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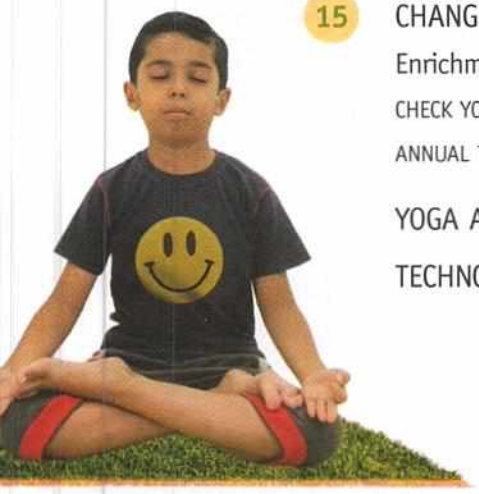


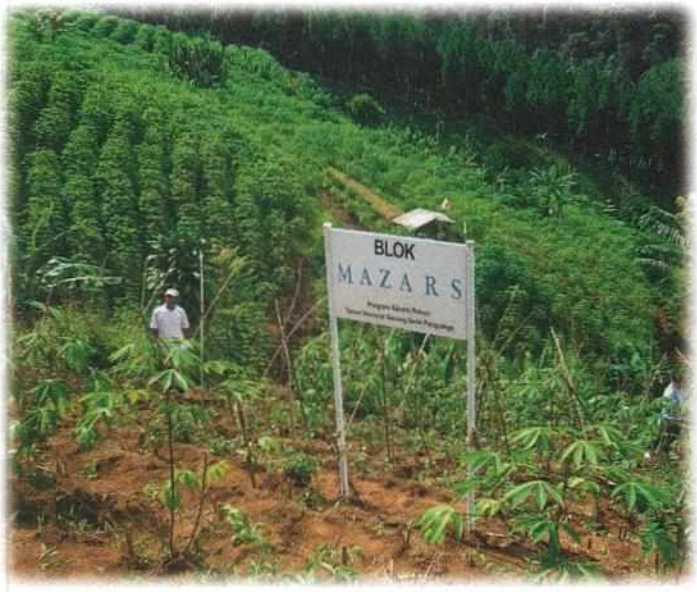
An Environment Story

This is a story about the Land of Plenty.
Read the story carefully and answer the questions at the end.

Long ago, a magical forest grew in the Land of Plenty. The trees could speak and were friends of the people. The trees gave the people many things. The people needed wood to build houses, to keep warm and to cook food. So, they would cut down the trees. But for every tree they cut down, they would plant two trees. They had promised the trees to do so.

Over a period of time, the people forgot their promise. They continued to cut the trees. However, they stopped planting new trees. The trees became sad. They stopped talking to the people. One night when the people were sleeping, the forest quietly walked away. The people woke up to find the forest gone!

The animals that lived in the forest became homeless. They did not have any food to eat. They began to die. The air no longer smelled fresh and clean. There was no rain. Soon no plants could grow on the land. People could not grow food or get water to live. The Land of Plenty became the Land of Famine.



The people realized that they had been wrong not to keep their promise. They started planting trees. The forest came back. Slowly, the land of Famine changed back into the Land of Plenty. The trees became friends again with the people. Both the trees and the people lived happily ever after.

Discuss with your partner.

1. How did the trees help the people?
2. How did the 'Land of Plenty' become the 'Land of Famine'?

1

Plants: Increasing the Numbers

AIMS

To enable the student to

- identify some seed-producing plants
- study the various stages in the germination of a seed
- experimentally find out the conditions necessary for germination
- learn about the two types of crops and the ways of seed dispersal

AIDS

- an animated film clip about germination
- dry gram and bean seeds
- sprouting gram, bean, wheat, etc.
- charts or slides showing parts of monocot and dicot seeds
- specimens of seeds with special features that help them to be dispersed

Soma comes home from school at 3 p.m. She has lunch which consists of roti and vegetables. Now it is 8 p.m. She is having dinner with her family. Talk to your partner and write the names of at least six food items which you see in the picture.

Fig. 1.1 Our life depends on plants.

Our life depends on nature. Plants are a major part of nature. Plants give us **food**. Cereals, pulses, vegetables and fruits come from plants. Sugar and oil too are obtained from plants. Plants provide us with **wood**, **fibre**, **rubber**, **gum**, **tea** and **coffee**.

Plants supply us with life-giving **oxygen**. Plants help to reduce soil erosion.

Life on earth cannot exist without plants. We need to grow more and more plants since we depend on them. More plants would mean a continuous supply of plant products to meet our needs.

CEREALS grains used for food such as wheat, oats or corn

NEW PLANTS FROM SEEDS

Why does a plant produce so many seeds? They do so because most new plants grow from seeds. Yet all seeds do not grow into new plants.

Some seeds are not fully grown when they are separated from their parent plants. Some seeds are destroyed by strong winds or heavy rain or are eaten by insects or birds. Some do not get the right soil or enough air and water. Such seeds do not grow into new plants.

Seeds that survive and get favourable conditions for their growth, grow into new plants. Let us do an activity to see the parts of a seed.

A seed and its parts

Activity 1 Soak some gram seeds in water for a few days. Take one of these seeds. You will notice that it has an outer covering which has swelled because the seed was in water. This outer covering is the **seed coat**.

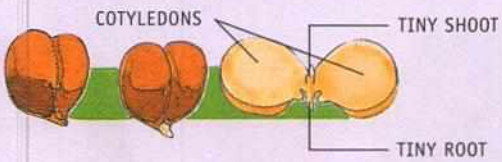


Fig. 1.2 A gram seed has two seed leaves.

Remove the seed coat. You will see two **seed leaves** or **cotyledons**. Separate them and you will find a baby plant inside. This baby plant has a tiny **shoot** and a tiny **root**.

Food for the baby plant is stored in the seed leaves. As long as the baby plant does not grow green leaves, it depends on the food stored in the seed. Seeds of some plants like grams, peas and beans have two seed leaves and are called **dicot seeds**.

Seeds of some plants like wheat, maize and rice have one seed leaf and are called **monocot seeds**.

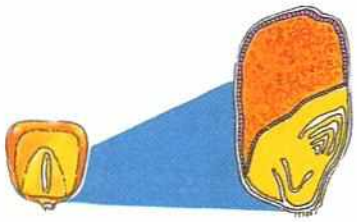


Fig. 1.3 A maize seed has one seed leaf.

