

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

# GENERAL SCIENCE

## 4



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# 01

## UNDERSTANDING OURSELVES

In this chapter, we will learn about:

- Introduction to human body
- Major body parts and their functions

Our body has various parts just like a machine (Figure 1.1). These parts are called organs. Organs work together to make our body work.



Figure 1.1: Car and its parts

Whenever we look into a mirror we see many of our organs (Figure 1.2) i.e. eyes, ears, nose, etc. These are called external organs. The organs present inside our body are called internal organs.

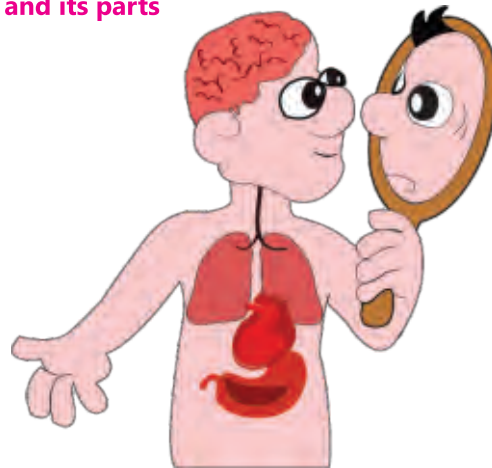


Figure 1.2: Parts of human body



### Activity 1.1

Name some internal organs of our body.



## MAJOR BODY PARTS AND THEIR FUNCTIONS

### EYES

The eyes make us see the world around us. We have a beautiful world around us which is full of colours such as green trees, blue sky, etc. Eyes are the only organs of our body which can see this beauty and make our lives colourful (Figure 1.3).



Figure 1.3: Human eyes

### EARS

At the end of the school time when the bell rings we become happy and start packing our bags for going home. Have you ever thought which part of your body makes you hear this sound? It is the ears which receive the sounds from all around us and make us hear (Figure 1.4).



Figure 1.4: Human ear

### TEETH

Teeth are very important part of our body. We chew our food with the help of teeth (Figure 1.5).

Count the number of teeth in your mouth. How many are they?

We have two sets of teeth in our life time, one is milk teeth and the other is permanent teeth (Figure 1.6).



Figure 1.5: Human teeth

### MILK TEETH

It is the first set of teeth which starts appearing at the age of 6 months. At the age of 3 years we usually have 20 teeth.



Milk Teeth



Permanent Teeth

Figure 1.6





### Activity 1.2

Collect the following data from your friends:

Sr. No.	Name of Friend	Age in which first tooth fell
1		
2		
3		
4		
5		

### PERMANENT TEETH

Milk teeth start falling from 5 to 6 years of age. They are replaced by permanent teeth which are 32 in number.



### Activity 1.3

- See the picture carefully, and write what has happened to his teeth and why?

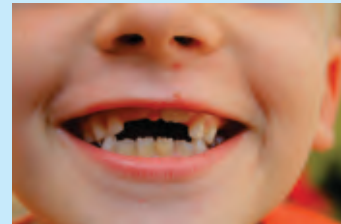
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### ? Do you know?

Every year in China, people celebrate a special day called "Love Your Teeth Day".

### BONES

Look at the Figure 1.7. It shows the bones which are present in our body.

Bones make up the structure of our bodies. We call this structure the **skeleton**. An adult skeleton is made up of 206 bones.

- The skeleton provides support to the body.
- Bones give shape to the body.
- The skeleton protects soft parts of our body. For



Figure 1.7



example, heart is protected by ribs. What protects our brain?



Figure 1.8: Leg bones

## JOINTS

The point where two bones meet is called a joint. Joints help in movement. Some joints are fixed and do not move. For example, the joints in our skull. Some joints move a little, like the joints in our spine. Some joints move a lot, like our elbows and knees (Figure 1.9).

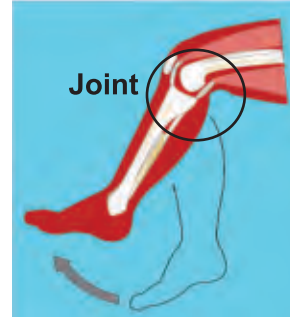


Figure 1.9: Knee joint



### Activity 1.4

Identify the joints in this picture by colouring them with different colours.



## MUSCLES

Muscles perform many functions in the body. Muscles help us in walking, running, lifting things, writing and many other actions (Figure 1.10).



Figure 1.10: Muscles help in running and lifting things



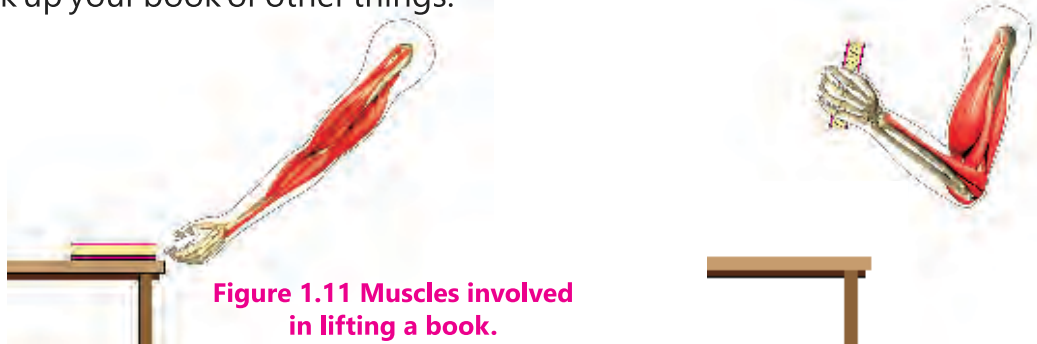


## MOVEMENT OF OUR BODY BY MUSCLES

Muscles can contract or relax. A bone is attached to the muscles for movement. Muscles can move a bone when they contract or relax. Muscles contract when they get message from the brain. For example, if you want to pick up your book, the brain will send a message to the muscles. On getting the message, the muscle contracts and pulls up the bone attached (Figure 1.11). After doing this the muscle will relax, which means that it will return to its normal size. In this way, you pick up your book or other things.

### ? Do you know?

There are more than 600 muscles in our body.

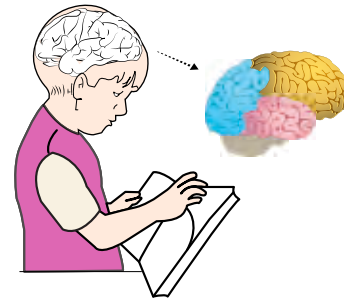


**Figure 1.11 Muscles involved in lifting a book.**

## BRAIN

Brain is the control centre of our body (Figure 1.12). The brain commands our muscles when to move. It makes us laugh and cry. It allows us to learn new things. It keeps on working even when we are asleep.

The brain receives different information from organs such as eyes, ears and nose. The brain reads each message and decides how our body should respond.

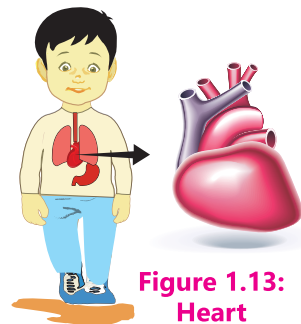


**Figure 1.12: Brain**

## HEART

Sometimes we get hurt and get a cut, blood flows out and we need a bandage to stop the bleeding. The blood in our body is continuously circulating. It is a need of our body. The flow of blood keeps us alive.

Heart is the organ which pumps the blood so that it circulates throughout our body (Figure 1.13).



**Figure 1.13: Heart**



## STOMACH

Have you ever thought where the food you eat goes in the body? It is well chewed by the teeth and is pushed into the stomach (Figure 1.14). The stomach churns up the food. It breaks up the food into a sort of soup. Some of it is absorbed for body functions and the rest goes out as a waste.

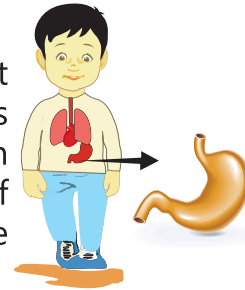


Figure 1.14: Stomach

## LUNGS

We have two lungs in the right and left side of our chest. The lung on left is a little smaller than the lung on the right because it has to make room for our heart to fit in our chest. These are the organs which help in breathing (Figure 1.15). Breathing means taking air in the lungs and sending it out. Lungs take oxygen from the air and send it to the whole body.

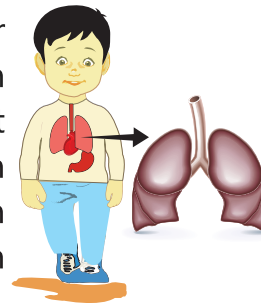


Figure 1.15: Lungs



### Activity 1.5

Take two balloons and two drinking straws and attach them as shown in the figure. Now fill air in the balloons using your mouth. These balloons now look like the lungs in our body.



## SKIN

It is an important organ of the body which performs many functions such as it covers the body altogether (Figure 1.16). It stops germs and dirt from getting into the body.



Figure 1.16: Skin of hand

## HEALTHY BODY

Eating healthy food and doing regular exercise make our body healthy.

These are the foods which you love to eat every day (Figure 1.17). But all these foods are not healthy foods.



Figure 1.17: Junk food or unhealthy food



Healthy foods are the ones which contain all those things which our body needs. This food helps in our growth and makes our body strong. Vegetables, rice, flour, pulses, fruits, meat and meat products, milk and milk products are healthy foods (Figure 1.18). Excess of everything is not good for health.



**Figure 1.18: Healthy food**

Foods which are not good for our health are called unhealthy foods. Example of unhealthy foods are chocolates, sweets, cold drinks etc. (Figure 1.19). Eating too much of them can make our stomach upset and can harm our teeth.



**Figure 1.19: Unhealthy food**

We should walk and play daily. It makes us strong and healthy (Figure 1.20). Without this, bones and muscles become weak, and are easily damaged.



**Figure 1.20: Playing and running make us strong and healthy**



A man sitting in a restaurant wants to have healthy food for his lunch. What should he order?

- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_

## MALARIA AND DENGUE FEVER

Malaria and dengue are the diseases which are spread by mosquitoes. Malaria is caused by microorganisms called Plasmodium. Plasmodium are transferred to human blood by the biting of *Anopheles* mosquito (Figure 1.21).



**Figure 1.21** Biting action of *Anopheles* mosquito

## DENGUE FEVER AND ITS PREVENTION

You might have heard about viruses. Viruses are tiny living things that can only be seen with the help of a powerful microscope. Dengue fever is caused by a special type of virus. It is spread by *Aedes* mosquitoes which develop in the environment of standing clean water. *Aedes* mosquito, which spreads dengue fever, has black and white stripes on its body. This mosquito usually bites at dawn and dusk.



**Figure 1.22** Biting action of *Aedes* mosquito

Dengue virus is transferred to human body by the biting of *Aedes* mosquito. Biting action of *Aedes* mosquito is shown in Figure 1.22.

The presence of dengue virus in the body of a person can be known by the symptoms of the disease and the blood test.

## SYMPTOMS OF DENGUE FEVER

- Severe headache and vomiting.
- High fever and pain in the back and joints.
- Rash with red and black spots on body.
- Pain behind the eyes.



- Usually bleeding from nose and gums.

### SAFETY PRECAUTIONS

- Apply mosquito repellent lotion on your exposed body parts when you are going out.
- Sleep under mosquito net (Figure 1.23).
- Wear dress that covers maximum parts of your body (Figure 1.24).
- Keep doors and windows screened and closed especially in the morning and in the evening (Figure 1.25).



Figure 1.23: Sleeping under mosquito net



Figure 1.24: Dress that covers maximum parts of the body

If anyone in your family shows symptoms of dengue fever, immediately contact some doctor or a nearby hospital.



Figure 1.25: Keep the doors closed

### REMEMBER

- Dengue fever can be controlled by appropriate and timely preventive measures.
- Keep your home and street clean. Do not let stay water in your surroundings.



- *Aedes* mosquito usually lays eggs in clean standing water. So,  
(a) keep storage tanks, pitchers, drums and animals' feeding pots covered.  
(b) remove water from flower pots and fountains daily (Figure 1.26).
- Use mosquito killing sprays, coils, mats etc. in your homes.



**Figure 1.26: Mosquitoes can be prevented from developing by keeping our homes clean, storage tanks covered and removing standing water from the flower pots**

## KEY POINTS

- Our body has different parts which are called organs.
- Eyes make us see things.
- Ears help us hear sounds.
- Teeth help in chewing food into small pieces.
- Bones make up the framework of our body.
- Bones and muscles help us moving.
- Brain controls all the functions of the body.
- Heart pumps blood to all parts of the body.
- Lungs are breathing organs. They help in the exchange of gases.
- Skin covers our body altogether.
- Dengue fever is caused by a special type of virus.
- Dengue is spread by *Aedes* mosquito.
- *Aedes* mosquito has white and black stripes on its body.
- Severe headache, high fever, pain in body, vomiting, bleeding from nose and gums are the symptoms of dengue fever.



## GLOSSARY

- Organ :** Part of the body which performs specific function.
- Skeleton :** Bones combine together to form skeleton.
- Joints:** The points where the bones meet.
- Muscle:** Part of the body which contracts, relaxes and causes movement.
- Healthy food:** Food which contains all those things which a body needs in proper amount.
- Unhealthy food:** Food in which amount of different things is not according to body requirement.

### EXERCISE

#### 1.1 Fill in the blanks.

- (i) We see with our \_\_\_\_\_.
- (ii) Food is chewed by \_\_\_\_\_.
- (iii) Two bones meet at a \_\_\_\_\_.
- (iv) Heart pumps \_\_\_\_\_ to every part of the body.
- (v) Dengue fever is caused by a \_\_\_\_\_.
- (vi) Dengue fever is spread by \_\_\_\_\_.

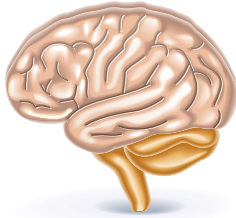
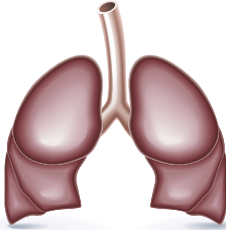
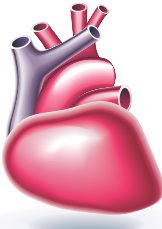
#### 1.2 Encircle the correct option.

- (i) The organ which is involved in body movements is:
  - a. bones
  - b. muscles
  - c. joints
  - d. all of these
- (ii) In their whole life, humans have sets of teeth:
  - a. 2
  - b. 3
  - c. 4
  - d. 5



- (iii) The control centre of our body is:
- a. heart
  - b. stomach
  - c. brain
  - d. skin
- (iv) Which of the following organ pumps the blood in the body:
- a. heart
  - b. stomach
  - c. brain
  - d. skin
- (v) Unhealthy food is:
- a. vegetables
  - b. fruits
  - c. milk
  - d. chocolates
- (vi) The dengue virus is spread by:
- a. air
  - b. flies
  - c. *Aedes* mosquito
  - d. shaking hands

**1.3 Column A shows the organs of the body. Write their functions in column B**

Column A (Organ)	Column B (Function)
	
	
	



#### 1.4 Short Answer Questions

- (i) What is the role of bones in our body?
- (ii) Write the functions of brain.
- (iii) Differentiate between milk teeth and permanent teeth.
- (iv) Write any two ways of taking care of your skin.
- (v) What would happen if your body had no joints?
- (vi) How does dengue fever spread?
- (vii) State important preventive measures for dengue fever.

#### 1.5 Write briefly functions of brain, heart and lungs.

#### 1.6 How do bones and muscles help in the movement of body?

#### 1.7 Write the importance of healthy food. Why does the doctor advise us not to take unhealthy food?

### SCIENCE PROJECT

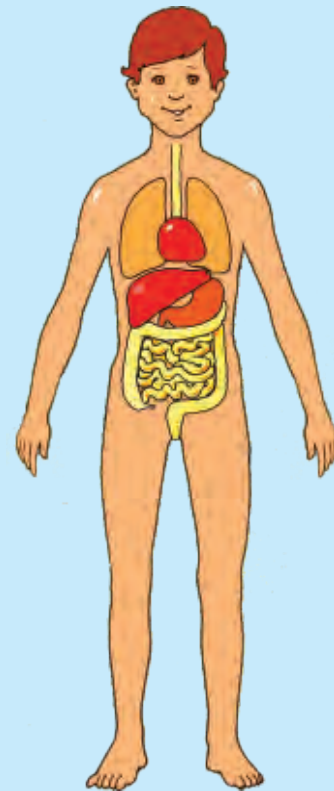
Identify different organs of human body in the given figure.

#### Word Puzzle

Find words in the puzzle using word bank below:

**BRAIN, TEETH, LUNGS, STOMACH, HEART, EYE, EAR, HEALTHY**

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





# 02

## CHARACTERISTICS AND NEEDS OF LIVING THINGS

### In this chapter, we will learn about:

- Living things need food, sunlight, air and water to survive
- Living things move, grow, reproduce and maintain the continuity of life
- Similarities and differences among members of one kind of organisms
- Life cycle

There are many things around us. Some of them are nonliving things like table, chair, book, etc. Some are living things like animals and plants. Living things can grow, eat, reproduce, move, etc. Nonliving things cannot grow, eat, reproduce or move by themselves.

Living things need food, water, air and light for their survival.

### FOOD

Living things need food to live and grow. Food makes them strong and healthy. It gives them energy.

Some of the living things like plants can make their own food. They get energy from the sunlight. They use light energy to convert carbon dioxide and water into food.



**Figure 2.1: Animals eat different types of food**

Some living things cannot make their own food. They depend on plants and other animals for their food. Humans and animals are the examples of such living things (Figure 2.1).



