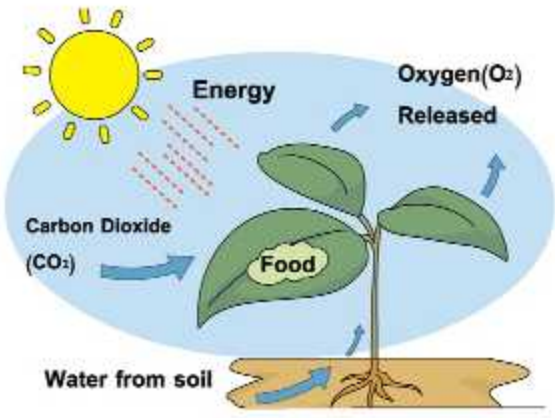

Figure 15.4 : Carbon Cycle

Carbon dioxide is an important green house gas that helps to trap heat in our atmosphere. Without it our planet would be very cold.

Have you tried aerated cold drink? The fizz in Soda/Cold drink is due to carbon dioxide gas dissolved in water.

Carbon dioxide neither burns nor supports burning so, it is used as a fire extinguisher gas.

Human beings breathe in oxygen and exhale carbon dioxide. When we go in a crowded place, we feel uneasiness. This is due to the presence of excess of carbon dioxide gas.

Nitrogen

Nitrogen is very important for the growth of both plants and animals. Plants and animals cannot take nitrogen directly from air. Nitrogen is first fixed to the soil by bacteria in the form of compounds then it is absorbed by the plants. Animals get it by eating the plants in the form of food.

Dust and Smoke

Air contains dust particles and smoke. Smoke is released in air by vehicles and industries. It causes air pollution. The amount of dust and smoke particles in air varies from place to place. In the month of mid october to November you can see more dust and smoke particles because in these months our farmer burn remaining unused parts of paddy which produce more smoke. So farmer

are advised not to burn it as, smoke is harmful fo human beings. We can change it into manure.

Activity 4 : To show the presence dust particles in air .

Material required : Wooden piece, gum.

Procedure : Take one flat wooden piece or iron sheet. Now take gum material or fevicol. Spread this material on the flat wooden piece or iron sheet. Keep it in the open ground. After 1 hr you will see some dust particles on the flat wooden piece or iron sheet.

Activity 5 : To show the presence of dust particles in air.

Material required : Dark room, Curtain.

Procedure : Choose a dark room in which sun light is coming inside from a window. Make a hole in the curtain. Let sun light come through small slit only. You will see tiny dust particles floating in the light rays

Figure 15.5 (a)

Figure 15.5 (b)

Water vapour

Water is present in the form of vapours in the air. When air comes in contact with a cool surface, water vapours present in the air condense to form droplets on the cool Surface. The amount of water vapour in air varies with temperature and heat. It is very important for water cycle in nature.

Activity 6 : To Show water vapour in air.

Material required : Steel glass, ice cubes.

Procedure : Take a empty beaker. Now take some ice cubes and add the ice cubes in empty steel glass. After sometime you will see tiny droplets around the glass.

15.2 How does oxygen become available to animals and plants living in water and soil ?

The plant and animals that lives in water use air which is dissolved in water. Plants take carbondioxide from water and release oxygen. Animals takes oxygen from water and release carbondioxide for plants. The plants

that grow in soil use oxygen trapped in the soil particles. The animals living in soil dig burrows and holes into the soil to make space for air to move in.

Activity 7 : To Show that air is present in water.

Material required : Beaker, water, $KMnO_4$

Procedure : Take one glass beaker. Fill it with water and place it on low flame. After some time you will see air bubbles at the bottom of beaker. Then slowly add solid $KMnO_4$ (Potassium permanganate) in beaker. The air bubble start rising from the surface of the beaker. The purple colour start rising up.

Conclusion : This is due to the dissolved air in the water which expands on heating.

Activity 8 : To Show that air is present in the soil.