SEED GERMINATION

The development of a seed into a seedling is called **germination**. Let us do an activity to find out the conditions necessary for the germination of a seed.

Activity 2 Take four plates and number them 1, 2, 3 and 4. Take some dry gram seeds. Put some seeds in Plate 1 and keep the plate on a windowsill where it can get air and sunlight. Put some seeds in Plate 2. Keep the plate in a beaker containing water. Now keep the beaker on the windowsill. Put some seeds soaked on moist cotton in Plate 3. Keep the plate inside a refrigerator. Put some seeds soaked on moist cotton in Plate 4. Keep the plate on the windowsill. Keep the cotton of Plate 4 moist all the time.

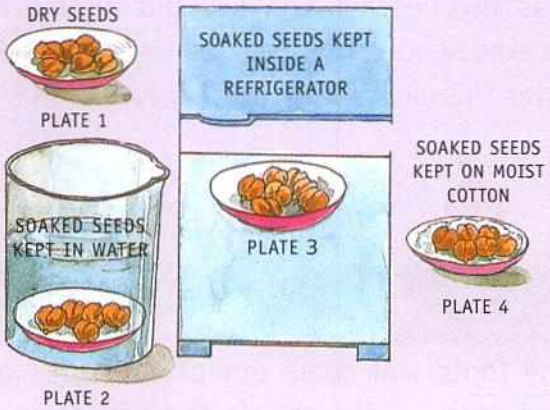


Fig. 1.4 The conditions necessary for the germination of a seed

Now fill in the table.

CONDITIONS THE SEEDS GOT	CONDITIONS THE SEEDS DIDN'T GET	DID THE SEEDS GERMINATE?
PLATE 1 AIR, WARMTH (SUNLIGHT)	WATER	NO
PLATE 2 WATER, WARMTH		
PLATE 3 AIR, WATER		
PLATE 4 AIR, WATER, WARMTH		

You will notice that only the seeds in Plate 4 have germinated. This shows that air, moisture (water) and warmth (sunlight) are the conditions necessary for germination.

This is because a germinating seed needs **air** to breathe. **Water** also makes the seed coat soft. This helps the baby plant to break the seed open and come out. **Warmth** is needed for the cells of the seed to become active.

Stages in germination

ACTIVITY 3 Soak some gram seeds in water. You will notice that a soaked seed is swollen because it has absorbed water. Its coat has also become soft. Now put these soaked seeds on a piece of wet cloth tied over the mouth of a jar (Fig. 1.5).

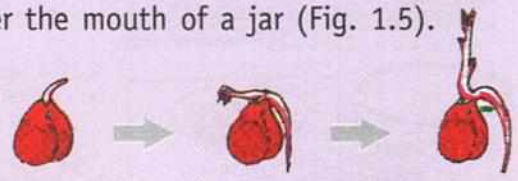


Fig. 1.5 Stages in germination

Tiny roots will come out of the soft, moist seed coats. Later, shoots too will come out. The root grows downward, towards gravity and the shoot grows upward, towards sunlight. This seedling grows and becomes a plant.

DISPERSAL OF SEEDS

Plants are fixed to the ground and cannot move from one place to another. If all baby plants grow near the parent plant, not all would survive. They would not get enough sunlight, food, water and space to grow. Hence, there are some agents in nature to scatter these seeds. These agents carry the seeds or fruits away from their parent plant. This process is called **dispersal**.

Agents of dispersal

Dispersal is carried out by the **wind**, **water**, **animals** and by the **explosion of fruits**. The special structures of certain seeds and fruits help these seeds in dispersal.

WIND: Seeds of cotton, madar and hiptage

Fig. 1.6 Seeds dispersed by wind

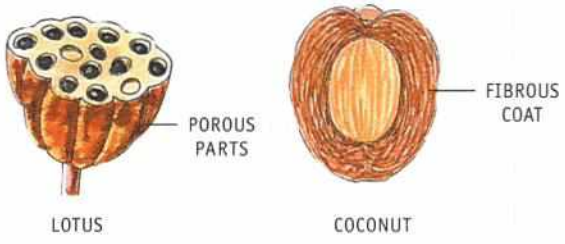


Fig. 1.7 Seeds dispersed by water

DISPERSAL (dis-purse-al) the process of scattering of seeds through agents of nature

Fig. 1.8 Seeds dispersed by animals

Fig. 1.9 Seeds dispersed by explosion

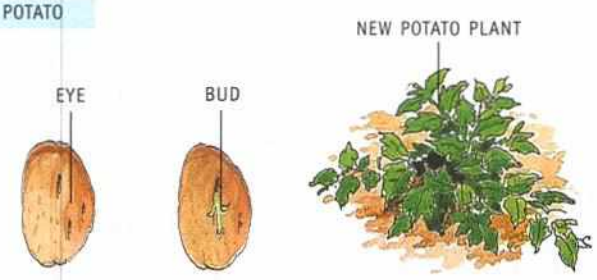


Fig. 1.10 Any part of a potato which has an 'eye' can grow into a new plant.

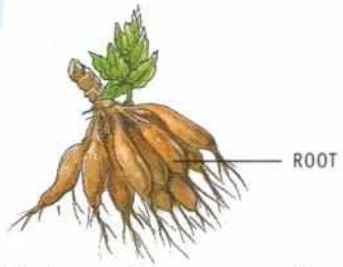


Fig. 1.11 A new plant can grow from the root of a sweet potato.

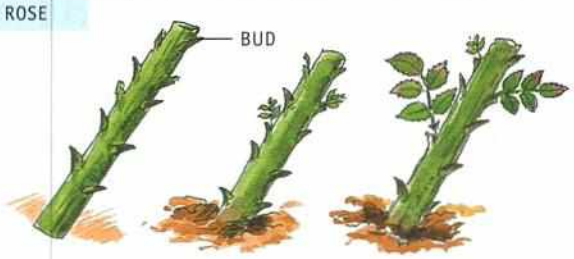


Fig. 1.12 A stem cutting of a rose can grow into a new plant.

are light and have hair or wings, so they can be easily carried by the wind.

WATER: The lotus fruit has a spongy part and the coconut has a fibrous outer covering to enable them to float on water.