## WATER

Water is very important for life. All plants and animals need water for survival (Figure 2.2).

Humans not only drink water but also use it in their daily life for cooking, washing, cleaning, etc. Plants also cannot make food without water.



Figure 2.2: All animals and plants need water for survival



### Activity 2.1

Bring a potted plant in the classroom with the help of the teacher. Water it regularly for three days and observe it. Now stop watering it for next three days. Observe it daily and record its condition in the chart given below.

Number of days	Condition of plant with water	Condition of plant without water
Day 1		
Day 2		
Day 3		

What have you learnt from this activity?

## AIR

Air is needed by all living things on the Earth. Humans have lungs in their body which help them breathe. Lungs take oxygen present in air and send it to whole body. Plants also use carbon dioxide from air to make food.

## LIGHT

Light is a source of energy. All organisms need it. Plants cannot make food without sunlight.



## PHYSICAL CHARACTERISTICS OF LIFE

### MOVEMENT

Movement is a characteristic of life. Nonliving things cannot move on their own.

Different groups of animals make different types of movements. This difference is due to their body structure and place where they live. Fish swim, frogs and kangaroos hop, birds fly, humans walk, etc.

Plants as a whole remain fixed and do not change their position. However, most of their parts grow which can be considered as a sort of movement.



Figure 2.3: Animals making different types of movements



#### Activity 2.2

Collect the information from different sources; books, internet etc. to find how the following animals move:

Sr. No.	Animal	Mode of Movement
1	Fish	Swim
2	Frog	
3	Lizard	
4	Crow	
5	Monkey	

### GROWTH

Growth is one of the important characteristics present in living things and absent in nonliving things. We have not seen a book, a chair or a pen increasing in size. The size of living things like humans, animals and plants continuously grows and gets bigger.

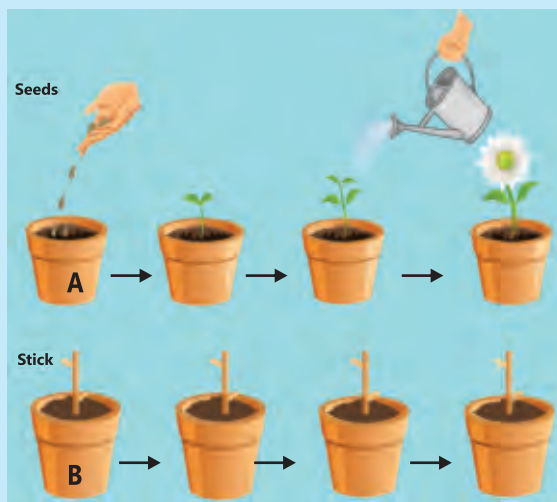




### Activity 2.3

Perform an experiment to show that living things can grow while nonliving things cannot grow.

Take two pots as shown in the figure. In pot A put some seeds and in pot B put some marbles or stick of wood. Water them daily and observe what is happening?



What happens in pot A after a few days?

---

---

What happens in pot B after a few days?

---

## REPRODUCTION

Reproduction is another characteristic which is present in the living things but absent in nonliving things.

Reproduction means producing their young ones. Dog produces puppies (Figure 2.4), cat produces kittens (Figure 2.5). Rose plant produces baby rose plants.



Figure 2.4:  
Dog and puppies



Figure 2.5: Cat with kittens and rose plant with its baby plant



## SIMILARITIES AND DIFFERENCES AMONG MEMBERS OF ONE KIND OF ORGANISMS

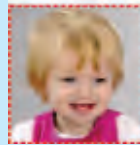
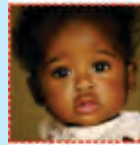
We have studied in class III that one kind of organisms resemble each other. For example, all humans are alike. They all have two eyes, two ears, hair, etc.

But in the same kind of organisms, some differences also exist. We are not exactly like our parents. Some of the differences may be in eye colour, hair colour, height, skin colour, etc.



### Activity 2.4

- Look at the pictures of babies and match them with their parents.



## LIFE CYCLE

Life cycle means different stages which a living thing goes through during its life.

### LIFE CYCLE OF PLANTS

A plant passes through various stages during its life time.

- The life cycle of a plant begins with the seed.
- In the next stage, a small root appears and begins to grow



downward. Soon a shoot arises from the seed and grows upward.

- This shoot grows and changes into a seedling. A seedling is a small plant with a few leaves.
- The seedling develops into a young plant. The young plant grows into an adult plant and produces fruit. The seeds are produced in the fruit (Figure 2.6).

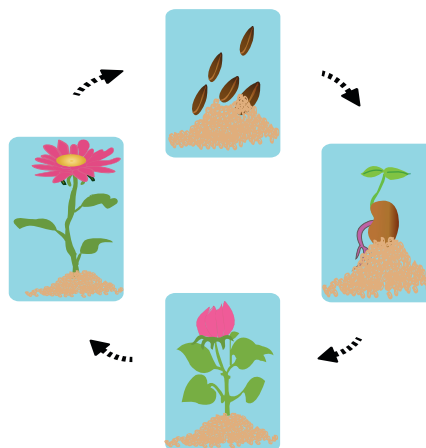
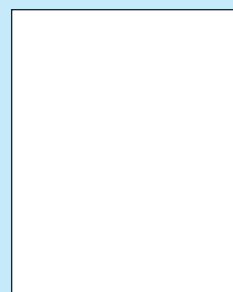
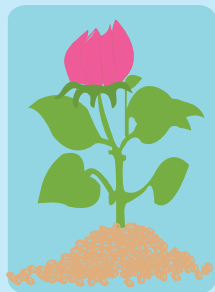
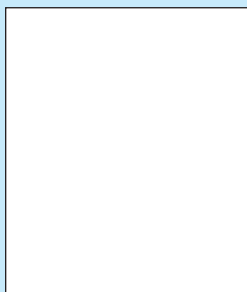
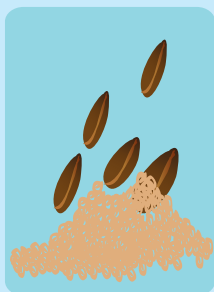


Figure 2.6: Plant life cycle



### Activity 2.5

Draw the missing stages in the life cycle of the plants.



## KEY POINTS

- Living things need food, water, air and light for their survival.
- The characteristics such as movement, reproduction and growth are present in living things and are absent in nonliving things.
- Animals make different types of movements.
- A continuous increase in the size of a living thing is called growth.
- The process of producing young ones is called reproduction.
- There are similarities and differences among members of one kind of organisms.
- Plants have many stages in their life cycles such as seed, seedling and adult plant.



# GLOSSARY

- Life cycle:** Different stages which a living thing passes through during its life.
- Reproduction :** Process by which living things produce their young ones.
- Seedling:** A small plant with a few leaves.

## EXERCISE

### 2.1 Fill in the blanks.

- (i) Plants and animals need \_\_\_\_\_ , \_\_\_\_\_ and \_\_\_\_\_ to survive.
- (ii) Animals move from place to place to get \_\_\_\_\_ and \_\_\_\_\_.
- (iii) Roots of plants grow \_\_\_\_\_.
- (iv) Young ones have characteristics \_\_\_\_\_ to their parents.
- (v) A seedling is a small plant with a few \_\_\_\_\_.

### 2.2 Encircle the correct option.

- (i) Which one of the following is nonliving?
  - a. animals
  - b. plants
  - c. bacteria
  - d. car
- (ii) Which one of the following does not run on its feet?
  - a. frog
  - b. fish
  - c. humans
  - d. kangaroos
- (iii) The characteristic which is observed in living things is:
  - a. movement
  - b. growth
  - c. reproduction
  - d. all of these
- (iv) The ability to produce young ones is called:
  - a. respiration
  - b. excretion
  - c. reproduction
  - d. circulation



(v) Life cycle of a flowering plant starts from:

- |           |             |
|-----------|-------------|
| a. flower | b. seedling |
| c. fruit  | d. seed     |

### 2.3 Short Answer Questions

- (i) Name the factors which play an important role in the survival of living things.
- (ii) A car moves from place to place. It also uses petrol as fuel. Can you call it a living thing?
- (iii) What is growth?
- (iv) How are you different from your parents?

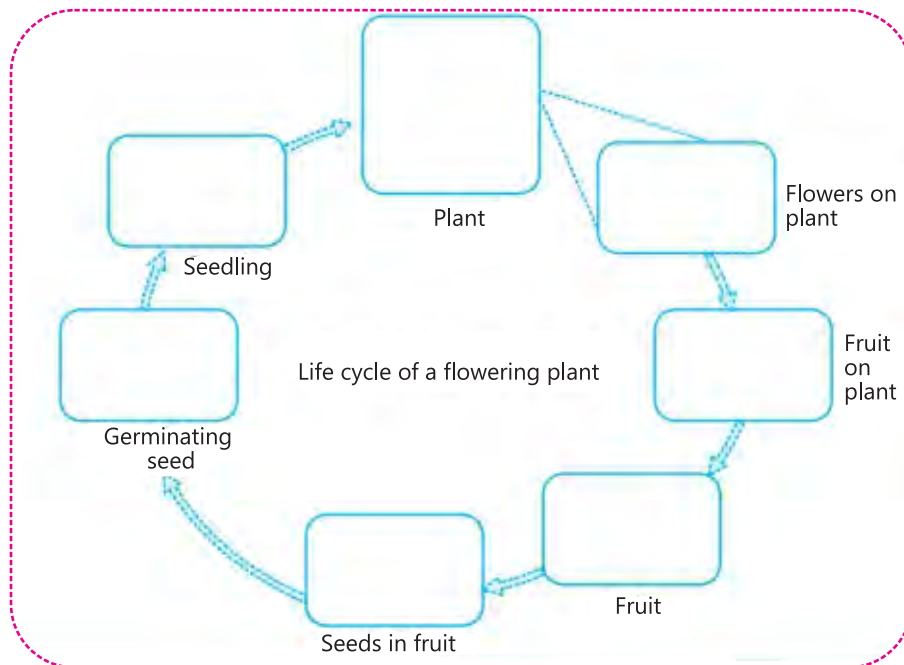
### 2.4 Which factors are necessary for the survival of plants and animals? Discuss in detail.

### 2.5 Describe the physical characteristics of living things.

### 2.6 Discuss the life cycle of plants.

## Science Project

A. Collect pictures from old books and paste them to complete the life cycle of a plant.

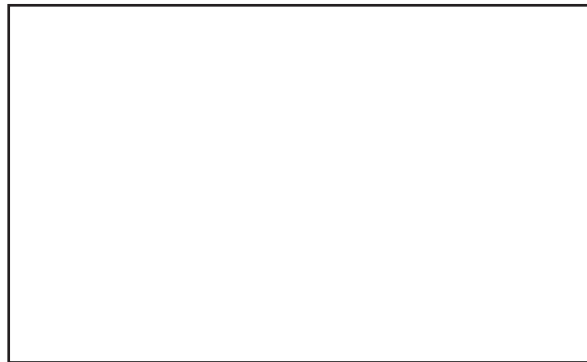




**B. Do you have any pet or a plant at your home which you look after? Observe it carefully and put (✓) to that characteristic it has.**

- It needs food daily. ☐
- Grows and increases in size. ☐
- Moves on its own. ☐
- Reproduces young ones of its own kind. ☐
- Drinks water. ☐

**C. Draw or paste the picture in the box given below.**



### Word Puzzle

**Find words in the puzzle using word bank below:**

**REPRODUCTION, LIGHT, WATER, AIR, MOVEMENT, FOOD, GROWTH**

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



# 03

## FOOD AND HEALTH

In this chapter, we will learn about:

- Sources of different food groups.
- Main groups of food.
- Hygiene and its basic principles.



Food is one of the basic needs of life. We need food in the same way a car needs fuel. It gives us energy. Our body needs energy not only to walk or exercise but also for all other activities such as growth and protection from diseases.

### FOOD GROUPS AND SOURCES

We get food from plants and animals. Wheat, rice, vegetables and fruits come from plants. Fish, meat, eggs, milk and its products such as butter, yoghurt and cheese are obtained from animals.



The chemical substances which are needed by our body for various purposes are present in different foods (Figure 3.1). The major chemical components of food are listed below:

1. Carbohydrates
2. Proteins
3. Fats
4. Vitamins
5. Minerals
6. Water

### CARBOHYDRATES

Carbohydrates are the most important source of energy for our body. These are the fuel that keeps our body working. It is also necessary for proper functioning of brain, heart, kidneys and nervous system. Most carbohydrates we eat come from plants (Figures 3.2, 3.3). Sugar is a carbohydrate found in fruits, honey, milk and table sugar. Foods such as wheat, rice, maize, barley, potatoes are rich in carbohydrates.



Figure 3.1: Different types of food



Figure 3.2: Carbohydrates from fruits



Figure 3.3: Wheat, rice, maize, potatoes are carbohydrate rich foods

#### ? Do you know?

Whole grains, fruits and vegetables are healthy sources of carbohydrates, whereas cookies, sodas, candies and sweets are not healthy sources of carbohydrates.

### PROTEINS

Proteins are the building materials for our body parts, such as muscles, brain, blood, skin, hair and bones. These are also essential for growth and repair of damaged body parts.

Proteins are obtained both



Figure 3.4 Protein rich foods



from animal and plant foods. Meat, fish, eggs, milk and milk products are rich sources of animal proteins, while pulses, nuts, seeds, peas and beans are rich sources of plant proteins (Figure 3.4).

**? Do you know?**

Human hair is made of protein known as 'keratin' which is also found in fingernails.

## FATS

Like carbohydrates, fats also provide us energy. They give more energy as compared to carbohydrates and proteins. These are stored under the skin to protect the body from temperature changes (Figure 3.5). Fats protect our major organs such as heart, kidneys and intestines from injury.

Fats are obtained from animals as well as plants (Figure 3.6). Animal sources of fats are ghee, butter, fats of meat, fish oil, etc. Vegetable sources of fats are various vegetable oils such as olive oil, corn oil, coconut oil, mustard oil (sarson), etc.



**Figure 3.5: Thick layers of fat help polar bears against the effects of low temperatures**



**Figure 3.6: Foods rich in fats**

**? Do you know?**

"Edible Oils" are the fats which are in liquid state at room temperature.

## VITAMINS

Vitamins are needed in small amounts for the normal functioning of our body. They help in keeping our eyes, bones, teeth and gums healthy. Unlike carbohydrates, proteins and fats, vitamins do not provide energy, but help in



**Figure 3.7: Sources of vitamins**



regulating many functions of the body. Vitamins are also called protective foods because they are essential for fighting against certain diseases.

Vitamins are of different kinds such as vitamin A, B, C, D, E and K, each of which has a specific function in our body. Sources of vitamins are leafy green vegetables, fruits, meat, seafood, eggs, milk, etc. (Figure 3.7).

## MINERALS

Minerals perform many functions in our body such as formation of bones, teeth and blood cells. They also play an important role in our growth. Examples of minerals include calcium, iron, iodine, fluorine, phosphorus, potassium, zinc, sodium, etc. Minerals are found in green vegetables, fruits, milk, eggs, etc. (Figure 3.8).



Figure 3.8: Sources of minerals

## WATER

Although, water does not give us energy, it is the most important component of food to maintain proper body functions. It is the main component of the blood, urine and sweat of our body. It helps in transporting substances inside our body and maintains body temperature through sweating. We should take eight to ten glasses of water daily. No one can live for more than a few days without water. Water is also obtained from foods such as watermelon, milk, juices, etc. (Figure 3.9).



Figure 3.9: We get water from juices, milk, etc.



## BALANCED DIET AND ITS IMPORTANCE

We eat different types of food everyday. These may be wheat, rice, pulses, vegetables, fruits, meat, milk, curd, etc. which contain various nutrients (Figure 3.10). These nutrients provide energy to our body for performing different functions. As we have learnt that some food items are rich in proteins while others are rich in carbohydrates, fats, vitamins or minerals. So, it is necessary to select different food groups in proper amounts so



Fig. 3.10 Balanced diet

that our body may get all the required nutrients to remain healthy and develop resistance to diseases. Nutrient requirement varies from person to person. It depends on age, gender and nature of work they do. A diet that contains proper amounts of all the necessary nutrients required for healthy growth and activity is known as '**Balanced Diet**'.

### ? Do you know?

Junk food rich in fats and deficient in other nutrients is unhealthy. Drinking too much soda is injurious to health as it causes dental cavities and reduces bone thickness.

## UNBALANCED DIET AND ITS HARMS

An unbalanced diet is unhealthy as it usually lacks some nutrients and is not in the right quantities to ensure good health and satisfy body needs. An unbalanced diet may cause deficiency of some nutrients.

Deficiency of proteins affects the growth. Lack of vitamin A affects the vision. Deficiency of vitamin C leads to bleeding of gums (Figure 3.11 a). Without enough vitamin D, a person can develop weak and bent bones (Figure 3.11 b).



Figure 3.11(a): Bleeding gums



Figure 3.11(b): Child suffering from weak bones



## FOOD PYRAMID

A food pyramid is a chart that helps us in choosing our daily food. It shows food which we should eat from each group everyday. The food pyramid helps people to select foods that supply all the nutrients they need. Foods that contain the same nutrients belong to a food group. The base of a pyramid shows what we should eat the maximum. As it goes up it shows what we should eat the minimum. Food pyramid is divided into six food groups as shown in Figure 3.12.