Material required : Pot, Soil, Water

Procedure : Take one pot. Fill it with soil. Now put water into the soil. You will see air bubbles coming out of the soil.

Conclusion : This is because when we add water in the soil, water tries to take the place of air. Air get displaced so seen as bubbles.

Figure 15.6

15.3. How is the oxygen in the atomsphere replaced ?

During photosynthesis, plant makes their own food with the help of carbondioxide and release oxygen. Human being and other animals use that oxygen for breathing and release carbondioxide back in the air. In this way balance of oxygen and carbondioxide in the atmosphere is maintained.

The balance between oxygen and Carbondioxide in the air is maintained by respiration by plants and animals. Excess burning of fuels and deforestation can upset this balance due to excessive release of carbon-dioxide At high mountain there is not enough oxygen in the air because the atomsphere becomes thinner as we move up. Due to thinner atmosphere the amount of air reduces and oxygen level drops. This is the reason why mountainers who climb high mountains always take oxygen cylinder with them.

Air is used to run wind mills. The wind mill is used to draw water from tubewells, runs flour mills and also generate electricity. Air helps in sailing yachts gliders, parachutes and aeroplanes. Even birds and insects can fly due to the presence of air. Air helps in dispersal of seed and pollen of flower of several plants.

You have seen earthworms during rainy days because their burrows which had air got filled with water, so they come out to get air for respiration.

Key Words

- Composition of air
- Atmosphere
- Oxygen
- Nitrogen
- Smoke

Summary

- Atmosphere - Dense layer around the earth.
- Moving Air is called wind.
- Air can be compressed and can exerts pressure.
- Air has mass and occupies space.
- Air is a mixture of gases.
- Oxygen support burning
- carbon dioxide is used in fire extinguisher.

Exercise

1. Fill up the blanks in the following:

a) Plants gives out _____ gas and breathe in _____ gas.

b) _____ gas can not be used directly from the atmosphere.

c) Earth is protected from the harmful rays of sun by _____ layer.

d) _____ is important for the water cycle.

2. Write True or False:

a) Oxygen gas protects us from the harmful UV rays of the sun.

b) Carbondioxide is required for burning of fuel.

c) Composition of air always remain the same.

d) Air contains equal amount of oxygen and nitrogen.

e) Aquatic animals breathe carbon dioxide which is dissolved in water.

3. Match the following:

1.	Most abundant gas in the air	a.	ozone
2.	Gas required for photosynthsis	b.	water vapour
3.	Gas used for respiration	c.	carbondioxide
4.	Form of water present in the air	d.	nitrogen
5.	Layer that protect us from harmful rays of sun.	e.	oxygen

4. Choose the correct answer:

(i) Air contains highest percentage of which gas ?

a) Oxygen b) Nitrogen

c) Smoke d) Carbondioxide

(ii) Which gas is a supporter of combustion ?

a) Nitrogen b) Carbondioxide

c) Smoke d) Oxygen

(iii) Moving air is known as

a) Wind b) Water vapour

c) Ozone d) Wind mill

(iv) Earthworms comes out of soil during

a) heavy rains b) cold weather

c) snow d) hot weather

5. Very short answer type:

(i) Which gas is essential for breathing of animals ?

(ii) Name one component of air that does not support burning ?

(iii) Name the components of air.

6. Short answer type:

(i) Which gas in the atmosphere is essential for respiration.

(ii) Why does a lemp of cotton wool shrink in water.

(iii) How will you show that air dissolves in water.

7. Long answer type:

(i) How will you show that air supports burning ?

(ii) How is the balance of carbondioxide and oxygen gases are maintained in the atmosphere ?

T8D6P6

Garbage Management and Disposal

CHAPTER - 16

Every day, we all are producing huge quantities of waste and garbage. You might have seen people throwing out groundnut shells on public places after eating the nuts or students throwing out pencil waste after sharpening. Any substance which is discarded after use or it is worthless or defective is called waste.Waste can be solid (like vegetable peels), liquid (like waste water after washing clothes) or gas (like smoke from factories). Solid waste is commonly called **garbage**. A large, low-lying area used to dispose garbage is known as a **dump**. Getting rid of all this waste and garbage is a big problem in India. We produce a large amount of garbage with our daily life activities. Proper disposal of garbage is necessary for maintaining cleanliness in our home and surroundings. We cannot stop the production of garbage but we can surely minimize it by being wise.Can we contribute towards this in any way? Is it possible to change this into something that will not harm us? We will look for answers to these questions in this chapter.