ANIMALS: Human beings and animals eat fruits like cherries and mangoes and throw away their seeds. Some seeds have hooks or spines. They get stuck to the hairy skin of animals and are carried away. Birds swallow some seeds which come out unchanged in their droppings.

EXPLOSION: Some fruits like peas in a pod, burst open or explode when dry. The force of explosion helps to scatter the seeds.

NEW PLANTS FROM OTHER PARTS OF PLANTS

Besides growing from seeds, new plants also grow from certain other parts such as roots, stem and leaves of the parent plant.

Some plants like the rose, sugarcane and hibiscus grow from **stem cuttings**. The potato is a stem that grows **underground** and has buds called 'eyes'. Any part of a potato that has buds on it can grow into a new plant. Onion and ginger are also

Fig. 1.13 New plants can grow from the leaves of the bryophyllum.

underground stems from which new plants grow. Sweet potatoes and carrots are examples of plants whose **roots** can grow into new plants. The **leaves** of plants like the bryophyllum can grow into new plants.

Oral Questions

Choose the correct answer.

1. The development of a seed into a seedling is called hibernation / budding / germination.
2. Air / Moisture / Seed, water and warmth are necessary for germination of a seed.
3. Seeds of cotton are dispersed by water / wind / explosion.
4. Some plants like roses grow from root / leaf / stem cuttings.

CROPS AND VEGETABLES

Plants of one kind grown in a particular area or region during a particular period are called **crops**. Farmers grow different crops in different seasons. Crops like wheat and gram grown from November to April are called **rabi crops** or winter crops. Crops grown from June to October are called **kharif crops** or monsoon crops. Rice, maize, jowar and bajra are kharif crops.

Vegetables like the cabbage, cauliflower, radish, bean and pea grow during winter. Vegetables like the brinjal, pumpkin and gourd grow in summer.

Different plants not only grow in different climates and seasons but also require different kinds of soil. If we know the conditions that are suitable for the germination of seeds, we can grow better crops.

Rice and jute grow in **clayey soil** which holds plenty of water. That is why more rice is grown in and around West Bengal.

On the other hand, wheat is grown in the **sandy** and **irrigated soil** of Punjab and Uttar Pradesh. Jowar and bajra are grown in **sandy soil** like that of Rajasthan. Cotton grows well in the **black soil** of central and western India. Tea plants need **moist soil** and grow on the slopes of hilly areas like Assam, the Nilgiris and Darjeeling. Coconut trees grow in **coastal areas** like Kerala and Goa. Maize grows well in the **dry soil** of the plains or hills. Onion and groundnut need **well-drained, sandy soil**.

Agriculture

Plants need to be grown on a large scale to feed the entire population of a country. The practice of growing plants on a large scale is called **agriculture**.

Manure is added to soil to increase production. Fertilizers like urea, super phosphate, ammonium sulphate and nitrate are added to the soil. However, overuse of chemical fertilizers can be harmful for the soil as well as the crops.

For a good and healthy crop, we must

- use healthy and ripe seeds for sowing.
- prepare the soil properly.
- add manure or fertilizers to the soil.
- irrigate the soil.
- use **insecticides** and **pesticides**. These are chemicals that are sprayed on standing crops. If sprayed properly, they protect the crops from being destroyed by pests. However, too much of

IRRIGATED (iri-gated) artificially watered
INSECTICIDES (in-sek-ti-sides) chemicals used for destroying harmful insects
PESTICIDES (pes-ti-sides) chemicals used for destroying pests

Fig. 1.14 Maize, a kharif crop, is grown in the summer.

Fig. 1.15 Wheat, a rabi crop, is grown in the winter.

pesticides and insecticides can be harmful to our health.

Protection of crops and storage of seeds

We need to protect our crops against

- grazing animals like cows and goats,
- pests such as locusts, grasshoppers and caterpillars, and
- diseases.

Bigger animals can be kept away by proper fencing. After harvesting, grains need to be protected against moisture. They have to be kept safe from rats, moles, birds, squirrels and insects. So, they must be stored in airtight, sealed containers.

Plants, like other living things, need love and care. Under favourable conditions they grow well. A good crop adds to the wealth of a country.

THINK GREEN!

Use a natural insecticide.

Take a handful of dry neem seeds and grind them into fine powder. Mix it in 1 litre of water and soak overnight. Strain the liquid and then use it as an insecticide on your potted plants.

Let us say it again

- Plants are the most useful gifts of nature for humans and animals.
- A plant produces many seeds but only a few are able to grow into new plants.
- A seed has a seed coat, seed leaves and a baby plant inside it.
- Air, water and warmth are necessary for germination of seeds.
- The development of a seed into a seedling is called germination.
- Seeds have to get scattered or dispersed so that they get favourable conditions to grow.
- Seeds are dispersed by wind, water, animals and by the explosion of fruits.

- A new plant can also grow from stem cuttings, underground parts of plants and leaves.
- India has two main types of crops: rabi (winter) and kharif (summer).
- We can protect crops and seeds in different ways.

Let us answer

A. Tick (✓) the correct answer.

1. A seed with two seed leaves is called a
   a. damaged seed. b. monocot. c. soaked seed. d. dicot seed.
2. Right soil, warmth, enough air and water are necessary conditions for the growth of
   a. children. b. birds. c. seeds. d. books.
3. New plants can grow from the leaves of
   a. ginger. b. bryophyllum. c. onion. d. sweet potato.
4. Which feature helps a coconut fruit to float in water?
   a. a fibrous outer covering b. a spongy part
   c. presence of hook d. presence of spine
5. Plants that need clayey soil to grow well are
   a. wheat and gram. b. rice and jute. c. jowar and bajra. d. tea and coffee.
6. Insecticides and pesticides protect crops from being destroyed by
   a. drought. b. excessive rain. c. pests. d. elephants.

B. Fill in the blanks.

1. Maize has _____ seed leaf/leaves.
2. Any part of a potato that has _____ on it can grow into a new plant.
3. In India, crops like wheat and gram are grown from November to April, and are called _____ crops.
4. Onion and _____ need well-drained, sandy soil.
5. Plants help to reduce soil _____

C. Complete the series.

1. mango : seed :: _____ : root
2. hiptage : wind :: _____ : explosion
3. cabbage : winter :: _____ : summer
4. rice : clayey soil :: _____ : black soil
5. maize : dry soil :: _____ : sandy soil

D. If you were a gardener, which part of a plant would you plant to grow a new

1. rice plant? _____
2. rose plant? _____
3. ginger plant? _____
4. onion plant? _____
5. sweet potato plant? _____
6. bryophyllum plant? _____

E. Write short answers.

1. Name the outer covering of a seed.
2. What is a monocot seed?
3. What is germination?
4. What is meant by dispersal of seeds?
5. What are kharif crops?
6. Why do we spray pesticides on crops?