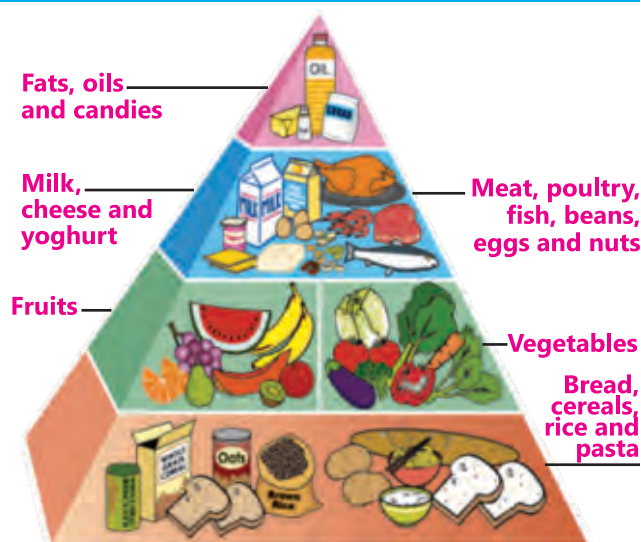


Figure 3.12: Food pyramid



### Activity 3.1

You should record what you eat daily and categorize the foods into groups in order to monitor whether a balanced diet is being taken or not.

		Breakfast		Lunch		Dinner	
Sr. No.	Days	Food Taken	Food Groups	Food Taken	Food Groups	Food Taken	Food Groups
1.	Monday						
2.	Tuesday						
3.	Wednesday						
4.	Thursday						
5.	Friday						
6.	Saturday						
7.	Sunday						

Conclusion: .....





### Activity 3.2

Recall what you have learnt about the food groups in this lesson. In the table shown below fill in three favourite foods for each group in a food pyramid.

Food group	My favourite foods
Fruits group	
Vegetables group	
Dairy group	
Fats, oils, sweets	
Meat, poultry, fish and beans group	
Bread, cereals, rice and pasta group	

## PERSONAL HYGIENE

Personal hygiene may be described as the principle of maintaining cleanliness of the body parts like head, hair, ears, face, eyes, nose, neck, teeth, hands, feet and skin.

### BASIC PRINCIPLES OF HYGIENE

**Wash your hands:** Wash your hands using clean water and soap before eating, after visiting toilet and touching unclean objects so that you get rid of germs.



**Take a bath:** Take a bath or shower every day to keep all parts of your body clean.



**Brush your teeth:** Brush your teeth twice a day, once in the morning and then before going to bed.



**Brush your hair:** Wash your hair often. Brush hair using a clean comb. Do not share comb with others.



**Care of nose:** Always keep your nose clean. Wipe the nose using soft cotton cloth. Do not put fingers or any object in your nose.





**Care of ears:** Always keep your ears clean. Remove wax from ears using cotton buds. Do not put anything in your ears like fingers, hairpins, etc. Clean your ears gently while bathing.



**Care of eyes:** Clean your eyes gently with water. Never read in dim light.



**Care of feet:** Keep your feet clean and wash them daily. Always wear shoes while going out.



**Care of nails:** Trim nails weekly. Keep nails short and clean. Do not bite your nails.



**Wear clean clothes:** Always wear clean, dry, neat, tidy and seasonal dress.



## KEY POINTS

- Our body needs energy to do work and that energy comes from food.
- Food provides nutrients to our body.
- Nutrients are substances that provide energy and materials for growth, repair and development.
- Carbohydrates, proteins, fats, vitamins (A, B, C, D, E and K), minerals (calcium, iron, zinc, fluorine, iodine, etc. ) and water are the main nutrients.
- Carbohydrates provide energy to our body.
- Proteins are needed for the growth and repair of our body.
- Fats also provide energy. They produce much more energy compared to the same amount of carbohydrates.
- Vitamins and minerals are needed in small amounts. They are essential for proper growth of body and for maintenance of good health.
- Food pyramid helps to select proper diet.
- Personal hygiene may be described as principle of maintaining cleanliness of the body parts.



## GLOSSARY

**Balanced Diet:** A diet that contains required amounts of all the necessary nutrients for healthy growth and activity.

**Food:** Food is the fuel for our body needed for energy, to help our body to grow, repair itself and keep warm.

**Food Groups:** Our food contains many substances that are necessary for our body. On the basis of their properties and functions foods are classified into the different groups called carbohydrates, proteins, fats, vitamins and minerals.

**Food Pyramid:** A food pyramid shows the proper amount from each food group that we should eat everyday to maintain a balanced diet.

**Nutrients:** The ingredients of food that we need to grow and survive.

**Unbalanced Diet:** It is a diet that lacks some nutrients to ensure good health and satisfy body needs.

### EXERCISE

#### 3.1 Complete the following sentences with suitable words.

- (i) Food gives us \_\_\_\_\_ for various activities.
- (ii) There are \_\_\_\_\_ food groups.
- (iii) Carbohydrates are the body's main source of \_\_\_\_\_.
- (iv) Proteins help us to \_\_\_\_\_ our body.
- (v) \_\_\_\_\_ do not provide energy to the body but are necessary for body functions.
- (vi) Fats protect our skin from \_\_\_\_\_.
- (vii) Fats that come from animal source are called \_\_\_\_\_ fats.
- (viii) Vitamins are substances present in \_\_\_\_\_ amounts in food.
- (ix) \_\_\_\_\_ is a chart that helps us in choosing daily food.

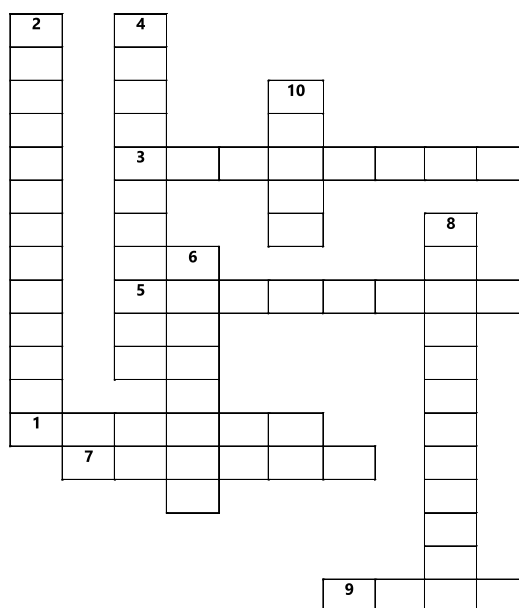


### 3.2 Encircle the correct option.

- (i) Which mineral helps in building of bones and teeth?  
a. iron    b. zinc    c. calcium    d. sodium
- (ii). What carries nutrients to all parts of the body and regulates the body temperature?  
a. carbohydrates                      b. fats  
c. water                                  d. proteins
- (iii) The foods rich in carbohydrates are:  
a. potato,wheat,sugarcane    b. meat,fish,pulses  
c. butter,ghee,oil                      d. spinach,ginger,tomato
- (iv) The diet which contains right amount of nutrients is:  
a. unbalanced diet                      b. unhealthy diet  
c. delicious diet                      d. balanced diet
- (v) The nutrients that are needed in small amount by our body:  
a. vitamins and minerals    b. carbohydrates and fats  
c. fats and proteins    d. carbohydrates and minerals
- (vi) They help our body to grow:  
a. vitamins                                  b. proteins  
c. minerals                                  d. carbohydrates
- (vii) Which of the following is body building food?  
a. spinach    b. meat    c. mango    d. tomato
- (viii) Which of the following food items if eaten more can make us sick?  
a. milk                                  b. burger and cold drinks  
c. fruits                                  d. vegetables
- (ix) Iron is a :  
a. vitamin    b. mineral    c. fat    d. energy food
- (x) Which vitamin is important for strong bones?  
a. vitamin A                                  b. vitamin C  
c. vitamin D                                  d. vitamin E



### 3.3 Fill in the puzzle boxes with the correct words using the clues given below:



Across	Down
1 a mineral found in table salt.	2 important source of energy for our body.
3 needed for growth and repair.	4 a chart that helps us in choosing our food.
5 make bones and teeth strong.	6 protect against the diseases.
7 food gives us.	8 contains proper amount of nutrients.
9 protect the body from temperature changes.	10 transports substances inside our body.

### 3.4 Match the food nutrients in column A with their functions in column B:

A (Nutrients)
Proteins
Carbohydrates
Vitamins
Water
Fats
Minerals

B (Functions)
give us energy for daily activity.
protect our major organs.
are the building material for body parts.
needed for strong bones and teeth.
help our body to stay healthy.
helps to take nutrients to all parts of the body.



### 3.5. Short Answer Questions

- (i) Why do we need food?
- (ii) What are the basic food groups essential for good health?
- (iii) Give some examples of food from each of the food groups.
- (iv) Why are carbohydrates essential for us?
- (v) Name two specific functions and sources of proteins.
- (vi) Name two specific functions and sources of fats.
- (vii) What is the use of vitamins and minerals?
- (viii) How else can you get water in your diet besides drinking it?
- (ix) Name sources of vitamins and minerals.
- (x) What would happen to your body if you eat only from one food group?
- (xi) How can you get enough of all the nutrients in your diet?
- (xii) Why is it important to eat food from all the food groups?

### Science Project

Make a chart of different food items used by your family during breakfast, lunch and dinner:

	Food Items	Balanced/Unbalanced
Breakfast		
Lunch		
Dinner		



# 04

## LIVING THINGS AND THEIR ENVIRONMENT

In this chapter, we will learn about:

- Environment and its components
- Types of environment
- Classification of animals according to eating habits
- Introduction to simple food chain



### ENVIRONMENT

When we talk about our **environment**, we mean every thing around us which can affect our lives.

It includes air, water, sunlight, plants and animals.

Plants and animals are its living components.

Air, sunlight, soil and water are its nonliving components.





### Activity 4.1

The given picture shows an environment of a park. Observe it carefully; fill green and red colour to the living things, yellow and orange colour to the nonliving things.



### TYPES OF ENVIRONMENT

Living organisms have their specific environment. They live in their own environment and get all the needs of life from it. There are various types of environments such as oceans, forests, deserts, ponds, urban and rural environment. Organisms show adaptations according to their particular environment. This means that these organisms possess certain features that help them in living successfully and comfortably in that environment.





### Activity 4.2

Two types of environment are shown below. Observe them carefully.



- Are the two environments similar?
- What do you call them?
- What is the important feature of desert environment?
- Tell any important feature of forest environment.



### Activity 4.3

Pictures of urban and rural environment have been given below.



**(A) Urban Environment**

**(B) Rural Environment**

- Describe important features of rural environment.
- What facilities are available to the children in urban environment?
- Can you identify and name some features of the environment that are harmful to us?



## Word Puzzle

Find the following words in the puzzle.

POND DESERT MOUNTAIN RIVER OCEAN GRASSLAND FOREST

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

### EFFECTS OF ORGANISMS UPON ONE ANOTHER

Many kinds of organisms live together in an environment. They influence the lives of one another. Sometimes one organism harms the other. On the other hand, they may be mutually beneficial. We can say that they are essential for one another. All the living things are well adapted to their environment. The bodies of water animals suit them well to move in water without much resistance. The boat-shaped body of a fish helps it swim in water easily. On contrary, the land animals like dogs, goats, lions and monkeys, etc. have bodies suitable to live on land (Figure 4.1). The animals living on land breathe through lungs while the animals living in water like fish, breathe through gills.





**Figure 4.1: Three mammals: dolphin is adapted to live in water whereas lion and goat are adapted to live on land.**

The bodies of the birds are smaller in size with hollow bones. The muscles of their trunk and wings are very strong which help them in flying.

The animals like toads, frogs and salamanders that live in water as well as on land are called **amphibians** (Figure 4.2). In water, they respire through skin and on land, they respire by lungs.



**Figure 4.2: Three amphibians**

## PROJECT



### THINK, TALK AND WRITE

Write about the environment you live in. What is its climate? What kinds of living things are found in your environment?

## EATING HABITS OF ANIMALS

Living things in an environment need different amounts of food to meet their energy needs. Green plants make their own food. They make more food than they need. Animals cannot make their own food. They eat different kinds of food. Animals that eat only plants are called **herbivores**.



Caterpillar, goat, rabbit, horse and elephant are herbivores (Figure 4.3). Can you name some more herbivores?



Figure 4.3: Herbivores

Some animals eat other animals. They are called **carnivores**. Lion, tigers and eagles are carnivores (Figure 4.4). Can you name some more carnivores?

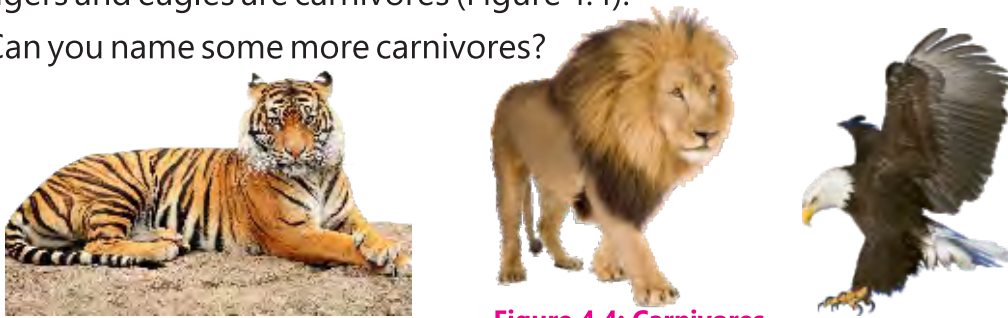


Figure 4.4: Carnivores

Some animals eat both plants and animals. They are called **omnivores**. Bears, monkeys and human beings are examples of omnivores (Figure 4.5).



Figure 4.5: Omnivores

Look carefully at the pictures (Figure 4.6) and write name of each animal in the correct group.



Figure 4.6: Animals



HERBIVORES	CARNIVORES	OMNIVORES

## PRODUCERS, CONSUMERS AND DECOMPOSERS

### PRODUCERS

Plants prepare food for themselves and for all other organisms. That is why they are called producers. Plants produce various types of food which include fats, carbohydrates and proteins. All vegetation including herbs, shrubs and trees are producers. Algae are another example of producers. Algae float on water surface and are a major source of food for water animals.

#### ? Do you know?

Most photosynthesis occurring in the seas is done by algae.

### CONSUMERS

Animals cannot prepare their food themselves. Some get their food from plants. All such animals which depend on plants directly or indirectly for their food are called



Figure 4.7: Consumers



## DECOMPOSERS

You have studied about bacteria and fungi (Figure 4.8). What type of food is consumed by these organisms? They decompose (break down) the dead bodies of animals and plants into simple components and mix them in the soil for reuse by the plants for preparing food. They are thus, called decomposers. During this activity, they get their food.

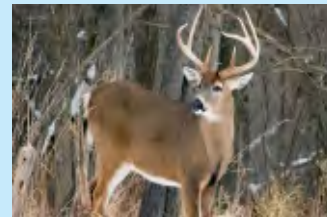


Figure 4.8: Bacteria and fungi as decomposers



### Activity 4.4

Identify and write (P) for producers, (C) for consumers and (D) for decomposers in the boxes under the pictures given below.





## FOOD CHAIN

Organisms also depend upon one another for food. An animal feeds on plants or animals and is itself eaten by some other animal. A third animal consumes the second animal and so on. For example, a rat eats seeds of plants. The rat is eaten by a snake and the snake is hunted by an owl (Figure 4.9).

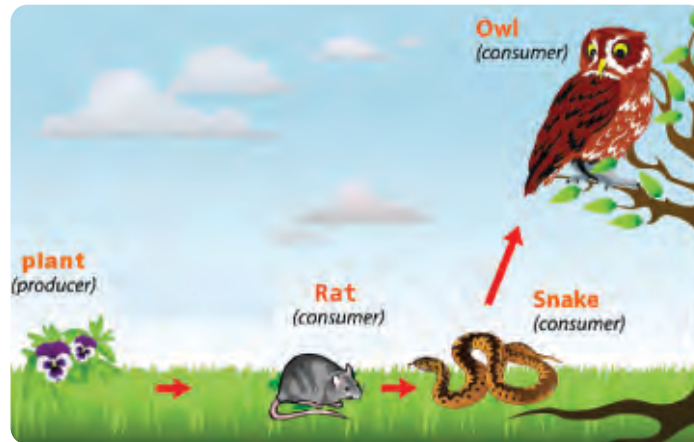


Figure 4.9: Food chain

This relationship or series of eating and being eaten among organisms is called a **food chain**.

## KEY POINTS

- The two components of the environment are living component and nonliving component.
- Environments are of various types, i.e., land environment, water environment, pond environment, urban environment, rural environment.
- Living organisms depend upon one another through food chain.
- Green plants prepare food and are called producers.
- The organisms which depend upon plants and other animals for food are called consumers.
- Depending upon the eating habit, animals are classified as herbivores, carnivores and omnivores.
- Herbivores eat plants, carnivores eat meat and omnivores eat both plants and meat.



- The organisms like bacteria and fungi decompose the dead bodies into smaller compounds and mix them in the soil for reuse by the plants for preparing food.
- Bacteria and fungi are called decomposers.

## GLOSSARY

<b>Environment:</b>	Everything in and around an organism.
<b>Adaptation:</b>	Characteristic of an organism that enables it to live in a particular environment.
<b>Food Chain:</b>	A link for eating and being eaten among the organisms.

### EXERCISE

#### 4.1 Fill in the blanks.

- Plants and animals are \_\_\_\_\_ components of environment.
- Animals living on land breathe through \_\_\_\_\_.
- The water animals, like fishes, breathe by means of \_\_\_\_\_.
- Frogs and toads are found in \_\_\_\_\_ as well as on \_\_\_\_\_.
- Animals that eat both plants and animals are called \_\_\_\_\_.
- Animals that eat other animals are called \_\_\_\_\_.
- Animals that eat only plants are called \_\_\_\_\_.
- Algae, herbs, shrubs and trees are all \_\_\_\_\_.
- Bacteria and fungi are called \_\_\_\_\_.
- Organisms that depend on plants for their food are called \_\_\_\_\_.