16.1 Sources of Garbage

The waste material comes from various sources that can be divided as follows:

1.Industrial Waste : Industries are producing large quantities of waste materials. Solid waste from factories contains many toxic chemicals which pollute soil. Through ponds, rivers and

Electronic waste or e-waste :- Discarded computers, mobiles and other e-gadgets are also waste and grouped under e-waste.

water bodies' liquid waste enters in our food chain and cause serious diseases. The gaseous waste cause respiratory disorders in human beings.

2. Domestic Waste : The waste that is generated by household during our daily activities is called domestic waste. The household garbage contains vegetable peels, food leftovers, paper and plastic (which are used as packaging material), and many other items.

3. Agricultural Waste : This includes paddy stubble, dried stems and straws, baggage from sugar cane, weeds and cattle waste. Leftover pesticides are the most harmful component of agricultural waste, it not only kills harmful organisms but also kill helpful micro- organisms. Pesticides contaminate soil and water and enter in our food chain.

4. Biomedical Waste : The waste generated by hospitals and pathological laboratories is known as biomedical waste. It consists of medicines, blood, urine, stool, sputum and various tissue samples, chemicals, syringes, medicine stripes and cotton etc. Biomedical wastes are hazardous and infectious.

16.2 Types of Garbage

On the basis of the ability to get decomposed, wastes can be divided into two categories:

1. Biodegradeable Waste : The waste material which can be decomposed by the action of micro-organisms into harmless substances is called biodegradable waste. For example, domestic sewage, newspapers and vegetable matter.

2. Non-biodegradeable Waste : The waste material which cannot be decomposed by the action of micro-organisms into harmless substances is called non- biodegradable waste. They keep on piling up in our environment. For example, polythene bags, plastics, glass, and metal objects.

Activity 1 : To observe and list the waste originated from your school and house for a week and record your observations.

Days	SCHOOL		HOUSE	
	Bio-degradable	Non-Biodegradable	Bio-degradable	Non-Biodegradable
Monday				
Tuesday				
Wednesday				
Thursday				
Friday				
Saturday				
Sunday				

Think and Answer

Q.1. Vegetable peels are _____ waste. (Biodegradable /Non-Biodegradable)

Q.2. Glass is a _____ waste. (Biodegradable / Non-Biodegradable)

Q.3. Plant leaves are _____ waste. (Biodegradable / Non-Biodegradable)

16.3 Segregation of Garbage

The two types of waste can be disposed off in different ways. So, if we want to properly dispose off the waste, these must be segregated at the end of generation.

1. The **blue dustbin** is used for collecting non-biodegradable waste e.g.polythene bags, plastics, glass, and metal objects.
2. The **green dustbin** is used for collecting biodegradable waste e.g.domestic sewage, newspapers and vegetable waste.

16.4 Dealing with Garbage

There are three important methods of disposal of garbage-Composting, Landfill and Incineration

1. Composting

The process of decomposition of biodegradable waste into compost by the action of microorganisms is called Composting. Compost is rich in nutrients. It provides all essential nutrients for growth of plant. It is used as manure in gardening, horticulture, and agriculture.

Activity 2 : To make compost pit in your school.

Material required : A spade, news papers, organic waste (leaves, vegetable peels etc.)

Method :

1. Dig a pit in your school ground.
2. Take biodegradable wastes like vegetable and fruit peels, leaves, old newspaper etc. and bury them in the pit.
3. Sprinkle sufficient amount of water on it to keep it moist.
3. Cover it with soil.
4. Open the pit after 4-5 weeks and observe it.