F. Answer these questions.

1. How are plants useful to us?
2. Name the different parts of a seed. Draw a diagram and label the parts.
3. Name the conditions necessary for germination.
4. Why must seeds be dispersed? What are the different agents of dispersal?
5. What is agriculture?

HOTS questions

G. Think and answer.

1. A papaya has many seeds. Each papaya seed can grow into a new tree. However, that does not happen. Why?
2. Why can't all seeds be dispersed by the wind?
3. Why can't we grow tea in Rajasthan?

Let us do

ENRICHMENT ACTIVITIES

H. Divide the class into four groups. Each group can collect different kinds of seeds and paste them on chart paper. Now display them collectively as a class project. You may collect

- seeds that are cereals like rice, wheat and corn.
- seeds that are pulses like peas, grams and lentils.
- seeds that give us oils like mustard, sunflower and peanut.
- seeds used for flavouring like coriander, pepper, mustard and cumin.

I. Let us observe the different stages of seed germination.

Things required: a few seeds of *moong* (you may use seeds of peas, wheat or gram), five small pots filled with soil, water and a magnifying glass.

Method:

- Label the pots A, B, C, D and E.
- Place five seeds in the soil in Pot A. Water this pot regularly. Note down the date.
- After a week, repeat the above with Pot B.
- Next week, do the same with Pot C, the subsequent week with Pot D and finally Pot E.
- Make sure that the seeds do not dry up or get more water than necessary.

After five weeks of starting your experiment, observe the seedlings in various stages of development. You may use the magnifying glass.

Record your observations in your notebook.

You may draw the various stages of development you observed or you may click pictures and paste them.

Plant the seedlings in a nearby garden or park and watch them grow.

J. There are words from the lesson in this wordsearch. Circle them. Write the words you have found.

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

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

K. A healthy breakfast for you!

Soak a handful of *moong* seeds in water. Loosely tie them up in wet muslin cloth. Observe a tiny seedling growing out of each seed. After one or two days, you can have these sprouted seeds for breakfast with salt and lemon juice. Sprouted seeds are rich in protein.

L. Visit a farm/farmhouse. **TO VISIT**

If possible, your teacher may take the class to a farm/farmhouse and talk to the farmer or gardener. You can ask questions about the different steps that the farmer or gardener takes to raise crops or other plants there. Write their comments in your notebook.

A life skill 

M. Decorate your house with seedless plants.

With the tops of a few vegetables like carrot, turnip, onion and potato you can make your own indoor garden.

1. Put the tops in a deep dish, leaving some space between them.
2. Pour water into the dish till the vegetables are about half centimetre in water.
3. Add some water every 2–3 days to keep the water level.

After a week or two you will observe little seedlings coming out of the vegetable tops. Plant them in pots and decorate your house.

Let us meet 

M S Swaminathan is an Indian agriculture scientist. He is known as the 'Father of the Green Revolution in India'. He successfully introduced and further developed high-yielding varieties of wheat. He was honoured with the first World Food Prize by the United Nations in 1987.

A subject link 

(SOCIAL STUDIES)

N. Plants grow well in regions which are suitable for them. Can you match the plant to the state?

1. Keekar	a. Himachal Pradesh
2. Coconut	b. Maharashtra
3. Pine	c. Assam
4. Mango	d. Rajasthan
5. Tea	e. Kerala
6. Cotton	f. Uttar Pradesh

TEACHER'S NOTES: Encourage children to collect seeds dispersed by wind, water, animals and humans. A nature walk in the school garden can give them an idea of the variety of plants. Encourage them to grow one plant each at home.

2

Food and Health

AIMS

To enable the student to

- understand the importance of a balanced diet
- understand the importance of keeping fit
- learn about how to protect himself/herself from common diseases

AIDS

- samples of food of each type
- film clips and slides of common communicable diseases
- pictures and pamphlets on vaccination
- posters of polio campaigns

Rohit gets tired after playing for a little while. He gets frequent colds. He does not eat properly. Soma can play for many hours without feeling tired. She rarely falls ill. She has balanced healthy meals. We should be like Soma. We must eat wholesome food to keep healthy. We must keep our surroundings clean. Our house must have trees around it. We must drink clean water. We must exercise regularly. We must rest properly. Thus, to stay healthy our body needs **a. a balanced diet, b. regular exercise, c. enough rest** and **d. protection from diseases.**

A BALANCED DIET

Our food contains nutrients like **carbohydrates, proteins, fats, vitamins** and **minerals**. It also contains **roughage** and **water**. A **balanced diet** has the right amounts of all these nutrients.

SOURCES OF CARBOHYDRATES | SOURCES OF PROTEINS | SOURCES OF FATS | SOURCES OF VITAMINS AND MINERALS

Fig. 2.1 We must have some of the things from each food group every day.

Carbohydrates give us energy to work and to play. Some sources of carbohydrates are cereals, pulses, sweet potato and sugar. **Proteins** help us grow. Milk and its products, eggs, meat and pulses are rich in proteins. **Fats** give us more energy than carbohydrates. Vegetable oil, butter and ghee are rich in fats.

Vitamins keep our body fit, improve appetite and increase the body's ability to fight diseases. **Minerals** help in the growth and development of the body. Fresh fruits and vegetables are good sources of vitamins and minerals. **Roughage** in certain vegetables and fruits help the body to get rid of undigested food.

Food must be cooked with care so that its nutritional value is not lost. Cereals, pulses and vegetables should be cooked in the water in which they have been soaked. This water contains dissolved vitamins.

KEEP FIT

Muscles become weak and flabby if they are not used for a long time. Regular exercise helps to develop and tone up our muscles. During exercise air is pumped in and out of the lungs at a faster rate. Thus, more oxygen is taken in, and more carbon dioxide and water vapour are given out. The heart also beats at a faster rate during exercise and blood circulates faster. Exercise helps the nervous system by supplying more oxygen to the brain. We must play outdoor games to keep our body fit.