#### 4.2 Mark (✓) for true sentence and (✗) for false one.

- Algae are consumers.
- Things decay due to action of fungi and bacteria.
- Bacteria are producers.
- Man and crow are omnivores.
- Lion is a carnivore.



### 4.3 Encircle the correct option:

- (i) Which of the following organisms are decomposers?
- a. green plants                      b. men  
c. bacteria and fungi              d. lions
- (ii) Our environment consists of:
- a. living things                      b. nonliving things  
c. both a and b                      d. none of these
- (iii) Eating and being eaten in animals is called:
- a. habitat                              b. food chain  
c. pollution                           d. environment
- (iv) Cactus is found in:
- a. river                                  b. ocean  
c. forest                                d. desert
- (v) Omnivores eat:
- a. plants only  
b. meat of other animals only  
c. both plants and meat  
d. neither plants nor meat
- (vi) Which one of these shows the correct food chain in an environment?
- a. Sun → Decomposers → Consumers → Producers  
b. Sun → Consumers → Producers → Decomposers  
c. Sun → Producers → Consumers → Decomposers  
d. Sun → Producers → Decomposers → Consumers

### 4.4 Match the columns A and B.

Column A	Column B
Bacteria and Fungi	Omnivores
Human being	Land environment
Forests	Desert
Air	Decomposers
Cactus plant	Nonliving component



#### 4.5 Write short answer.

- (i) Define environment in your own words.
- (ii) What are producers, consumers and decomposers?
- (iii) What is meant by herbivore, carnivore and omnivore?
- (iv) Name any two examples of each of the following:
  - a. Land environment
  - b. Water environment
- (v) Would a dolphin survive in grassland? Argue why yes / no.

#### 4.6 Producers, consumers and decomposers depend upon each other. They need one another for survival. What would happen if there were no decomposers?

#### 4.7 A tadpole eats algae which can make its own food. A tadpole can be eaten by a pond skater; (a water insect) the skater is eaten by a frog or beetle. A beetle is eaten by a kingfisher (a type of bird). Write down two food chains from the given information.

Food chain 1:

Food chain 2:

#### 4.8 Sparrow eats rice, grains and locusts. Locusts eat rice plants.



Rice plants



Sparrow



Locust

Farmers are taught that by killing the sparrows, they would have a good harvest of rice. Is this correct? Why?

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#### 4.9 Describe different kinds of living organisms on the basis of their eating habits.

#### 4.10 What is meant by a food chain?



# 05

## MATTER AND ITS STATES

In this chapter, we will learn about:

- Introduction to three states of matter
- Effects of heat on solids, liquids and gases
- Mixing of materials
- Soluble and insoluble solids
- Separation of insoluble solids from water



**Figure 5.1: Variety of animals, plants, mountains, rivers, stars and different objects (examples of matter)**

We see different things around us. Trees, flowers and animals are found everywhere in our surrounding. We also see different objects in our homes and schools.

There are mountains, rivers, stars and the Moon. We feel air around us.

All these things are made up of matter. We can define matter as:



Anything which has mass and occupies space is called matter.

## SHAPE AND VOLUME

Some things are big and some are small. A watermelon is bigger than a lemon. Bigger things occupy more space than smaller things. **The space occupied by an object is called its volume.** Thus, a watermelon has more volume than a lemon (Figure 5.2).



Figure 5.2: Lemon and watermelon



### Activity 5.1

- Take two balls (one big and one small).
- Place them side by side.
- Label the big ball "A" and the small ball "B".



**Q 1:** Which of the two balls (A or B) has less volume?

**Q 2:** Which of the two balls (A or B) has more amount of matter?

**Bigger the size of an object larger is its volume.**

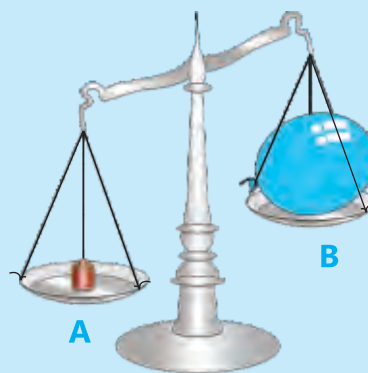
## MASS

The amount of matter in an object is called its mass.



### Activity 5.2

- Observe the objects placed in two pans (A and B) of the balance.



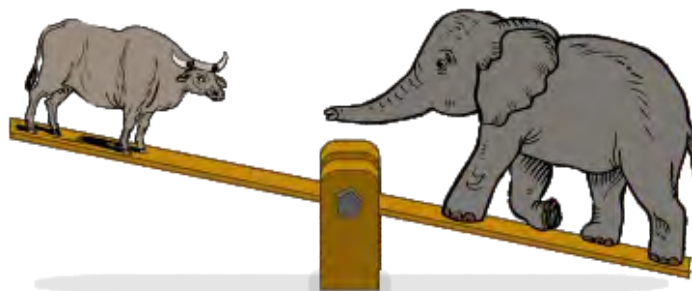
**Q1:** Which of the two shows greater mass?

**Q2:** Which of the two shows less volume?



## ASSESSMENT

- Tick the object showing less mass.



## THREE STATES OF MATTER

Matter exists in three physical states that are solids, liquids and gases.

### SOLIDS

A lot of things have fixed volume and fixed shape. Such things are called **solids**. Table, chair, book, brick wall, pencil, cup, car, wheat grains, sugar crystals, etc., are the examples of solids (Figure 5.3).



Figure 5.3: Solid objects



## LIQUIDS

Many things have fixed volume but no fixed shape. They take the shape of the container in which they are put. Such things are called **liquids**. Water, oil, petrol, milk, fruit juices, honey, etc. are the examples of liquids (Figure 5.4).



Figure 5.4: Liquid objects

## GASES

There are things which have neither fixed shape nor fixed volume. They spread out to fill the container (Figure 5.5). Such things are called **gases**. Air, smoke, oxygen, carbon dioxide, hydrogen, steam or vapours are the examples of gases.



Figure 5.5: Objects containing gas

The properties of solids, liquids and gases regarding their volumes and shapes can be observed through the activities given below.



### Activity 5.3

- Take a toy car, a small cup, an iron nail and a tub.
- Observe the shape and volume of toy car, cup and iron nail.
- Put all these things in the tub.



**Q1:** Is there any change in the shape and volume of any of the objects put in the tub?

**Q2:** What do you conclude from this activity?

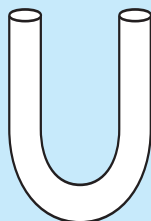


## Solids have fixed volume and fixed shape.



### Activity 5.4

- Take a test tube, a U-shaped tube, a plate and syringe



- Fill a syringe with water and empty it in the test tube.
- Again fill the syringe with water and empty it in the U-shaped tube.
- Fill the syringe once again with water and empty it in the plate.
- ❖ Observe the shape of the same amount of water added in the three containers (test tube, U-shaped tube and plate).
- ❖ Observe the space occupied by water in the three containers.

**Q1: What is the volume of water in three containers? (same or different)**

**Q2: What is the shape of water in three containers? (same or different)**

**Q3: What do you learn from this activity?**



### Activity 5.5

- Take two glasses, one big and one small.
- Fill the small glass with water.
- ❖ Observe the space occupied by water in the small glass.
- Pour the water of small glass into the big glass and note its level.



**Q1: Has water filled the whole space in the big glass?**

**Q2: What do you learn from this activity?**



We observe from activities 5.4 and 5.5 that the space that water occupies in a container depends upon the quantity of the water, not on the shape of the container. It means, liquid water has a fixed volume. We also observe that water changes its shape according to the shape of the container in which it is put.

Water is liquid at room temperature. The other liquids also have fixed volume and change their shape according to the shape of the container in which they are put.

**Thus, liquids have fixed volume but their shape is not fixed.**

**Quiz: Name any three liquids.**



### Activity 5.6

- Take three balloons having different shapes.
- Fill them with air and observe their shapes.

**Q1: What do you learn from this activity?**



### Activity 5.7

- Take a glass, a plastic tub, a piece of paper, a piece of cloth or a tissue paper and a gum stick.
- Paste the piece of paper at the bottom of the glass using the gum stick.
- Invert the glass in the tub filled with water as shown in the figure.



- Remove the glass out of water keeping it inverted and clean its wet sides with the help of a piece of cloth or tissue paper.
- Check the paper pasted at bottom of the glass. Is it wet or dry?
- If it is dry, explain why it remains dry?

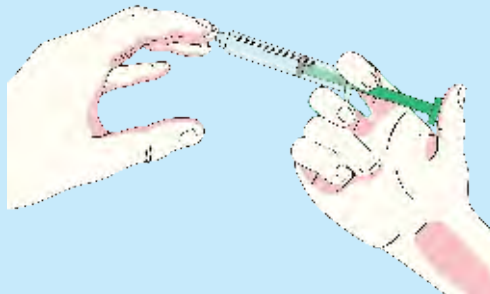
**Q1: What do you learn from this activity?**





### Activity 5.8

- Take a syringe without needle.
- Pull the piston of the syringe. (The air will fill the syringe).
- Note the volume of air inside the syringe.
- Close the mouth of the syringe with your finger and push the piston.
- Do you notice any change in the volume of the air inside the syringe?
- Can gases be compressed?



**Q1: What do you learn from this activity?**

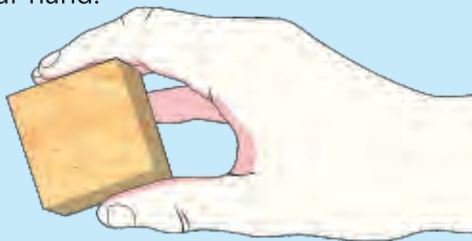
**Gases have neither fixed volume nor fixed shape.**



### Activity 5.9

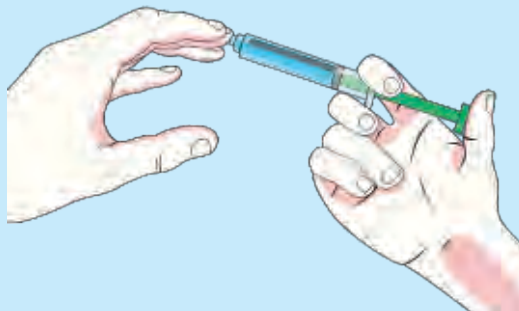
- Take a wooden block and press it in your hand.
- Can solids be compressed?

**Q1: What do you learn from this activity?**



### Activity 5.10

- Take a syringe without needle, fill it with water, close its mouth with your finger and push the piston inward.
- Can liquids be compressed?



**Q1: What do you learn from this activity?**



## Effect of Heat on Solids, Liquids and Gases

Things change their state on heating or cooling. Solids melt on heating and change into their liquid states. Liquids boil on heating and change into their gaseous states. Gases expand on heating and increase their pressure in the container. Liquids freeze on cooling and change into their solid states. Gases condense on cooling and change into their liquid states.



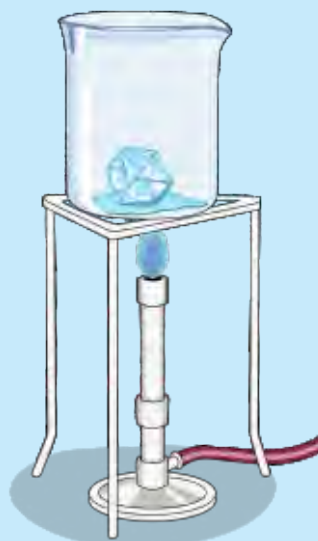
### Higher Order Thinking

- ❖ Matter consists of very small particles called atoms and molecules, etc. Molecules can exist independently. These particles of matter are always moving. The particles of solids do not change their position during their movement. That is why solids cannot flow or spread and have fixed shape and volume. The particles of liquids have rapid movements as compared to solids. They can change their position during the motion but remain in the liquid. That is why liquids can flow and change their shape but their volume remains fixed. The particles of gases are freely moving fast and spread out to occupy the whole available space. That is why gases have neither fixed shape nor fixed volume.



### Activity 5.11 (Demonstration by the teacher)

- Take an ice cube in a beaker or china dish and place it in front of the students.
- Ask students to observe the shape and volume of the ice cube and tell what its physical state is.
- Heat the ice cube by placing the china dish or beaker on a burner and ask students to observe what happens to the ice.
- Continue heating and ask students to observe what happens further.
- Ask students to write a note on what they have observed during the activity.







### Activity 5.12

- Fill a glass half with water and place it in your freezer.
- Observe after 5 to 6 hours what happened to the water in the freezer.
- Record your observation.

Physical state of water before freezing	Physical state of water after freezing

- Share what you have learnt from this activity with your friends and teacher next day.



### Activity 5.13

- Take a glass and fill it half with water.
- Add some crushed ice in it.
- Wipe the outer surface of the glass with a piece of cloth or tissue paper.
- ❖ After some time, you would notice tiny droplets of water along the outer surface of the glass.

**Q1: Where have these water droplets come from?**

**Q2: Does water in the glass pass out through the glass walls?**

**Q3: What do you learn from this activity?**





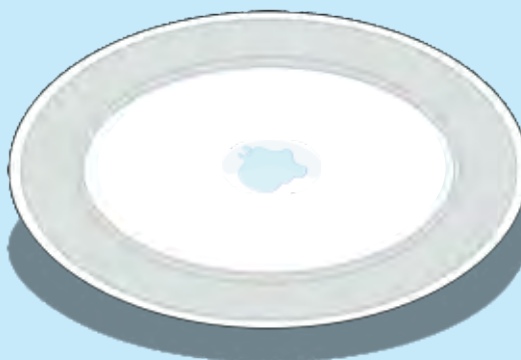


### Activity 5.14

- Take a little amount of water in a plate and place the plate in the sun.
- ❖ After some time, you would notice that the water disappears from the plate.

**Q1: Where has the water gone and why?**

**Q2: What do you learn from this activity?**



### Inquiry

- Have you ever noticed that the tyre of a bicycle bursts in a hot summer day?
- If yes, why does it happen?

## MIXING OF MATERIALS

Most of the things we find in our surroundings are not in their pure form. They are the mixtures of different substances. For example, soil is the mixture of sand, rocks, moisture and air, etc. Milk is a mixture of different food groups, i.e., carbohydrates, proteins, vitamins, fats, salts and water, etc. Similarly, air is a mixture of different gases and water vapours.

**A mixture is a sample of matter containing two or more things mixed with each other.**

We mix many things to prepare salad. Can you name the things used in salad? We mix many things to make tea. Can you name the things used to make tea? Different things are used to prepare soda water. Can you tell the names of the things used in the preparation of soda water? Sweets, vegetable rice, lassi, yogurt, fruit juices etc., are the mixtures consisting of different substances (Figure 5.6).





Salad



Sweets



Vegetable rice



Lassi



Tea



Soda water

Figure 5.6: Examples of mixtures



### Activity 5.15

- Name and collect different things which are mixed to prepare lemonade water.
- Prepare lemonade water and serve it to your friends.



### Activity 5.16

- Take a glass and fill it half with pure water.
- Add one teaspoonful of sand in it and stir the mixture well. Label the glass A.
- Take another glass half filled with pure water and add one teaspoonful of sugar in it and stir the mixture well. Label the glass B.
- Place the two glasses side by side, observe and compare the two mixtures.



Write the components of mixture A (----- and -----).

Write the components of mixture B (----- and -----).

**Q: What is the difference between the mixture A and B?**



## Separation of Insoluble Solids from Water

Insoluble solids can be separated from water by different methods. The two simplest ones are the decantation and filtration.

### Decantation

Decantation is a method for separating insoluble heavier solids from water. In this method, water of the mixture is carefully poured into another container.



#### Activity 5.17

- Take a glass or beaker and fill it half with water.
- Add two spoonful of sand in it, stir the mixture and let the sand settle down at the bottom of the beaker.
- When the water above sand becomes clear, pour it carefully into another glass or beaker so that the sand is not disturbed.



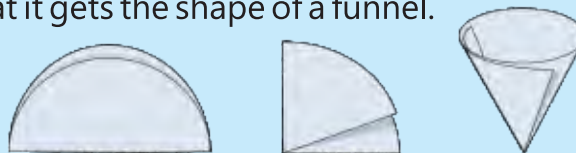
### Filtration

Filtration is another method of separating the insoluble and suspended components of a mixture. In this method, the mixture is passed through a porous sheet like a filter paper, a cotton cloth or a strainer. Separating tea leaves from tea using a strainer is a well-known example of filtration.



#### Activity 5.18

- Prepare the mixture of mud and water in a beaker.
- Take a filter paper and fold it twice so that it gets four folds.
- Keep its three folds on one side and move one fold on the other side, so that it gets the shape of a funnel.



- Moisten the funnel from its inner side and fix the filter paper into it.
- Hang the glass funnel with the help of a stand and place an empty beaker below it.



- Pour the muddy water gently on the three fold side of the filter paper with the help of a glass rod.
- You will observe that the water passes through the pores of the filter paper and is collected in the beaker placed below while the mud and sand particles are left behind on the filter paper.
- This is because the mud and sand particles are relatively bigger in size than the pores in the filter paper.



## SCIENCE PROJECT

People cannot live without water. In case the clean water is not available, we must make the available water free from impurities before drinking. Let us work on a science project to make a water filter. This project can be done as a group activity.