Observation : Garbage has turned into compost.

You can use this as manure for your school plants.

Think and Answer

Q.1. Compost is rich in nutrients. (True / False)

Q.2. We can use non-Bio-degradable waste in composting. (True / False)

Vermicomposting

The method of preparing compost with the help of earthworms is called vermicomposting. The earthworms used for composting are called redworms. These worms eat the waste material along with soil and convert it into compost.This method is simple, effective and convenient.

Activity 3 : To prepare vermicompost pit in your school.

Material required : Your school's mid day meal kitchen waste (Biodegradable waste), redworms and water.

Procedure : Dig a pit about 30 cm deep in a shady place. Spread 1-2 cm thick layer of sand. Put some kitchen waste (biodegradable waste) and fallen leaves, avoid the food that have salt, pickles, oils. Don't press the layer of waste so that it has sufficient air and moisture. Sprinkle some water to make this layer wet. Put some redworms in the pit. Cover it with old sheet of cloth or a layer of grass. After every 2-3 days, remix the top layers of pit. After 3-4 weeks, put some waste in one corner of the pit, the redworms will shift to that corner. Remove the compost and dry it in the sun for a few hours.

Observation : You will observe soil like loose material.

Conclusion : This is your vermi-compost.

Think and Answer

Q.1. Vermicomposting is done by _____ .

Q.2. Kitchen waste (biodegradable waste) is used in Vermi-composting. (True / False)

2. Landfill

A landfill site is a large, open area usually away from residential areas, where the garbage is dumped. The

garbage often contains some useful items and some non-useful items. Items which can be recycled are separated and sent for recycling. Other items are left on the landfill site. Once the landfill site is full with garbage, it is covered with soil. It is left for atleast 20 years before any construction can be allowed on the landfill site. Landfill site is ideal for making parks and playgrounds. Millennium Indraprastha Park in New Delhi has been completely made from a landfill site. It was developed by Delhi Development Authority in 2004 as a picnic spot for families. Now this park has beautiful garden, children Park and food court. It is a centre of attraction for tourists.

3. Incineration

The process of burning of waste in specially designed furnaces is called incineration. This is very effective method of reducing the volume of waste. Hospital waste is generally disposed off in this way. This method has some disadvantages too.

This process produces harmful gases which pollute our environment.

16.5 Waste Management - The 4 R's:

1. Reuse : Reuse means to use again. Instead of throwing away an item we can use the item in various efficient ways. We can use empty jars and bottles as containers like pen stand, flower pot and storing the things. We can reuse things after repairing e.g. fans and mobiles.

2. Reduce : Reducing the amount of waste we produce is the best way to protect the environment. We can use metals or glass utensils instead of disposable glasses and plates.

3. Recycle : The process of changing the waste and non-useable materials into useful material is called recycling. Usage of recycled materials will help the environment to be green again.We can recycle old news paper into cardboard. Glass, plastic and metals can be recycled into useful products.

4. Refuse : Refuse the plastic and polythene bags. By refusing we can avoid disposable plastic which pollute our environment. The easiest example of this is using a reusable metal water bottle instead of a disposable plastic one.

Activity 4 : To make your own recycled paper.

Material required : Old newspapers, gum, water and a wire mesh fixed to a screen.

Procedure : Tear the old newspapers into small pieces. Soak these pieces in a tub of water. Keep them soaked for a day. Convert it into paste by churning the mixture .Add a few drops of gum to this paste and mix it well. Spread the wet paste on the wire mesh fixed to the frame. Pat it gently to make its surface even. Spread old newspaper on it to absorb extra water. After one hour remove it carefully from the mesh and let it dry in the sun. Your paper is ready for use.