Posture is the position in which we hold our body when we sit, stand or move. We must sit and stand straight. We must walk upright. Correct posture gives a graceful appearance to our body. It improves the flexibility of our joints.

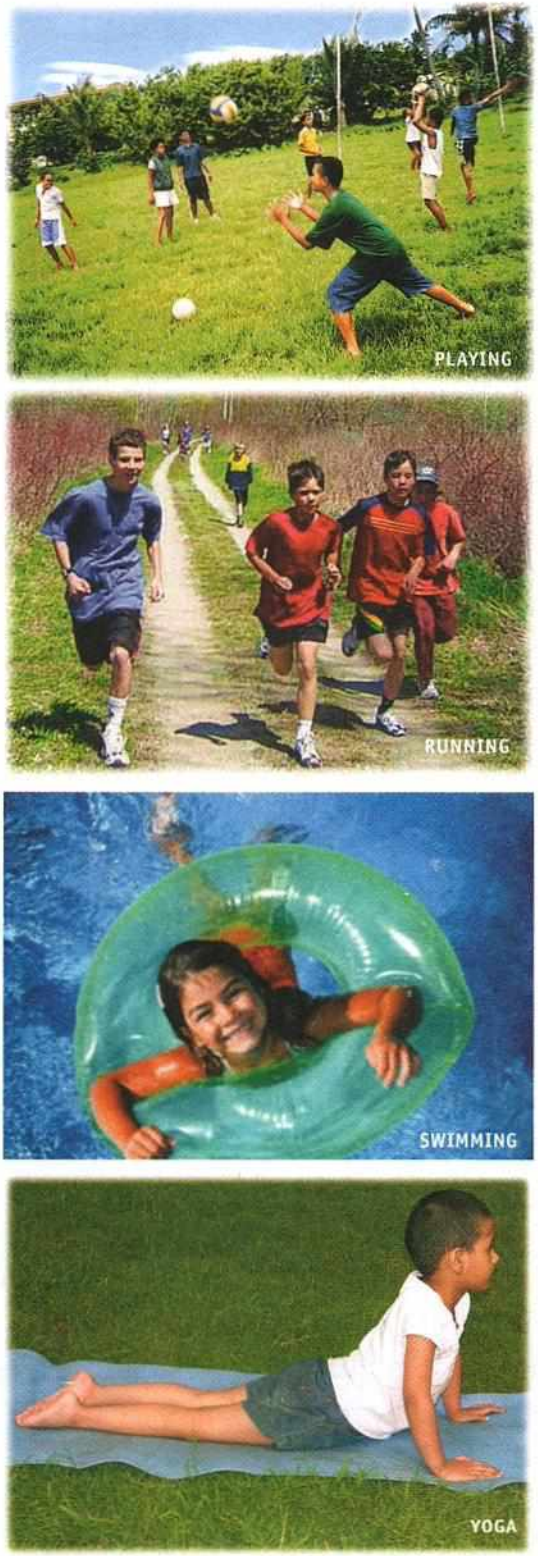
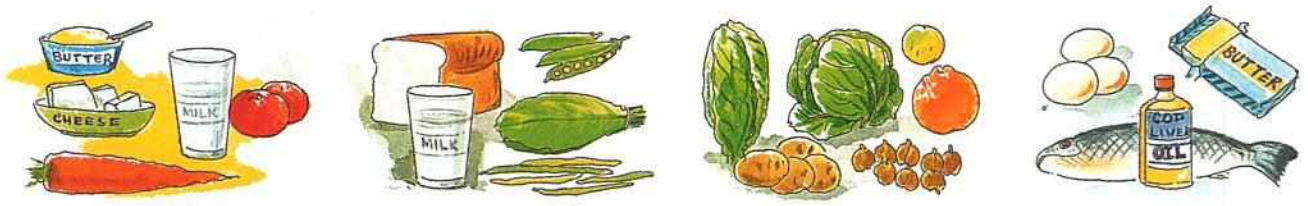


Fig. 2.2 Regular exercise keeps us healthy.



VITAMIN A VITAMIN B VITAMIN C VITAMIN D

Fig. 2.3 Food rich in vitamins

ENOUGH REST

Proper rest and regular hours of sleep relax our muscles, and give our body the much needed rest. We feel fresh and ready to work again. We can work more efficiently. Sleep also gives time to the body for the growth and repair of body cells.

DISEASES

When we are sick, neither our body nor our mind is at ease. A **disease** is an abnormal condition in which the body is not able to function properly. Diseases can occur due to many reasons. Some diseases like diabetes or arthritis are caused when a particular part of our body stops functioning properly. Deficiency or the lack of particular minerals or vitamins in the body also causes diseases. They are called deficiency diseases. Diseases can broadly be classified into two types—**non-communicable** and **communicable**.

Non-communicable diseases

These are diseases that are not passed on from one person to another. Some non-communicable diseases are night blindness, beriberi, scurvy, rickets and anaemia.

- **Night blindness** is caused by the deficiency of **vitamin A**. Green leafy vegetables, mango, papaya, tomato, butter, milk, fish and egg yolk are rich sources of vitamin A. In night blindness, the patient cannot see in dim light.
- **Beriberi** is a disease caused by the deficiency of **vitamin B1**. Vitamin B is present in unpolished rice, milk, meat, peas, cereals and green vegetables.
- **Scurvy** is caused by the deficiency of **vitamin C**. Bleeding of the gums and swelling of joints result from scurvy. Vitamin C is present in citrus fruits, amla, tomato, green leafy vegetables, potato and sprouted grains and pulses.
- Rickets is caused by the deficiency of vitamin D. In this disease the bones become soft. Vitamin D, along with the minerals calcium and phosphorus, makes our bones and teeth hard and strong. Calcium comes from milk and its products.
- **Goitre** is caused by deficiency of **iodine**. In goitre, a gland in the neck region swells. Goitre can be prevented by using iodized salt. Seafood is also rich in iodine.
- **Anaemia** is caused by the deficiency of

Fig. 2.4 Milk and its products can prevent rickets.

Fig. 2.5 Iodized salt can help prevent goitre.

iron in food. In anaemia, the **haemoglobin** in the blood becomes low. So, the oxygen-carrying capacity of the blood reduces. Iron is present in dates, apples, bananas, guavas, spinach, brinjal, pulses, jaggery, meat and liver.