### Part-I: Making a Water Filter (Demonstration by the teacher)

1. Take a plastic bottle, make a hole in its cap and cut the bottle into two halves with the help of your teacher.



2. Stuff the upper half of the bottle with cotton as shown in the figure.
3. Put some sand over the cotton.
4. Put some gravel over the sand.







5. Now the water filter is ready for use. Pour muddy water on the top of the filter. Collect water in a glass or beaker placed below the filter as shown in the figure.



## Part-II: Creating Awareness

- Conduct a campaign to create awareness about the importance of drinking clean water.
- Share the technique of making water filter with the people of your locality.

## KEY POINTS

- Anything which has mass and occupies space is called matter.
- Matter exists in three states, i.e., solid, liquid and gas.
- Solids have fixed shape and fixed volume.
- Liquids have fixed volume but no fixed shape.
- Gases have neither fixed shape nor fixed volume. They fill the whole container in which they are contained.
- Solids melt on heating and convert into their liquid states.
- Liquids boil on heating and convert into their gaseous states.
- Gases condense on cooling and convert into their liquid states.
- Liquids freeze on cooling and convert into their solid states.
- A sample of matter containing two or more substances mixed with each other is called mixture.



- Separation of heavier and insoluble solid from its liquid mixture by pouring the liquid carefully into another container is called decantation.
- Separation of insoluble and suspended solid from liquid mixture by passing the mixture through a filter paper is called filtration.

## GLOSSARY

<b>Volume:</b>	The space occupied by an object
<b>Mass:</b>	The amount of matter in an object
<b>Melting:</b>	Conversion of a solid object into its liquid state on heating
<b>Freezing:</b>	Conversion of a liquid into its solid state on cooling

### EXERCISE

#### 5.1 Encircle the correct option.

- (i) A state of matter having a fixed volume but no fixed shape:
  - a. solid
  - b. liquid
  - c. gas
  - d. none of these
- (ii) The process in which a liquid turns into its solid state:
  - a. melting
  - b. freezing
  - c. boiling
  - d. condensation
- (iii) Tomatoes from the salad can be separated by:
  - a. picking
  - b. decantation
  - c. filtration
  - d. heating
- (iv) The quantity of water in the air increases in:
  - a. summer
  - b. winter
  - c. spring
  - d. rainy season
- (v) Which of the following is not a matter?
  - a. animals
  - b. plants
  - c. air
  - d. sound



(vi) Matter that spreads out to occupy the whole available space:

- a. ice cream                      b. honey
- c. air                                d. water

(vii) The property which is common in liquids and gases:

- a. definite shape                b. definite volume
- c. no definite shape           d. no definite volume

(viii) Both the components of a mixture have no fixed shape:

- a. sand in water                b. air in sand
- c. air in water                  d. sugar in salt

(ix) The mixture that can be separated by filtration:

- a. sugar in water                b. table salt in water
- c. air in water                  d. sand in water

(x) The process which involves mixing:

- a. making tea                    b. making ice
- c. making steam                d. all of these

**5.2 Match each statements of column A with the relevant statement of column B.**

A	B
Heating a solid	Formation of steam
Boiling water	Formation of ice
Cooling water	Formation of liquid

**5.3 Fill in the columns keeping in mind the state of matter.**

State of matter	Shape	Volume
Solid		
Liquid		
Gas		



---

**5.4 Define the following:**

- |              |                 |                 |
|--------------|-----------------|-----------------|
| (i) Matter   | (ii) Mass       | (iii) Volume    |
| (iv) Mixture | (v) Decantation | (vi) Filtration |

**5.5 Describe the properties of the following:**

- |            |              |             |
|------------|--------------|-------------|
| (i) Solids | (ii) Liquids | (iii) Gases |
|------------|--------------|-------------|

**5.6 Describe the effect of heat on the following:**

- |            |              |             |
|------------|--------------|-------------|
| (i) Solids | (ii) Liquids | (iii) Gases |
|------------|--------------|-------------|

**5.7 Describe the process of filtration.**

**5.8 Make a list of six solids, four liquids and three gases from the things found in your kitchen.**

**5.9 Name a drink which can be prepared by mixing a solid, a liquid and a gas.**

**5.10 Why is it necessary to boil water before drinking?**



# 06

## TEMPERATURE AND ITS MEASUREMENT

In this chapter, we will learn about:

- Temperature
- Common scales of temperature
- Measurement of temperature
- Safety measures in using thermometers



When your mother is cooking bread for you and you touch the bread, how does it feel? It feels hot. Again when you are eating an ice cream, how do you feel the ice cream? It feels cold. To describe how much hot or cold a thing is, scientists use the term "Temperature". A hot body is at high temperature and a cold body is at low temperature.

**Temperature of a body indicates how hot or cold the body is.**

We can guess the temperature of a body by touching it. But this is not an accurate and safe method for measuring temperature. In order to measure temperature accurately and safely at home or at school laboratory, we use an instrument called **Thermometer**.



**Thermometer is an instrument which measures the temperature accurately and safely.**

### LABORATORY THERMOMETER

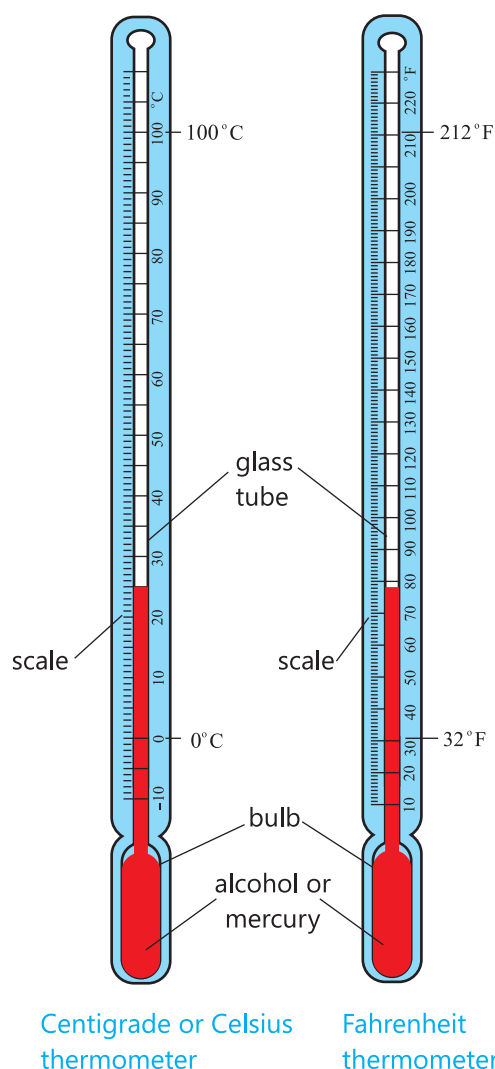
Figure 6.1 shows a laboratory thermometer. A laboratory thermometer consists of a thick-walled glass tube having a narrow bore in it. There is a glass bulb at lower end of the tube and its upper end is closed. The bulb is filled with alcohol or mercury.

When bulb of the thermometer touches a hot body, the liquid in the bulb expands and rises up in the tube. In this way the thermometer shows a high temperature. But when the bulb of the thermometer touches a cold body, the liquid contracts and comes down in the tube and the thermometer shows a low temperature.

### TEMPERATURE SCALES

The numbers written on the thermometer show the degree of hotness or coldness of a body. These numbers are called **Temperature Scale**.

Now-a-days, two types of temperature scales are used. The most commonly used scale is the **Celsius or Centigrade** scale. The other scale is the **Fahrenheit** scale. We shall learn about these scales from the following activity.



**Figure 6.1**

#### ? Do you know?

A Celsius degree is larger than a Fahrenheit degree.





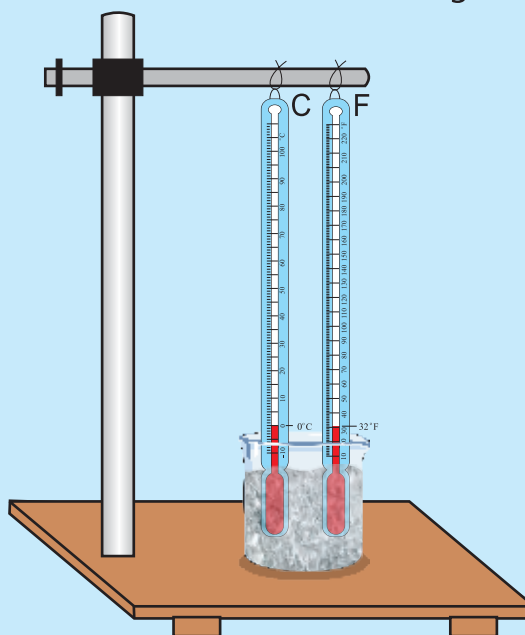
### Activity 6.1

#### Material and Apparatus

A Celsius scale thermometer marked C, a Fahrenheit scale thermometer marked F, crushed ice, beaker, iron stand, thread

#### Procedure

- Put the crushed ice into the beaker.
- Suspend both thermometers in the beaker as shown in the figure.
- Carefully observe the alcohol or mercury in the two thermometers. In which direction is the liquid in the bulbs moving?
- Note the point on both the thermometers where alcohol or mercury stops falling.



On thermometer C \_\_\_\_\_

On thermometer F \_\_\_\_\_

From activity 6.1, we have seen that on Celsius scale thermometer, the temperature of melting ice is  $0^{\circ}\text{C}$ . The other thermometer which shows melting point of ice  $32^{\circ}\text{F}$  is Fahrenheit scale thermometer.

#### **i** For Your Information

- $^{\circ}\text{C}$  stands for degree centigrade.
- $^{\circ}\text{F}$  stands for degree Fahrenheit.



### DEMONSTRATION (to be performed by the teacher)

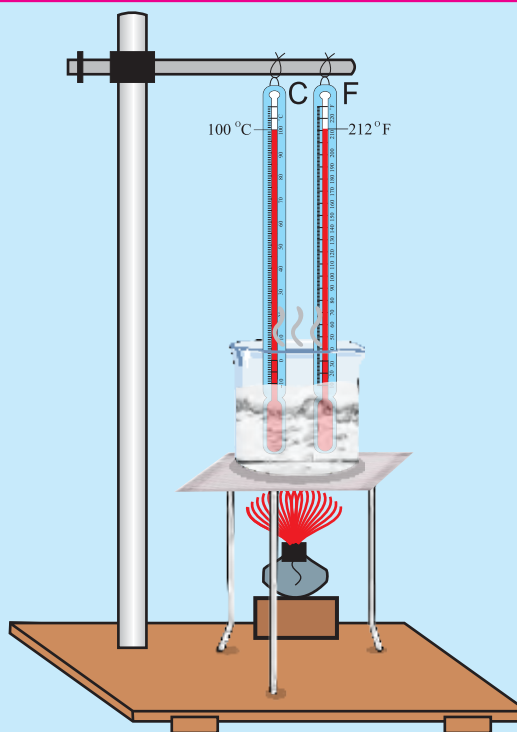
#### Material and Apparatus

Beaker, water, Celsius scale thermometer, Fahrenheit scale thermometer, tripod stand, wire gauze, spirit lamp



## Procedure

- Fill the beaker half with water and place it on the tripod stand.
- Suspend both the thermometers into the beaker as shown in the figure.
- Heat the water in the beaker with the help of spirit lamp.
- Ask the students to note the temperature on both thermometers when water is boiling.



## ! Brain Teaser

A person puts a thermometer into a pot of water to see how hot it is. The thermometer reads 132, but the water is not boiling yet. Which temperature scale is the thermometer measuring?

(a) Celsius (b) Fahrenheit

## i For Your Information

Temperature in Celsius (°C)	Temperature in Fahrenheit (°F)	Comments
100	212	Water boils
0	32	Water freezes
-40	-40	Fahrenheit equals Celsius
25	77	Room temperature

## CLINICAL THERMOMETER

A clinical thermometer is used for measuring the temperature of the human body. Its glass tube is marked in centigrade scale from 35 to 42 °C and in Fahrenheit scale from 95 to 110 °F (Figure 6.2). A clinical

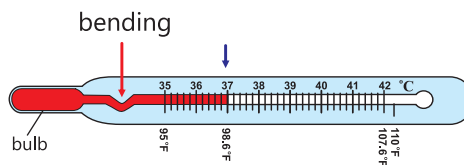
## ? Do you know?

The normal temperature of a healthy human body is 37 °C or 98.6 °F.



thermometer has a small range. This is because the human body temperature cannot be below or above this range.

A clinical thermometer has a small bending in the narrow bore just above the bulb. When we put the thermometer under the armpit of the patient, alcohol or mercury in the bulb rises up in the bore due to high temperature (Figure 6.3). When we remove the thermometer from the armpit of the patient, liquid in the bulb contracts on cooling. The small bending in the bore prevents the fall of the liquid into the bulb. Therefore the liquid level does not change and we can get correct reading of body temperature. However, to use the thermometer again, we give it jerks to bring down the liquid back into the bulb.



**Figure 6.2: Clinical thermometer**



**Figure 6.3: Measuring body temperature**

#### **i For Your Information**

Mercury is poisonous, and there is a danger of breakage of the thermometer, therefore, never put the thermometer into the mouth of a patient.

## **SAFETY MEASURES IN USING THERMOMETERS**

Take the following safety measures while using thermometers:

1. keep the thermometer upright while measuring the temperature.
2. mercury is harmful to health, therefore, in case of breakage of a thermometer, do not touch it with hands.
3. do not touch the bulb of a clinical thermometer with fingers. It should be cleaned with spirit and water before use on another patient.
4. after using a clinical thermometer, it should be cleaned, disinfected and placed in an appropriate container for storage.
5. do not keep a clinical thermometer below 0 °C and above 50 °C.
6. do not put the clinical thermometer into hot water. It may burst and injure the user or the person nearby.



### ✓ Things to do

1. Suspend a Centigrade thermometer and a Fahrenheit thermometer first in the sunshine and then in the shade and note the temperature of air.
2. Measure the temperature of tap water using Centigrade and Fahrenheit thermometers.
3. Measure your temperature and the temperature of five of your friends, with a clinical thermometer.

## KEY POINTS

- The degree of hotness or coldness of the body is called its temperature.
- An instrument used to measure the temperature of an object is called a thermometer.
- On Celsius scale, water freezes at  $0^{\circ}\text{C}$  and boils at  $100^{\circ}\text{C}$ .
- On Fahrenheit scale, water freezes at  $32^{\circ}\text{F}$  and boils at  $212^{\circ}\text{F}$ .
- A clinical thermometer is used to measure the temperature of a human body.
- A clinical thermometer has a bending just above the bulb which prevents the fall of alcohol or mercury back into the bulb.

## GLOSSARY

**Temperature:** Degree of hotness or coldness

**Thermometer:** An instrument used for measuring temperature

**Celsius scale:** A scale on which temperature between melting point of ice and boiling point of water is divided into 100 equal parts

**Fahrenheit scale:** A scale on which temperature between melting point of ice and boiling point of water is divided into 180 equal parts



## EXERCISE

### 6.1 Encircle the correct option.

**(i) Temperature means:**

- (a) how high or low something is
- (b) how hot or cold something is
- (c) how fast or slow something is
- (d) how the weather changes

**(ii) With increase in temperature, mercury in thermometer will:**

- (a) increase
- (b) decrease
- (c) fall
- (d) rise

**(iii) The temperature at which a solid changes into a liquid is called:**

- (a) melting point
- (b) ice point
- (c) boiling point
- (d) fixed point

**(iv) Celsius scale is also called :**

- (a) Fahrenheit scale
- (b) Centigrade scale
- (c) Absolute scale
- (d) Kelvin scale

**(v) The difference in temperature between melting point of ice and boiling point of water on Centigrade scale thermometer is:**

- (a) 180 °C
- (b) 100 °C
- (c) 37 °C
- (d) 98.6 °C

**(vi) On Fahrenheit scale, water boils at:**

- (a) 32 °F
- (b) 100 °F
- (c) 180 °F
- (d) 212 °F

**(vii) Normal human body temperature on Fahrenheit scale is:**

- (a) 37 °F
- (b) 42 °F
- (c) 95 °F
- (d) 98.6 °F



**6.2 Choose the correct word from the word bank for each of the following:**

**clinical thermometer    temperature    melting point of ice  
bending    ice    boiling point of water    mercury**

- (i) Solid form of water \_\_\_\_\_
- (ii) 0 °C of ice \_\_\_\_\_
- (iii) 212 °F for water \_\_\_\_\_
- (iv) Stops alcohol or mercury to fall  
in the clinical thermometer \_\_\_\_\_
- (v) Degree of hotness or coldness \_\_\_\_\_
- (vi) Thermometer measures human  
body temperature \_\_\_\_\_
- (vii) Liquid metal filled in thermometer \_\_\_\_\_

**6.3 Answer these questions.**

- (i) What is temperature? State the scales used to measure temperature.
- (ii) Sketch a laboratory thermometer and label its important parts.
- (iii) Sketch a clinical thermometer.
- (iv) State at least three features of a clinical thermometer.
- (v) Write three differences between laboratory thermometer and clinical thermometer.
- (vi) What are the precautions needed while using a clinical thermometer?



# 07

## FORCE AND MACHINES

In this chapter, we will learn about:

- Force
- Effects of force
- Speed
- Simple machines



Figure 7.1 Hawker pushing a cart



Figure 7.2 Horse pulling a tonga

### WHAT IS FORCE?

Pushing and pulling is a part of our daily life. A hawker pushes his cart to move it from place to place (Figure 7.1). A horse pulls a tonga to move the people (Figure 7.2). Similarly, a bicycle moves when you push its pedals. Sometimes, a push or a pull is also applied to stop the moving objects. A wicket keeper when catches the ball, he stops it with his hands (Figure 7.3).