Think and Answer

Q.1. We can also recycle glass and metals to useful product.
(True / false)

Q.2. The process of changing the waste and non-useable materials into useful material is called recycling.
(True / false)

16.6 Plastic-A Boon or A Curse

Plastics have become a part of our day to-day life. Plastics have certain advantages and disadvantages. They are lightweight, flexible, low cost, and water resistant. The plastic containers have replaced the glass and paper containers, which were used earlier. The plastic bags are reusable and can be recycled. Plastic tubes, bottles are used extensively in the laboratory equipments, syringes, bottles and so on. Plastic is used for making lightweight furniture, toys, boxes and many other household appliances. It is easily available as well as cheap. Even plastic containers have taken place in our kitchen as they are easy to handle and quick to wash. We cannot imagine our lives without plastic.

Plastic is non-biodegradable. It cannot be destroyed easily. Plastic is very harmful to our health. Water will become polluted if plastic is dumped in it. It can be destroyed to some extent if it is burnt but on burning it produces dangerous gases which

cause air pollution. Plastics can take thousands of years to decay. Animals and fishes die every year after consuming plastics.

Plastic is boon as well as a curse to mankind. We should minimize the use of plastics.

1. Avoid the use of plastic bags.
2. Insist shopkeepers to give paper bags.
3. Avoid single use plastics.
4. Don't store eatables in plastic boxes.
5. Don't throw plastic bags here and there.
6. Don't burn plastic items.
7. Don't dispose of garbage in plastic bags.

We must reduce the generation of garbage. More garbage we generate, more difficult it will be to get rid of it.

Key Words

- **Waste** - Materials which are no longer needed.
- **Garbage** - Solid waste is commonly called garbage.
- **Biodegradable** - The Waste materials that can be decomposed by microorganisms.
- **Non-Biodegradable** - The Waste materials that cannot be decomposed easily.
- **Incineration** - The process of burning of waste is called incineration.
- **Vermicomposting** - Composting done by earthworms.
- **Recycling** - Conversion of waste material in usable form.

Summary

- Waste is an unwanted material which is no longer considered useful. Solid waste is commonly called garbage.
- The waste generated by an industry is called industrial waste. The waste generated by household is called domestic waste.
- Common agricultural wastes are rice husk, bagasse, weeds and pesticide.
- Landfill is an area where the garbage collected from a city or town is dumped.
- Converting plant and animal waste including that from kitchen, into manure is called composting.
- The method of preparing compost with the help of earthworms is called vermicomposting.

- Incineration is the process in which waste is burnt.
- We can minimize the use of plastics.
- Paper, glass and metal can be recycled.

1. Fill in the blanks

a. Solid waste is commonly called _____ .

b. Plastic is a _____ _____ material.

c. Composting done by earthworms is called _____ .

d _____ dustbin is used for collecting non-biodegradable waste.

2. Write True or False

a. Green dustbin is used for collecting non-biodegradable waste.

b. Biomedical wastes are hazardous and infectious.

c. A large, low-lying area used to dispose off garbage is known as a dump.

d. Landfill site is ideal for making parks and playgrounds.

3. Match the column A with column B

	A		B
1.	Biomedical waste	(a)	fly ash
2.	Industrial waste	(b)	medicines and syringes
3.	Domestic waste	(c)	paddy husk
4.	Agricultural waste	(d)	vegetable peels

4. Choose the correct answer :

(i) Hospital waste is generally:

(a) Recycled (c) Incinerated

(b) Dumped in landfill (d) Composted

(ii) The earthworms used for composting are called

(a) Redworms (c) Blueworms

(b) Greenworms (d) Whiteworms

(iii) _____ is a non-biodegradable waste.

(a) Plastic (c) Paper

(b) Vegetable matter (d) Animal dung

(iv) We can recycle _____

(a) Glass (c) Metals

(b) Plastic (d) All

5. Very short Answer type Questions:

(i) What is meant by dump?

(ii) What type of garbage is collected in blue dustbin and green dustbin?

(iii) What is meant by recycling?

6. Short Answer type Questions:

(i) Distinguish between biodegradable and non-biodegradable waste.

(ii) What is vermicomposting? How is it done?

7. Long Answer type Questions:

(i) Explain how plastic is a boon.

(ii) List various methods of garbage disposal. Explain any one.

(iii) Explain the 4R's.