Communicable diseases

These are diseases that can be passed on from one person to another.

Communicable diseases are spread by microbes or **germs** called bacteria, protozoa and viruses. These germs spread through coughing, spitting or sneezing. Germs enter the body of a person through the nose or mouth, or with food and water. They can also enter the body through cuts in the skin.

- **Bacteria** cause diseases like plague, tuberculosis, typhoid, pneumonia and meningitis.
- **Protozoa** cause diseases like malaria and amoebic dysentery.
- **Viruses** cause diseases like the common cold, polio, chickenpox and measles.

Some of the ways in which these diseases spread are discussed below.

Through direct contact

Many diseases like the common cold, chickenpox, measles, ringworm, whooping cough and scarlet fever spread through direct contact, either through clothing or other articles used by the sick person.

Through infected food and water

Diseases like typhoid, cholera, diarrhoea, polio and jaundice spread by eating infected food and drinking polluted water. Flies and cockroaches carry germs from sewers, and contaminate our food and water. Handling of food with dirty hands and lack of proper sanitation are the main causes of pollution of food and water. Milk from diseased cows can also be a source of infection.

Through the air we breathe

Germs that cause diseases like chickenpox, whooping cough, diphtheria, influenza and scarlet fever are present in the discharge from the nose and the mouth of a patient. These diseases can spread through sneezing

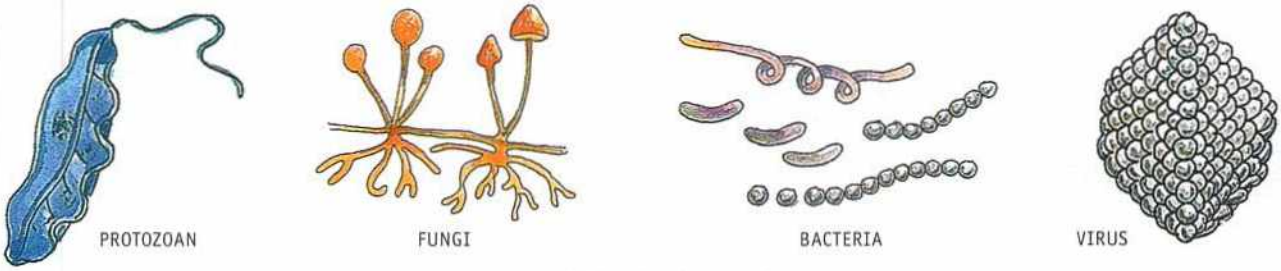


Fig. 2.6 Kinds of microbes

HAEMOGLOBIN (him-o-glow-bin) a protein in red blood cells that carries oxygen from the lungs to the tissues
COMMUNICABLE (come-you-ni-cable) **DISEASE** a disease that spreads from one person to another
CONTAMINATE (kon-tam-e-nay-te) infect or make impure

and coughing, when germs are passed from one person to another through the air.

Through insects

Diseases like malaria, yellow fever, plague, dengue and kala-azar are caused by blood-sucking insects like mosquitoes, fleas, bugs and sandflies.

In 1994, a large number of people in parts of Maharashtra and Gujarat suffered from plague caused by the bites of rat-fleas. Similarly, dengue fever is quite widespread. Dengue is transmitted to a person by the bite of an Aedes mosquito that is infected with dengue fever.

Malaria is caused by a protozoan which is carried by the female Anopheles mosquito. When the mosquito bites a person suffering from malaria, the protozoa are sucked up with the blood. When this mosquito bites a healthy person, the protozoa are injected into the person's blood, causing malaria.

Through carriers

Some diseases are spread by healthy carriers of germs. A healthy person may carry germs of typhoid, cholera, dysentery, etc. in his body. Such a person usually does not suffer from the disease. However, people who come into contact with the carrier are in danger of catching the disease. AIDS is an incurable communicable disease that damages the immune system of the person and leads to death. It is spread by a virus called HIV.

IT'S A FACT!

The female mosquito sucks human blood which helps it to lay eggs. Male mosquitoes suck up only water and plant juices.

Oral Questions

Choose the correct answer.

1. Deficiency of vitamin C causes dengue / night blindness / scurvy.
2. Beriberi is a disease caused by the deficiency of vitamin B1 / vitamin C / vitamin A.
3. Rickets / Anaemia / Malaria is a disease in which the bones become soft.
4. Deficiency of iron / iodine / calcium in the body causes goitre.

PREVENTION OF COMMUNICABLE DISEASES

Germs of certain diseases stay on articles like clothes, combs, towels and toys used by a patient. All such articles, including the linen and clothing, must be disinfected or boiled to kill the germs. The floor and the walls of the room must be sprayed with a disinfectant.

All cases of infectious diseases must be reported to the civic authorities so that precautions can be taken to prevent their spread in the area. Children suffering from any communicable disease should stay away from school till they are fully recovered.

Progress in the field of medicine and immunization have helped us to get rid of many diseases.

We should make efforts to prevent the breeding of germs (personal and environmental cleanliness prevent the breeding of germs). Destruction of mosquitoes and their breeding grounds is the best solution for protection from these dreadful diseases.

Methods for prevention

Houses should be airy and open. Fresh air

BOILING

VACCINATION

KEEPING THE TOILET CLEAN

SUNLIGHT AND FRESH AIR

USING A MOSQUITO NET

CLEANING HOUSE

Fig. 2.7 Some methods of preventing diseases

and sunlight are natural disinfectants. Mattresses, linen and clothes should be exposed to sunlight from time to time.

A supply of clean and germ-free water for drinking and cooking is essential for health. Impure water should be boiled for about 10–15 minutes and then stored in clean and covered containers. Water filters can also be used for purifying water. Chlorination is a way of purifying huge quantities of drinking water.

Germs in milk are killed by **pasteurization**. The milk is heated at a high temperature for at least half an hour and then cooled down quickly. This kills harmful bacteria.

Breeding of flies must be prevented in or near your house as they pollute your food and water and act as carriers of disease. Rooms should have wire screens.

Activity 1 Form groups of five. Take a walk around your locality and observe if there

- are any stagnant water puddles.
- is 'standing water' in coolers.
- are heaps of open rubbish lying on the roadside or near the houses.
- is a dead animal anywhere on the road.
- is a vendor selling cut vegetables or fruits.
- are edible items kept uncovered for sale.
- are overhead tanks left uncovered in houses.