Figure 7.3 Wicket keeper catching the ball

There are many other tasks which you do by applying push or pull or both in your daily life. In science, both push and pull are the same things and have one meaning that is force.





### Activity 7.1

The objects shown on the right side move either by push or pull. Separate these objects.



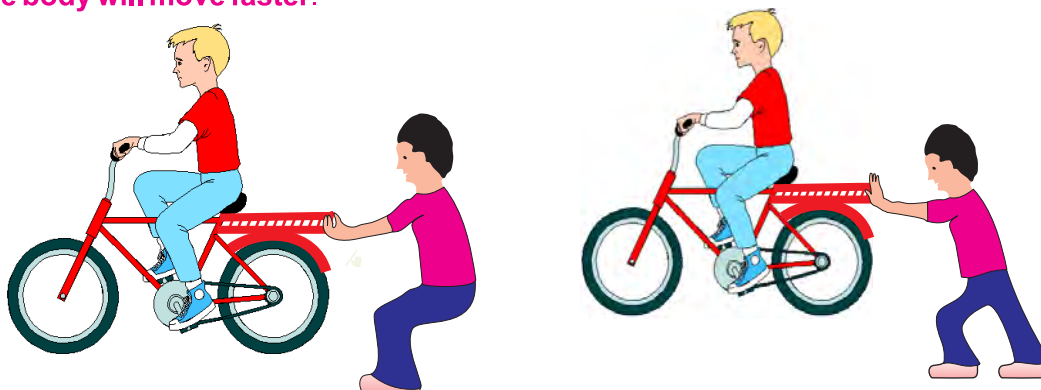
## EFFECTS OF FORCE

### 1- FORCE AND CHANGE IN MOTION

Motion is important to our lives and it affects so many things that we do. Motion is the change in position of an object. We have already seen that the force can produce motion in a body. Force can also stop a moving body. Another effect of force is that it can change the motion of a body by moving it faster or slower. Let us demonstrate it by an example.

Suppose your friend is riding his bicycle. If you gently pull the moving bicycle from behind, it slows down (Figure 7.4a). Again, if you give it a push, it moves faster (Figure 7.4b).

**This means that if a force is applied in an opposite direction of motion of a body, the body will slow down or stop. But if force is applied in the direction of motion, the body will move faster.**



(a) A boy by pulling the bicycle slows it down (b) A boy by pushing the bicycle moves it faster

**Figure 7.4**



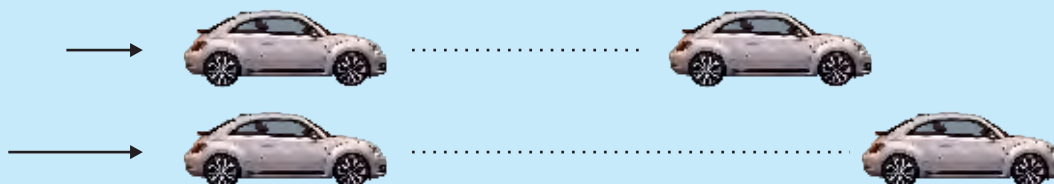


## Activity 7.2

Take two identical toy cars. Push both the cars gently with some force. The cars will start to move. How long both of them move, depends upon the amount of pushing force. If the cars are given an equal push they will cover nearly equal distances. Now push one of the cars slightly harder than the other and observe the cars. Which car will cover more distance at this time?



When both the cars are pushed gently with the same force they cover the same distance.



When one car is pushed slightly harder than the other then they cover the different distances.

**Greater the force, greater will be the distance covered by the object.**

## 2- FORCE AND CHANGE IN DIRECTION OF MOVING OBJECT



Figure 7.5

Force not only makes the objects move slow or fast but it can also change the direction of the moving objects. For Example, when a batsman hits the ball with bat, his force not only moves the ball faster but changes its direction as well (Figure 7.5).



Figure 7.6

Similarly, a football player changes the direction of motion of the ball by kicking it with his foot (Figure 7.6).



### 3- FORCE AND CHANGE IN SHAPE OF THE OBJECTS

What happens when we apply force to a rubber band? It stretches out. But when we remove the force, the rubber band shrinks back to its original shape. A force can stretch, compress, squeeze and cause change in the shape of the objects. The change in the shape of the objects, when a force is applied may be temporary or permanent. Let us understand how force changes the shape of objects temporarily.

#### Be Careful

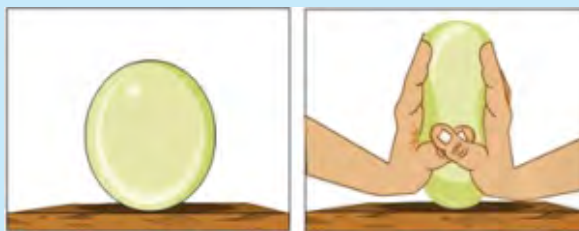


When stretching rubber bands, they can snap if you stretch them too far and can flick against your skin.



#### Activity 7.3

- Take an inflated balloon. Press this balloon between the palms of your hands.
- What happens to the shape of balloon?
- What happens when you remove the hands?
- What do you conclude from this activity?



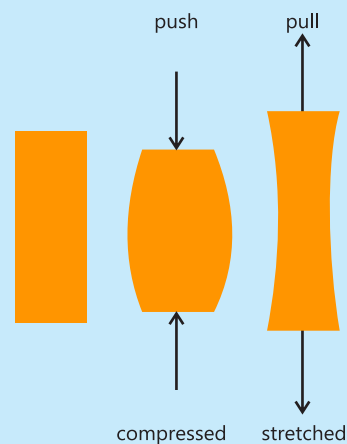
#### Activity 7.4

Take a rectangular sponge and compress it from both ends. The sponge changes its shape.

- What happens when you remove the force?

Now pull the both ends of the sponge. It again changes its shape.

- What happens when you remove the force of your hands?



From the above activities we can observe:

**some objects return to their original shape after the removal of force. These objects are called Elastic objects.**



Shape of some objects is changed permanently when force is applied on them. For example, the molding of clay is a permanent change in shape by the force (Figure 7.7).



Figure 7.7 Moldings of clay



### Activity 7.5

Take a ball of dough, press it with the help of a roller to make a round flat bread.

- Does the flat round bread become a ball again when you remove the roller?



From this activity we can observe:

**Some objects do not return to their original shape after the removal of force. These objects are called inelastic objects.**



### Activity 7.6

Force is applied on the things shown below, so that their shapes may or may not change. Identify the temporary or permanent changes in the given objects when the force is removed from them.





## DISTANCE AND SPEED

Mr. Saleem and Mr. Kareem started their journey from Lahore to Islamabad (400 km).

Mr. Saleem boards a train from Lahore. He travels for 4 hours and reaches Islamabad.


On the other hand, Mr. Kareem boards a bus. But the bus reaches only Jhelum in 4 hours.

- Which covers more distance in the same time, the train or the bus?
- Which is moving faster?

From the above example we can know more about motion by relating the distance covered by the object with the time taken to cover this distance.

- Can you define a new term that is called **speed** of the moving object?

*i* **For Your Information**



The speed of an object can be measured at any time during its motion by using this relation:

$$\text{Speed} = \frac{\text{Distance covered by the object}}{\text{Time taken to cover this distance}}$$

## SIMPLE MACHINES

A thing that helps us to do something faster or easier is called simple machine. Simple machines are the lever, the pulley, the inclined plane and the wheel and axle. We shall learn about them one by one

### LEVER

Lever is a simple machine which is usually a long rod. Lever is mostly used for lifting heavy loads by applying a smaller force (Figure 7.8). The rod is pivoted at a point that is called fulcrum. One end of rod is placed under the load to be lifted, while a downward force is applied on the other end to lift the load.



Figure 7.8 Lever lifting a block



Levers are all around us. Some examples of lever are scissors, nut cracker, wheel barrow and human arm (Figure 7.9).



7.9 Examples of lever

## PULLEY

Pulley is another simple machine which is used for changing the direction of force and moving the things up or down. A pulley is used for drawing water out of a well. It is also used in cranes for lifting heavy loads (Figure 7.10).

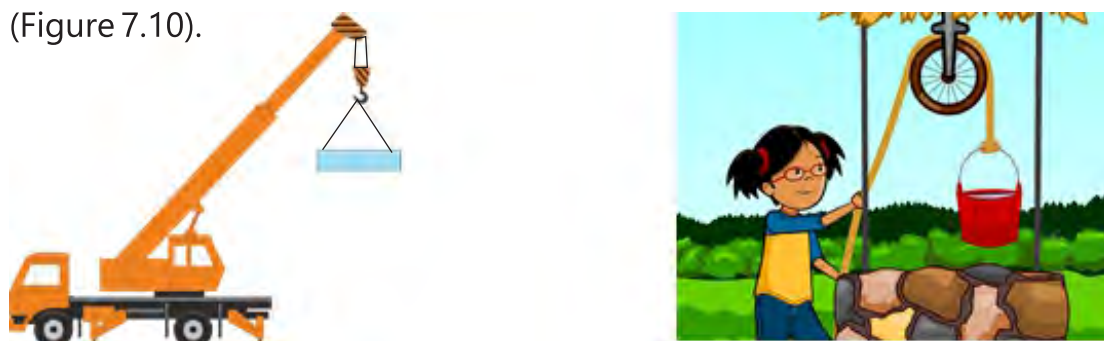


Figure 7.10 Examples of pulley

## INCLINED PLANE

It is also a simple machine. The inclined plane is simply a ramp, with the help of which we can move things from lower to higher places or higher to lower places easily.

Usually, ramps are used to load the heavy objects on the trucks (Figure 7.11). They are also used in hospitals to carry patients to upper storeys conveniently and comfortably without using stairs.



Figure 7.11 Use of inclined planes



## WHEEL AND AXLE

Wheel is the major invention in the history of mankind. Wheel does not work without axle. Axle is a rod passing through the centre of the wheel. It allows the wheel to turn around it. Wheel combined with the axle forms a simple machine “wheel and axle” which changes sliding motion into rolling motion (Figure 7.12). Wheel and axle have many uses in our daily life. A few are shown in the Figure 7.13.



Figure 7.12 Merry-go-round is an example of wheel and axle

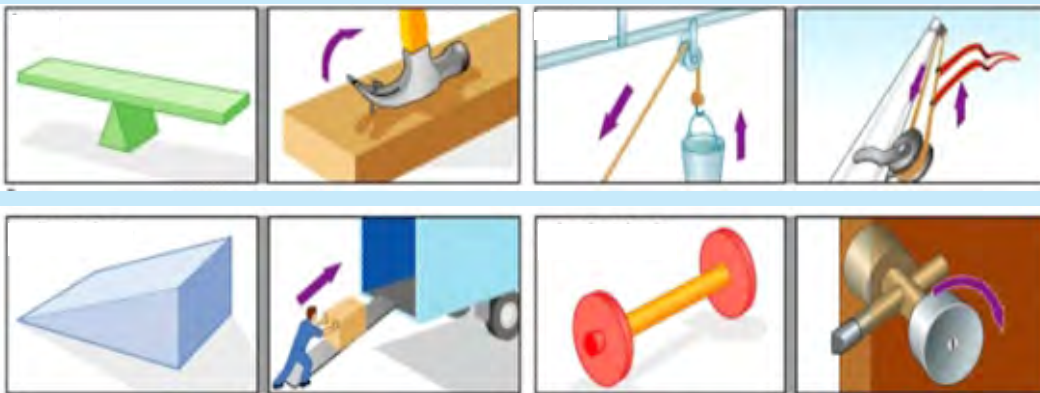


Figure 7.13 Use of wheel and axle



### Activity 7.7

Identify the simple machines given below.





## KEY POINTS

- The effort made to push or pull an object is the force.
- Position of an object can be changed by applying force on it.
- Greater the force greater will be the distance covered by an object.
- Force can change the shape of an object permanently or temporarily.
- Speed of an object is determined by dividing the distance covered by the time taken.
- A thing that helps us to do something faster or easier is called simple machine.
- A pair of scissors is a simple machine used to cut cloth, paper and other things.
- A pulley is a simple machine used to lift or lower heavy objects.
- A wheel barrow is a type of trolley used to transport material from one place to another.

## GLOSSARY

**Force:** Effort made to push or pull an object.

**Speed:** Distance travelled in unit time.

**Simple machine:** Device that makes work easier.

### EXERCISE

#### 7.1 Encircle the correct option.

(i) Which is not a force?

- a. speed    b. friction    c. pull    d. push

(ii) Anything that causes change in position or speed is called:

- a. distance    b. mass    c. force    d. moment

(iii) What must be applied to push or pull an object?

- a. force    b. gravity    c. speed    d. distance



- (iv) People use simple machines because:
- a. they make things smaller.
  - b. they do the work for us.
  - c. they make work easier.
  - d. they are found everywhere.
- (v) What happens to a football by applying a force?
- a. its position changes
  - b. its weight changes
  - c. its shape changes
  - d. its colour changes
- (vi) If you wish to kick a soccer ball to go as far as possible, what should you do?
- a. kick it from the side.
  - b. kick it very hard.
  - c. kick it without shoes on.
  - d. kick it to a team-mate.
- (vii) Which simple machine is used in bicycle to travel?
- a. wheel and axle
  - b. lever
  - c. screw
  - d. pulley
- (viii) Which of the following simple machines makes up the base of light bulb?
- a. wheel and axle
  - b. lever
  - c. screw
  - d. pulley
- (ix) Which moves with greater speed?



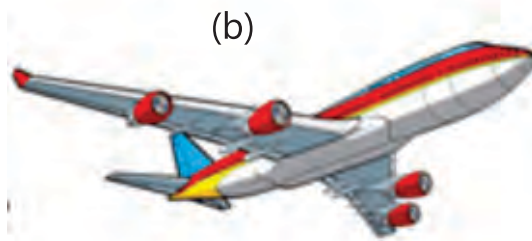
(a)



(b)



(c)



(d)



---

## 7.2 Fill in the blanks.

- (i) A push or pull is \_\_\_\_\_.
- (ii) You \_\_\_\_\_ the oven door to open it.
- (iii) The swing moves faster when you \_\_\_\_\_ it.
- (iv) A sewing machine is made up of many \_\_\_\_\_.
- (v) A flag is raised or lowered with the help of \_\_\_\_\_.

## 7.3 Short Answer Questions.

- (i) Give three examples of each of "Push" or "Pull" force.
- (ii) What is pulley?
- (iii) Define speed.
- (iv) Where are pulleys used?
- (v) What is lever? Give examples of lever used at your home.

## 7.4 Draw a labeled diagram of pulley used to lift a pail.

## 7.5 What is an inclined plane? Give three examples where inclined plane is used in our daily life.

## 7.6 What is wheel and axle? Give two examples where it is used in our daily life.



# 08

## INTRODUCTION TO SOUND

### In this chapter, we will learn about:

- Sound
- How is sound produced?
- Intensity of sound
- Medium for sound to travel
- Noise and its effects on human health
- Measures to reduce noise pollution

We hear different sounds in our surroundings. For example, we hear chirping of birds, car horns and sounds of rickshaws. We listen to the teacher in the classroom. We enjoy music. Have you ever thought how sound is produced and how it reaches us?



How do some sounds affect our ears? In this chapter we shall find answers to these questions.

### HOW IS SOUND PRODUCED?



#### Activity 8.1

- Take a tuning fork.
- Strike it against a rubber pad and hold it close to your ear.
- ❖ Do you hear any sound?
- Again strike the tuning fork against the rubber pad and observe its prongs.



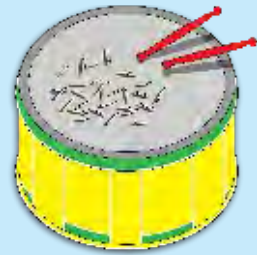
**Q: Can you see them vibrating?**





### Activity 8.2

- Get a drum and sticks. Place a few dry rice grains on the skin of the drum.
- Strike the skin of the drum with a stick and observe.



**Q: What two things happen on striking the drum?**

1. \_\_\_\_\_

2. \_\_\_\_\_

**Q: What do you conclude from this activity?**

### SOUND IS PRODUCED BY VIBRATING OBJECTS.

Sound is produced by vibrating objects. For example, in a drum, skin vibrates to produce sound. In a guitar, strings vibrate to produce sound. In a flute, air particles vibrate to produce sound (Figure 8.1). In our throat, there are vocal cords which vibrate to produce sound.



Guitar

Figure 8.1



Flute

### INTENSITY OF SOUND

Sounds of drum, rickshaw, train's whistle, donkey, etc. are very loud. On the other hand, the sounds of chirping of birds, rustling of leaves, ticking of clocks are soft. The loudness of a sound is related to its intensity. Loud sounds have high intensity (Figure 8.2) and soft sounds have low intensity (Figure 8.3).



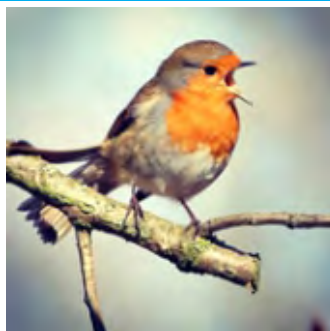
Train's whistle



Rickshaw's noise

**Figure 8.2 Objects producing high/loud sounds**





Chirping of bird



Ticking of clock

Figure 8.3 Objects producing soft/pleasant sounds



### Activity 8.3

- Take a large drum. Place some rice grains on it and beat it with heavy sticks.

**Q: What kind of sound is produced?**

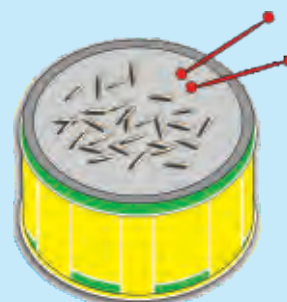
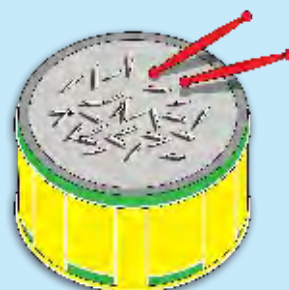
**Q: How much do the rice grains jump?**

- Now beat the drum with light sticks.

**Q: What kind of sound is produced?**

**Q: How much do the rice grains jump now?**

In this activity, we see that when the drum is beaten with heavy sticks, the rice grains jump high and when the drum is beaten with light sticks, the grains jump low.



**Objects vibrating strongly produce loud sounds and objects vibrating slowly produce soft sounds.**

### MEDIUM FOR SOUND TO TRAVEL

Does the sound need a material medium to travel around?

Most of the sounds that we hear reach us by travelling through air. Air is a medium through which sound can travel.

However, the sound can also travel through liquids and solids. We



can understand this by the following activities.



#### Activity 8.4

- Take a plastic tub and fill it with water.
- Take a plastic bottle and cut it from its bottom.
- Dip the lower side of the bottle in the water and bring your ear in contact with the mouth of the bottle.
- Ask your friend to strike two steel spoons with each other inside the water.
- Do you hear sound of striking spoons through the plastic bottle?



**Q: What do you conclude from this activity?**



#### Activity 8.5

- As shown in the figure place your ear to the wall.
  - Ask your friend to go outside the room and gently tap the other side of the wall with a wooden hammer.
  - Can you hear the tapping sound?
  - How has the tapping sound reached you?
  - What do you learn from this activity?
- We learn that sound can travel through solids.





**i Interesting Information**

*The sound travels fastest in solids. It travels slower in liquids and slowest in gases as compared to solids and liquids.*

## SOUND CANNOT TRAVEL THROUGH VACUUM

High sounds produced in the core of the Sun are not heard on the Earth. The reason is that sound cannot pass through vacuum in space.



**Figure 8.4 Loud sound of jet plane**

If a jet plane passes over at low height, a loud sound is heard. But when the same jet plane is flying at very great height, we hear less sound due to thin air and long distance (Figure 8.4).

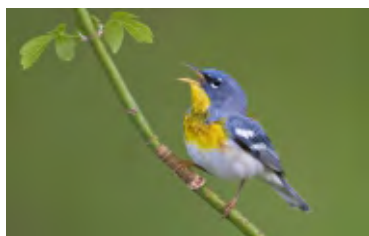
**? Do You Know?**

When astronauts land on the Moon, they cannot talk to each other as we do on the Earth. There is no air on the Moon. Hence, they talk through radio phone fitted in their space suits.



## NOISE

We feel pleasure to hear music or chirping of birds in the garden (Figure 8.5). Such sounds are called pleasant or musical sounds. There are some other sounds which we do not like to hear; such as sounds of heavy traffic, barking dogs, road construction machinery, hammering metal sheets, etc. (Figure 8.6). These are unpleasant sounds and are termed as noise. They are irritating, affect our ears and other body systems badly.



**Figure 8.5 Pleasant sounds**



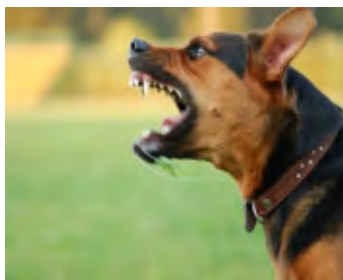


Figure 8.6 Noisy sounds

## EFFECTS OF NOISE ON HUMAN HEALTH

Noise affects not only our hearing but also our health. We cannot think and work properly at noisy places (Figure 8.7).

People living in noisy areas often suffer from headache, blood pressure and many other diseases. Noise makes people irritated. Noise may even disturb our nervous systems.



Figure 8.7 Effect of noise

## MEASURES TO REDUCE NOISE POLLUTION

Excessive noise that may harm human health is called noise pollution. There are laws to reduce noise pollution but due to lack of awareness, people do not care about them. The need is that people should try to understand the importance of these laws and should follow them strictly. Government also tries to create awareness about noise pollution in public through media.

Bus stands, airports and factories need to be shifted away from residential areas. Use of horns near hospitals, educational institutions and libraries should strictly be prohibited (Figure 8.8).



Figure 8.8 Blowing of horns is prohibited near hospitals and schools



Proper silencers should be used in the vehicles. The volumes of TVs or tape recorders should be kept low. The use of loud speakers at high volume has been prohibited. Trees should be grown wherever possible because they help to reduce noise and other types of pollution.

## KEY POINTS

- Sound is produced by vibrating objects.
- Loudness of a sound is related to its intensity.
- A medium is needed for the sound to travel.
- Sound can travel through solids easily.
- Sound can also travel through liquids and gases.
- Sound cannot pass through vacuum.
- Unpleasant sounds are called noise.
- Noisy sounds are irritating and produce bad effects on human brain and health.
- Musical sounds produce pleasant effects on human brain and health.
- Excessive noise that may harm human health is called noise pollution.
- Noise pollution can be reduced by obeying noise laws strictly and by shifting factories, airports, etc. away from residential areas.
- Tree plantation also helps to reduce noise and other types of pollution.

## GLOSSARY

<b>Vibration:</b>	Back and forth motion of an object
<b>Sound intensity:</b>	Loudness of sound
<b>Medium:</b>	Material through which sound can travel
<b>Noise:</b>	Sound which produces unpleasant effect on us
<b>Musical sound:</b>	Pleasant sound
<b>Noise pollution:</b>	Excessive and unbearable noise
<b>Vacuum:</b>	Place without air



## EXERCISE

### 8.1 Fill in the blanks.

Complete the sentences by choosing appropriate words from the following word bank:

noise pollution, wings, soft sound, vibrates, solids, vacuum,  
noise, pleasant, gases, musical

- (i) When an object moves back and forth it \_\_\_\_\_.
- (ii) Humming birds make a humming sound by motion of their \_\_\_\_\_.
- (iii) Sound travels faster in \_\_\_\_\_.
- (iv) Sound produced by an aeroplane is \_\_\_\_\_.
- (v) Our ears and nervous system are affected very badly by \_\_\_\_\_.
- (vi) The sound produced by a flute is a \_\_\_\_\_ sound.
- (vii) We cannot hear the sounds of explosions taking place in the Sun because sound cannot travel through \_\_\_\_\_.
- (viii) Sound travels slower in \_\_\_\_\_.

### 8.2 Encircle the correct option.

- (i) Sound is produced by:
  - a. solid
  - b. liquid
  - c. gas
  - d. vibrating objects
- (ii) Sound cannot travel through:
  - a. oxygen
  - b. water
  - c. wood
  - d. vacuum
- (iii) Intensity of sound is related to
  - a. production of sound
  - b. loudness of sound
  - c. speed of sound
  - d. traveling of sound
- (iv) Noise is produced by:
  - a. rustling of leaves
  - b. chirping of a bird
  - c. barking of a dog
  - d. ticking of a clock



(v) Noise can cause:

- a. malaria
- b. high blood pressure
- c. cough
- d. flu

(vi) Which sound is the loudest?

- a. heartbeat
- b. sound of a flute
- c. pressure horn
- d. rustling of leaves

(vii) Which of the following statements is correct?

- a. sound can travel through vacuum.
- b. sound travels faster in air than liquid.
- c. sound travels faster in solid than air.
- d. sound cannot travel through a solid.

(viii) A soft sound is produced by:

- a. beating a drum
- b. playing a flute
- c. heavy traffic
- d. hammering

### 8.3 Separate soft and loud sounds.

Whisper, Purring of cat, Taking off aeroplane,  
Sound of saw, Rustling of leaves, Sound of vacuum cleaner,  
Sound of motorcycle, Ticking of clock

Soft sounds	Loud sounds



**8.4 Match each statement of column A with the relevant statement of column B.**

A	B
Musical sound	Loud speaker
Noise	Vacuum
Sound travels faster in	Flute
Sound cannot travel through	Solids

**8.5 Short Answer Questions.**

- (i) What is sound?
- (ii) How is sound produced?
- (iii) What is meant by intensity of sound?
- (iv) What is noise?
- (v) What is noise pollution?
- (vi) Give two examples of loud sounds other than the examples given in the chapter contents.
- (vii) Give two examples of soft sounds other than the examples given in the chapter contents.

**8.6 Give four examples of the following:**

- (i) Pleasant sound      (ii) Unpleasant sound

**8.7 Describe the effects of noise on human health.**

**8.8 How can noise pollution be reduced?**

**8.9 Does sound travel outside Earth's atmosphere in space? Explain.**

**PROJECT**

Take an empty shoe box and some rubber bands of different sizes. Construct a simple musical instrument from these things.



# 09

## INVESTIGATING ELECTRICITY AND MAGNETISM

In this chapter, we will learn about:

- Conductors and insulators
- Simple circuit
- Switches
- Magnets
- Magnetic and non-magnetic materials



Everyone is familiar with the word 'electricity'. It is used to light up our bulbs, tubes and energy savers. It also provides power to refrigerator, washing machine, computer and TV at our homes. You also like to play with magnets. To ancient people magnets were a magic. Today magnets are widely used in our household appliances such as fans and refrigerators. In higher classes we shall learn that electricity and magnetism have close relationship with each other.



## SIMPLE CIRCUIT

To make use of electricity we have to set up an arrangement through which current can pass. This arrangement is called an electric circuit.

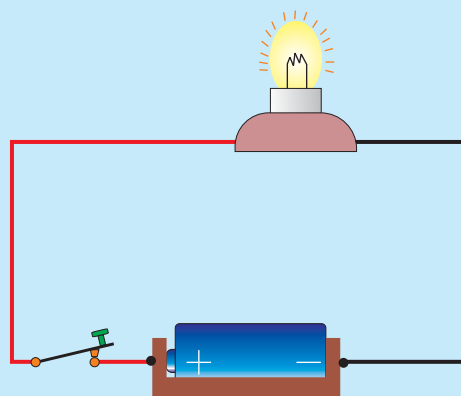
Thus, an electric circuit is a closed path through which an electric current can flow. Electric current flows through the things such as bulb or a fan to make them work.



### Activity 9.1

1. Take a torch bulb fitted in a holder and a dry cell placed in cell box.
2. Connect both terminals of the cell with the bulb using wires and a switch as shown in the figure.

Observe the bulb. What happens to the bulb and why?



We have designed a simple circuit in the above activity.

## OPEN AND CLOSED CIRCUIT

In activity 9.1, if anyone end of the wire is detached from its terminal the bulb will stop glowing (Figure 9.1). It is because the path of the current is broken.

A complete path is called as closed circuit and an incomplete or broken path is called an open circuit (Figure 9.1).

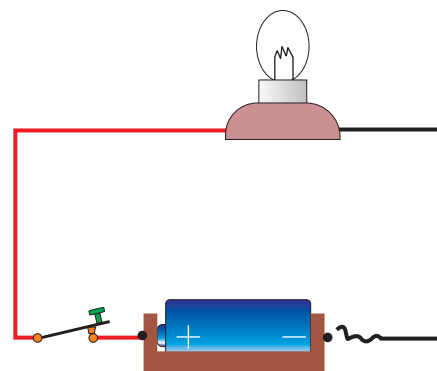


Figure 9.1: An open circuit

## USE OF A SWITCH

To open and close the path of current easily and safely, we use a switch. These are the switches which make it possible for us to OFF and ON our household electrical appliances safely.



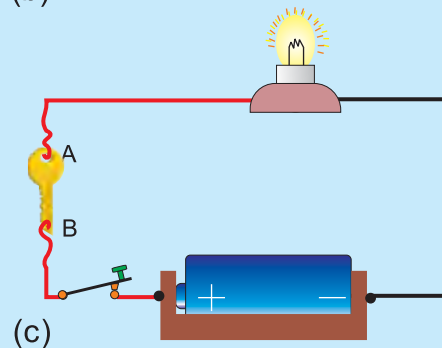
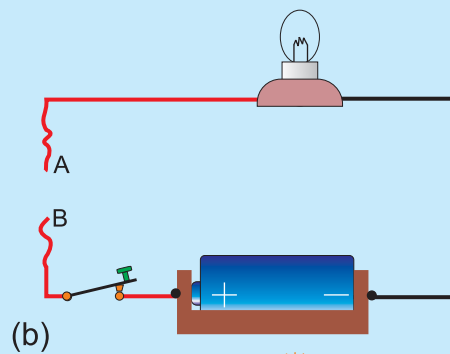
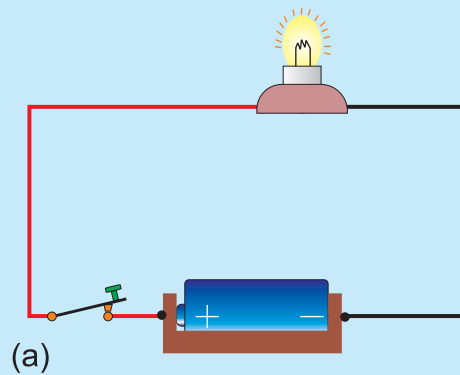
## CONDUCTORS AND INSULATORS



### Activity 9.2

- Take some material objects such as a key, a plastic comb, an iron piece, a glass strip or a wooden strip.
- Make a circuit as in activity 9.1. The bulb glows on turning the switch ON. This shows that current is flowing through all parts of the circuit (Figure a).
- Switch OFF the bulb and cut the wire as shown in Figure b.
- Connect free ends A and B of the wire with the above collected objects one by one and observe the bulb (Figure c).

The materials through which current can flow make the bulb glow. The materials through which current cannot flow do not make the bulb glow.



We can see in the above activity that in a closed circuit current passes through a certain type of material while through some other type of material it cannot pass.

**The materials which allow current to pass through them are called conductors and the materials which do not allow current to pass through them are called insulators.**

Metallic objects are usually conductors and materials like plastic, dry wood, glass and rubber are insulators.



## MAGNETS

Surely, you have seen or played with a magnet. It is a piece of material which can attract iron objects like nails, clips and common pins. Some stones also attract iron pieces. These stones are natural magnets. They are called loadstones (Figure 9.2). Magnets can also be made artificially by magnetizing a piece of steel.



Figure 9.2 Loadstone

## MAGNETIC AND NON-MAGNETIC MATERIALS

We know that a magnet pulls some objects. Does a magnet pull objects made up of all kinds of materials?

Let us perform an activity to distinguish the objects which are either pulled by the magnet or not.

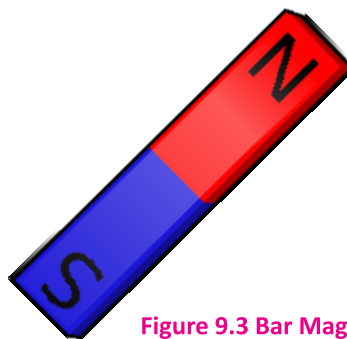


Figure 9.3 Bar Magnet



### Activity 9.3

- Collect some light objects made of different materials such as common pins, clips, a coin, a pencil, a plastic comb, a copper wire, a piece of rubber
- Place these objects on a table.
- Bring one end of a strong bar magnet near these objects one by one and observe if the magnet attracts them or not.
- Divide the objects into two groups: one group of those objects which are attracted by the magnet and the other of those ones which are not attracted by the magnet.

**Those materials which are attracted by the magnet are called magnetic materials. The other materials are non-magnetic materials.**



The iron, nickel and cobalt are magnetic materials. Copper, plastic and rubber are non-magnetic materials.

#### ? Do you know?

Over 2000 years ago, the Greeks found Loadstones. The Chinese found that a dish carrying a piece of loadstone would float in water such that the loadstone always settled in a North South direction.

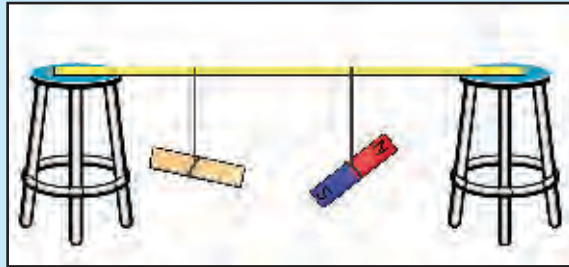
### PROPERTIES OF A MAGNET

A magnet has some more properties other than attracting iron objects. Let us perform an activity to explore its properties.



#### Activity 9.4

- Take a wooden rod and a bar magnet similar in size and shape to each other.
- Suspend them with the help of thread loops to a metre rule whose ends are placed on two tables as shown in Figure.
- Disturb both the wooden rod and bar magnet so that they rotate freely.
- Observe in which direction does the wooden rod come to stop?
- Observe in which direction does the bar magnet come to stop?
- Repeat the above activity several times with the wooden rod and the bar magnet.
- Do you find any difference in the behaviour of the wooden rod and the bar magnet?
- What conclusion would you draw from this activity?



### POLES OF A MAGNET

The end of the bar magnet that is pointing towards the geographic north of the Earth is called North Pole of the bar magnet, while the other end that is pointing towards the geographic south is called South Pole of



the bar magnet. The North Pole is usually painted red while the South Pole is painted blue. The symbols N and S are engraved at the poles (Figure 9.3).

It is interesting to find where the magnetic force in a magnet is strongest. Let us perform an activity to demonstrate this property of a magnet.



### Activity 9.5

- Place a bar magnet on a sheet of paper.
- Sprinkle iron filings all over the bar magnet and then lift it up.
- Now observe the magnet.
- Where are the most of the iron filings sticking?
- Where is the magnetic force stronger on the magnet?