If you find any of the above, report to your elders and spread the message. Absolute cleanliness is the only way to prevent the spread of diseases. Make and display posters in your locality.

PASTEURIZATION (pas-chew-rye-zay-shun) heating milk at a high temperature and quickly cooling it to kill harmful germs

Toilets and bathrooms must be cleaned and disinfected regularly.

To stop the breeding of mosquitoes, water must not be allowed to stagnate. Mosquitoes lay eggs in standing water. To destroy mosquito larvae, the surface of water in tanks and ponds must be sprayed with oil. Use a mosquito net or mosquito repellent at night. Kitchens must be rid of all insects. Floors must be swept every day. Drains must be kept covered.

Vaccination

Vaccination is another way of protecting ourselves by acquiring immunity against certain diseases. There are vaccines available for diseases like diphtheria, cholera, typhoid, tetanus, polio, measles, mumps, meningitis and hepatitis. Pulse Polio is an immunization campaign established by the Government of India in 1994 to eradicate polio by vaccinating. From time to time all children under the age of five are given oral polio drops against polio virus. This campaign proved to be successful and the incidence of polio in India has decreased dramatically.

We must get ourselves vaccinated as a protection against these diseases.

There are national programmes to eradicate communicable diseases.

If we take care of ourselves and our surroundings, we can stay healthy.

Remember: **Prevention is better than cure.**

Let us say it again

- Our body needs a balanced diet, exercise, and enough rest for keeping fit.
- Our diet must include carbohydrates, proteins, minerals, vitamins, fats and roughage.
- Regular exercise carries fresh blood to the heart, keeps muscles in good shape and improves posture.
- Enough rest and sleep are essential for growth and body repair.
- Diseases are mainly caused by the malfunctioning of an organ, deficiency of some vitamins and minerals or through germs.
- Diseases which spread from a sick to a healthy person are called communicable diseases.
- Communicable diseases are caused by germs and may spread through air, infected food and water, direct contact, cuts in the skin, or insect bites.
- Proper hygiene and vaccination prevent the spread of communicable diseases.

CORRECT POSTURES WHILE SITTING AND STANDING

VACCINATION (vak-si-nay-shun) the act of injecting vaccine to protect against a disease
ERADICATE (era-di-kate) to get rid of something completely

Let us answer 

A. Tick (✓) the correct answer.

1. To stay healthy our body needs
   a. a balanced diet. b. books. c. bread. d. only milk.
2. Which of the following is a non-communicable disease?
   a. chickenpox b. beriberi c. common cold d. measles
3. This disease is caused by a virus.
   a. typhoid b. malaria c. meningitis d. chickenpox
4. The spread of communicable diseases can be prevented by
   a. spitting. b. coughing. c. keeping clean. d. having medicines.
5. Vaccination can protect against diseases like polio, measles and
   a. AIDS. b. malaria. c. mumps. d. fever.

B. Complete the table.

NUTRIENT	FOUND IN			
Carbohydrate	_____	_____	_____	_____
Protein	_____	_____	_____	_____
Vitamin A	_____	_____	_____	_____
Vitamin C	_____	_____	_____	_____
Iron	_____	_____	_____	_____

C. Match the columns.

NUTRIENT	DEFICIENCY DISEASE	SYMPTOMS OF DISEASE
1. Vitamin A	goitre	bones become soft
2. Vitamin B1	night blindness	a gland in the neck region swells up
3. Vitamin C	rickets	patient cannot see in dim light
4. Vitamin D	scurvy	affects the nervous system
5. Iodine	beriberi	bleeding gums

D. Fill in the blanks.

1. Our body needs _____, protection from diseases, regular exercise and _____ to keep fit.
2. Our food should have enough _____ to get rid of undigested food.

3. We must play _____ games to keep our body fit.
4. _____ and _____ are caused by bacteria.
5. _____ is a virus that attacks the immune system of the patient and leads to death.

E. Write short answers.

1. What is a deficiency disease?
2. Name a disease caused by the lack of iron in food.
3. What is a communicable disease?
4. Which diseases are caused by eating contaminated food?
5. Name three diseases for which you have been vaccinated.

F. Answer these questions.

1. How do houseflies spread disease?
2. What precautions would you take to check the spread of malaria?
3. Explain two ways of controlling communicable diseases.
4. Which steps would you take to prevent the spread of germs from a sick person?
5. What is meant by pasteurization of milk?
6. Raju has bleeding gums and swollen joints. Name the disease he is suffering from. What is the cause and remedy of this disease?

HOTS questions

G. Think and answer.

1. When you have a cold and cough, your parents ask you not to go to school. Why?
2. Vijay always has snacks like potato chips, noodles and burgers. Mohan spends his holidays sitting in front of the computer. He does not play any outdoor games or do any other form of exercise. What trouble could both of them be asking for?

Let us do

ENRICHMENT ACTIVITIES

H. Make a poster for iodized salt.

Check a packet of common salt being used in your kitchen. Is the salt iodized or not? Find out more about the need to add iodine to your daily consumption of salt. Name the disease caused by the deficiency of iodine in your diet. Name the gland in your throat that swells up due to this disease.

Make a poster or advertisement for iodized salt.

I. Make a meal chart for yourself.

For each day of a week, write in the table below all that you eat for breakfast, lunch and dinner. Analyse whether you are having a balanced diet. Sort out the different nutrients you get from these food items. Is your diet deficient in a particular nutrient?

DAY	BREAKFAST	LUNCH	DINNER

J. Class project

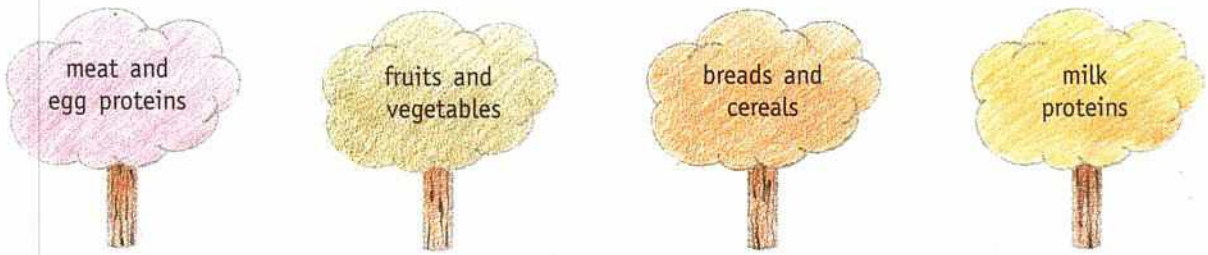
Get into groups of six. Make charts on the different kinds of microbes and the diseases caused by them. Each group can take up one kind of disease.