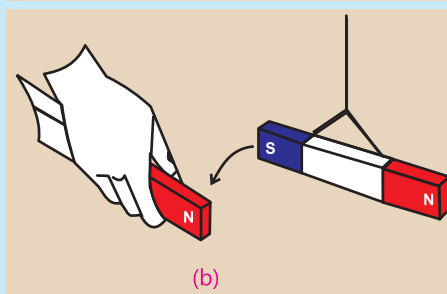
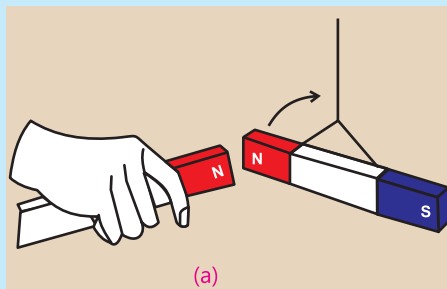


What happens when two bar magnets are brought near each other? Let us find this with the help of the following activity.



### Activity 9.6

- Suspend a bar magnet with the help of thread loops as in Figure (a). It is free to rotate.
- Take another bar magnet and bring its N-pole near the N-pole of the suspended magnet (Figure a).
- What happens to the suspended magnet?
- Now bring the N-pole of the magnet near the S-pole of the suspended magnet (Figure b).
- What happens to the suspended magnet now?
- What are your findings?





**Like poles repel each other and unlike poles attract each other.**

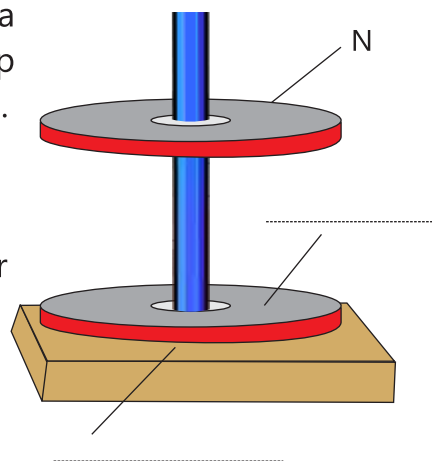
### SCIENCE PROJECT

Design an experiment to demonstrate that like poles repel each other and unlike poles attract each other.

### CHALLENGE

Two ring magnets are placed on a wooden stand. The upper magnet rises up and is suspended in air as shown in the figure.

- (i) Why does the upper magnet float in the air?
- (ii) Label the N and S-poles of lower magnet.
- (iii) Can you suggest a use for such an arrangement of magnets?



### KEY POINTS

- When a bulb is connected to a battery with the help of wires such that a current flows through it, the arrangement is called a simple circuit.
- A switch is used to make or break an electric circuit.
- Electric current can pass through conductors but cannot pass through insulators.
- A magnet is a piece of metal which can attract objects made up of iron, nickel and cobalt.
- Materials can be classified into two groups: magnetic and non-magnetic materials.
- A freely suspended magnet always points in the north-south direction.
- The ends of a magnet are called its magnetic poles.
- Two like magnetic poles repel each other while two unlike poles attract each other.



## GLOSSARY

<b>Electric circuit:</b>	The path of flow of current
<b>Battery:</b>	Source of electrical energy
<b>Conductor:</b>	Material through which current can pass
<b>Insulator:</b>	Material through which current cannot pass
<b>Magnet:</b>	A piece of metal which can attract objects made up of iron, nickel and cobalt
<b>Magnetic materials:</b>	Materials which are attracted by a magnet
<b>Magnetic poles:</b>	Opposite ends of a magnet

### EXERCISE

#### 9.1 Encircle the correct option.

- (i) An electric circuit is the
- (a) collection of bulb and cell.
  - (b) collection of bulb and wires.
  - (c) collection of cell and wires.
  - (d) path of electric current.
- (ii) An electric circuit can be made open or closed by using a
- (a) cell
  - (b) bulb
  - (c) switch
  - (d) magnet
- (iii) Current cannot pass through
- (a) aluminum wire
  - (b) copper plate
  - (c) piece of iron
  - (d) piece of dry wood
- (vi) Which of the following is a magnetic material?
- (a) glass
  - (b) nickel
  - (c) plastic
  - (d) aluminum



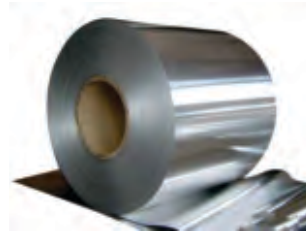
- (v) The S-pole of a freely suspended magnet always points towards:
- (a) east
  - (b) west
  - (c) north
  - (d) south
- (vi) What is the effect on the bulb in a closed circuit when the copper wire is replaced by a plastic string?
- (a) the bulb becomes dim
  - (b) the bulb becomes brighter
  - (c) the bulb turns OFF
  - (d) no effect on the bulb
- (vii) What do thick lines represent in a circuit diagram?
- (a) battery
  - (b) switches
  - (c) connecting wires
  - (d) bulb
- (viii) Which one of the following materials is a conductor?
- (a) cork
  - (b) plastic comb
  - (c) silver ring
  - (d) glass rod
- (ix) Connecting wires are usually covered with plastic coating to:
- (a) make them look pretty
  - (b) make the flow of current easier
  - (c) make the electrical circuit safe
  - (d) prevent the wastage of current
- (x) The magnetic force of the bar magnet is maximum:
- (a) at the poles
  - (b) at the centre
  - (c) between a pole and the centre
  - (d) all over the magnet
- (xi) Which of the following statements is true?
- (a) North pole attracts North pole.
  - (b) North pole repels South pole.
  - (c) North pole attracts South pole.
  - (d) South pole attracts South pole



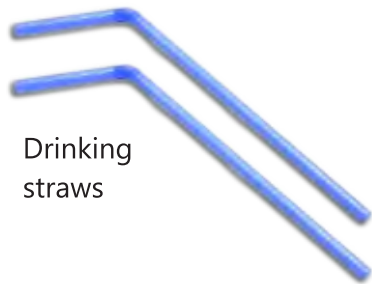
**9.2** A girl wants to make a simple closed circuit. She has a bulb, a cell and a switch, but no connecting wires. Tick the objects, which she can use for this purpose.



String

☐

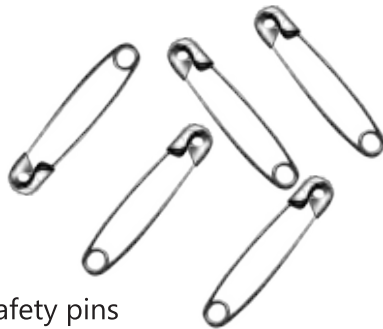
Aluminium foil

☐

Drinking straws

☐

Matchsticks

☐

Safety pins

☐

Scotch tape

☐

**9.3 Short Answers Question.**

- (i) Name at least three objects that are magnetic materials.
- (ii) Write down three uses of magnets.

**9.4 Name at least three materials that are conductors and three materials that are insulators.**



# 10

## MOVEMENTS OF THE EARTH

In this chapter, we will learn about:

- Shape of the Earth
- Earth's spin
- Revolution of the Earth



### SHAPE OF THE EARTH

Ancient people believed that the Earth was flat. Therefore, the ships reaching the far ends would fall down and would not come back. In 1519, a Portuguese explorer Ferdinand Magellan started his sea journey from Spain and after travelling through the sea for two years, his ship again reached Spain. This journey proved for the first time that the Earth is not flat but it is round like a football.



Picture sent from satellites in space also shows Earth as a huge sphere (Figure 10.1).



Figure 10.1: Our Earth



### Activity 10.1

- Take a world globe, carefully observe it. Different countries are painted in different colours, while the seas are all painted blue.
- Find Lahore. Put your finger on Lahore and start moving your finger around the globe in one direction only.
- Can you go around the globe and come back to Lahore?
- What does this prove?  
It proves that the Earth is round and not flat.
- Would it be possible to start from Lahore, travel in only one direction and come back to Lahore if Earth was flat?



### Activity 10.2

**Material:** Football, wooden block or box, three small plastic dolls, plasticine.

**Procedure:** Fix plastic dolls with plasticine at positions A, B and C on the football and observe from some distance away.

1. Do you see all parts of each doll on the football at the same time?

---



Now fix the plastic dolls at positions A, B and C on the flat wooden block and observe from some distance.

- (i) Do you see all parts of each doll on the wooden block at the same time?

\_\_\_\_\_

- (ii) Why cannot you see all the dolls completely on the football?

\_\_\_\_\_

- (iii) Why can you see all the dolls completely on the block?

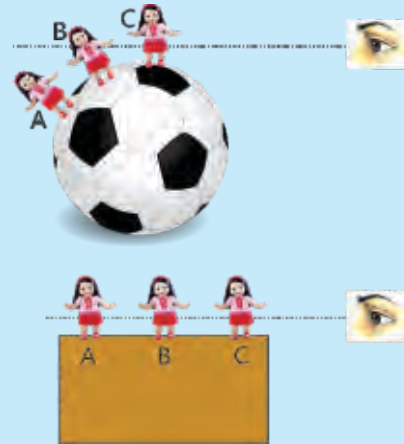
\_\_\_\_\_

2. Can you tell why we first see the chimneys of a ship approaching the seashore?

\_\_\_\_\_

3. What do you conclude about the shape of Earth from these observations?

\_\_\_\_\_



### Activity 10.3

An aeroplane flies towards East (Route-A) from Lahore and reaches Los Angeles (a city of USA). Other airlines fly towards West (Route-B) from Lahore and also reach Los Angeles.



1. Take a world globe.
2. Mark Lahore and Los Angeles on it.
3. Trace path with your finger leaving Lahore towards East and write the names of three countries on the way for Route-A.  
\_\_\_\_\_
4. Now trace path going towards West and name three countries



on the way for Route-B.

5. What do you conclude from the above activity?

## SPIN OF EARTH – DAYS AND NIGHTS

It was the old belief that the Earth was stationary while the Sun and the Moon were revolving around it. The occurrence of days and nights was due to their motion. Later, when it was found that Earth is round, this idea was found to be wrong.

By carefully observing the motions of other stars, scientists were able to prove that the Earth we are standing on is not only circling around the Sun but is also spinning about its own axis as well.

Just like a top rotating about its pin (Figure 10.2), the Earth rotates about its axis. This rotation is known as spin of the Earth (Figure 10.3). The axis is an imaginary line passing through the North and South poles of the Earth.

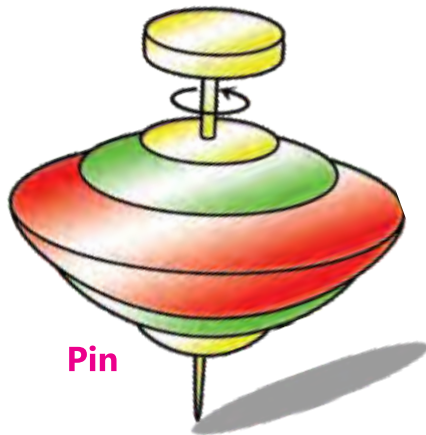


Figure 10.2: Top

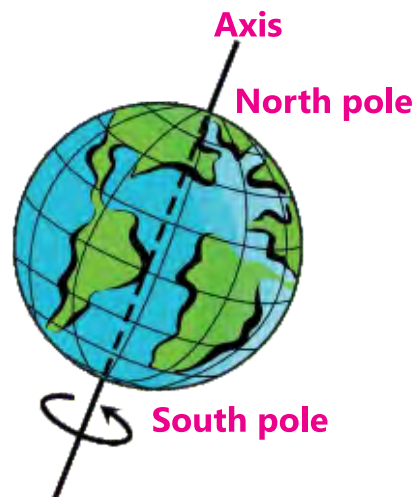


Figure 10.3: Spin of the Earth

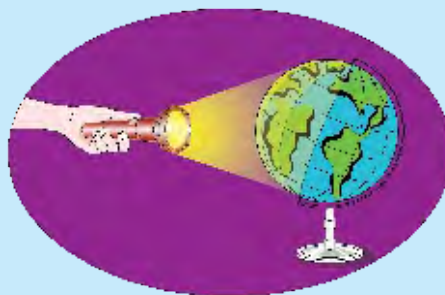
The occurrence of days and nights is due to the spin of the Earth. The Earth rotates from West to East. That is why the Sun appears to rise in the East and sets in the West.





### Activity 10.4

Place a globe on a table, throw light on one side of the globe from a torch. One half of the surface of globe will be lighted up while the other half will remain dark. Rotate the globe slowly. The part being exposed to light will be brightened while the other part will go into darkness.



Our Earth also rotates in front of the Sun in the same way. There is day in the half part of the Earth that is lighted up by the Sun and there is night in the other half not facing the Sun.

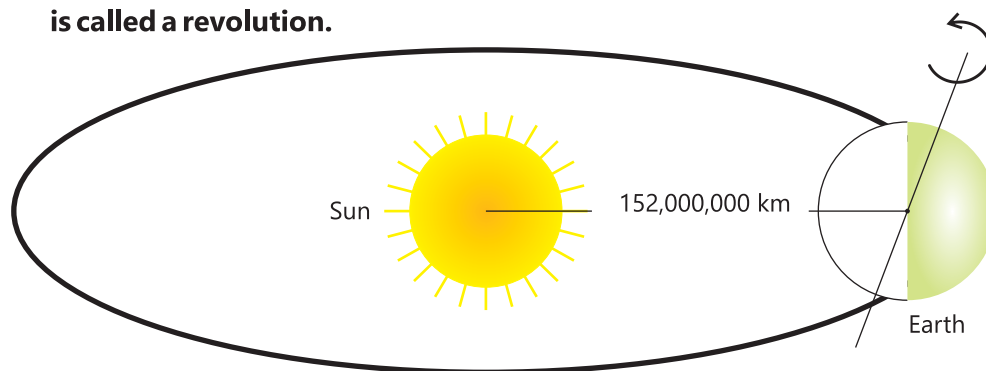
**Days and nights are caused by the spin of the Earth about its axis.**

The Earth completes its one rotation about its axis in 24 hours, so the total duration of one day and one night is 24 hours.

## REVOLUTION OF THE EARTH – THE YEAR

When a body is circling around another body, it is said that the first body is revolving around the other body.

**One complete round trip of a body around another body or a point is called a revolution.**



**Figure 10.4: Revolution of the Earth**

As mentioned earlier, the Earth also revolves around the Sun (Figure 10.4). This is called orbital motion of the Earth. The path of its orbital motion is nearly a circle of radius 152 million kilometres. The Earth completes one revolution around the Sun in about 365 days. This time is also called a **year**.



## KEY POINTS

- The axis is an imaginary line passing through the North and South poles of the Earth.
- The occurrence of days and nights is due to the spin of the Earth.
- The Earth rotates from West to East.
- The Earth completes its one rotation about its axis in 24 hours.
- The Earth completes one revolution around the Sun in about 365 days.
- One complete round trip of a body around another body or a point is called a revolution.

## GLOSSARY

<b>Axis:</b>	An imaginary line passing through the North and South poles of the Earth
<b>Revolution:</b>	One complete round trip of a body around another body or a point

### EXERCISE

#### 10.1 Encircle the correct option.

- (i) The time taken for one complete rotation of the Earth about its axis is :
- (a) 1 hour (b) 24 hours (c) 36 hours (d) 48 hours
- (ii) The Sun appears to move in the sky. In fact, this motion is due to the:
- (a) motion of the sky (b) motion of the Moon  
(c) spinning of the Earth (d) motion of the people on the Earth
- (iii) The axis of the Earth is an imaginary line passing through the:
- (a) North and South poles of the Earth  
(b) North and West poles of the Earth  
(c) East and West poles of the Earth  
(d) East and North poles of the Earth



(iv) The Earth completes one revolution around the Sun in:

- (a) one day (b) one month  
(c) three months (d) one year

(v) The Earth rotates from :

- (a) North to South (b) West to East  
(c) North to West (d) East to West

(vi) We experience day and night on the Earth because:

- (a) the Earth is rotating (b) the Earth is tilted  
(c) the Earth is round (d) the Moon orbits the Earth

(vii) The part of Earth facing away from the Sun is in:

- (a) night time (b) day time  
(c) summer (d) winter

### 10.2 Tick the right type of motion against each.

- |   |                                   |  |
|---|-----------------------------------|--|
| (i) Movement of a top.                              | <input type="checkbox"/> Rotation | <input checked="" type="checkbox"/> Revolution |
| (ii) Movement of an electric fan.                   | <input type="checkbox"/> Rotation | <input checked="" type="checkbox"/> Revolution |
| (iii) Motion of Moon around the Earth.              | <input type="checkbox"/> Rotation | <input checked="" type="checkbox"/> Revolution |
| (iv) Whirling of a ball attached to a string.       | <input type="checkbox"/> Rotation | <input checked="" type="checkbox"/> Revolution |
| (v) Motion of the Earth around the Sun.             | <input type="checkbox"/> Rotation | <input checked="" type="checkbox"/> Revolution |
| (vi) Movement of wheel of a bicycle about its axle. | <input type="checkbox"/> Rotation | <input checked="" type="checkbox"/> Revolution |
| (vii) Movement of horses of merry-go-round.         | <input type="checkbox"/> Rotation | <input checked="" type="checkbox"/> Revolution |

### 10.3 Answer the following questions:

- (i) How does the spin of the Earth cause day and night?  
(ii) Why is it dark at night?

### 10.4 Give three examples each for rotation and revolution.

**Rotation**

-----  
-----  
-----

**Revolution**

-----  
-----  
-----

### 10.5 How do rotation and revolution of the Earth differ?



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