K. Riddle time: Who am I?

1. You need this nutrient more than your mother does. _____
2. Spinach and dates have plenty of me. _____
3. I help in the quick removal of waste matter from your body. _____
4. I am full of energy, yet people avoid me. _____
5. A dangerous disease, I spread through Aedes mosquito. _____

L. Food or Fuel!

Bring some food items to school and sort them out in different groups. You may also bring empty packets or wrappers. Choose a table in your class where you can have four different placards as shown below.



M. Visit a milk dairy.

TO VISIT

Visit a milk dairy and find out what all you can explore at the dairy (including pasteurization). Discuss in your class all that you have learned from this particular visit. Make a note of some of the dairy products.

A life skill 

N. Fresh fruits for a fresh and healthy you

Meera came back from school, picked up a few grapes from the table and put them in her mouth. She took out an orange juice packet from the fridge and went to her room.

Jaggi, her brother, had lunch and carried an apple to his room. Both the children had fruits but did not benefit from them.

What would you choose?

1. Eating unwashed fruits or washing fruits before eating.
2. Washing your hands before or eating with dirty hands.
3. Having orange juice or having an orange.

Let us meet 

Charaka is considered to be the father of Ayurveda. He studied the internal structure of the human body and its organs. He knew how the characteristics of parents are transferred to their children. Charaka, who introduced the ideas of food digestion and immunity to diseases, believed that it is better to prevent a disease than to cure it. He wrote *Charaka Samhita* which was later translated into Arabic and Latin.

TEACHER'S NOTES: Encourage the children to eat a balanced diet. Emphasize the need for exercise along with proper food. Pass on the message to the children that cleanliness is the only way to prevent many diseases.

3

Safety and First Aid

AIMS

To enable the student to

- learn the importance of first aid
- learn about road signs
- handle common emergencies in daily life

AIDS

- a video film or CD on first aid
- a first-aid box containing sterilized bandages, an antiseptic lotion, scissors, band-aid, cotton wool, etc.
- charts showing different kinds of bandages and how to use them

Somebody has eaten a banana and thrown the peel on the road. Has he done the right thing? What could happen? An accident may occur anywhere at any time. Are you ready to give instant aid to the injured if an accident occurs?

FIRST AID

First aid is the first medical help given to an injured person before a doctor arrives. The most important thing while giving first aid is to stay calm.

Safety first

Safety on the road is more important than ever before because of the rapid increase in the number of vehicles. Read and follow **road signs**. They are meant for your safety. Always follow **safety rules** on the road and at home. However, sometimes accidents occur in spite of being careful. Here are ways to deal with some emergencies.

For cuts and scratches

Do not neglect any wound, however minor. Germs can enter a body through uncovered cuts or wounds and cause infection. Wash your hands before giving first aid, as germs from dirty hands may infect the wound.

- Wash away all dirt around the wound.
- Clean the affected area with cotton wool soaked in an antiseptic lotion.

Fig. 3.1 Understand and memorize these road signs.

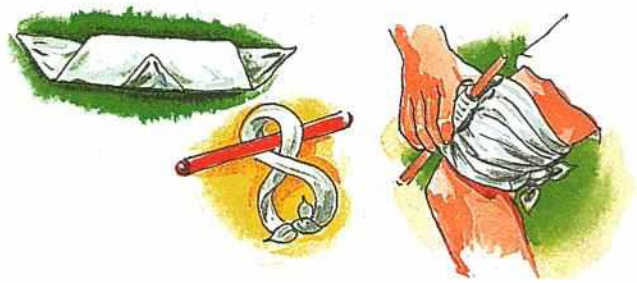


Fig. 3.2 A tourniquet is a tight bandage that is used for stopping the flow of blood from a wound.

Fig. 3.3 How to bandage different parts of the body

Fig. 3.4 To stop bleeding from nose, keep patient upright in a comfortable position.

- Place a thick pad of cotton wool or sterile gauze on the wound and press it with your thumb and fingers. This will stop bleeding in most cases.
  A **tourniquet** can be used. This is a bandage tightly tied over the wound to stop bleeding.
- Wrap a sterile gauze bandage around the wounded area.

IT'S A FACT!

The clear gel of Aloe vera can heal wounds and burns by forming a protective coating on the affected area.

When the skin is cut by a dirty or rusted object, germs may enter and cause a dangerous disease called **tetanus**. Consult a doctor for an anti-tetanus injection.

For nose bleeds

- Keep the patient upright in a comfortable position with his head held back.
- Press the bleeding side of the nose firmly.
- Keep an **ice-pack** or wet cloth on the nose and the head of the patient.
- Ask the patient to breathe through his mouth and not to blow his nose.
- A little bit of bleeding from the nose is harmless but if the bleeding is heavy, send for the doctor.

For sprains

When the tissues around a joint get torn we call it a **sprain**. Sprains cause swelling and sometimes **discolouration** of the skin. They are very painful.

- Keep on applying ice-packs or ice-cubes on the injured joint till the swelling subsides.

For fractures

A crack or a break in a bone is called a **fracture**.

- Keep the patient calm and comfortable, and send for the doctor.

ICE-PACK a bag filled with ice which is used to cool parts of the body
DISCOLOURATION change in colour (here, skin turns blue)
FRACTURE (frak-chu(r)) a crack or a break in a bone

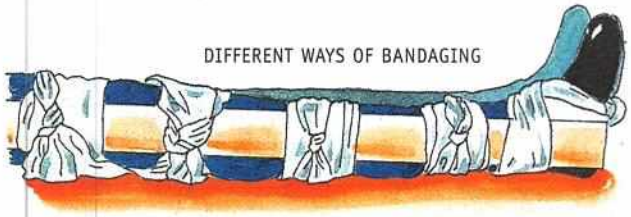


Fig. 3.5 Fracture of the leg

Fig. 3.6 Fracture of the arm

- Apply a **splint** to give support to the broken bone and try to avoid unnecessary movement. Any easily available article like sheets of newspaper, magazines, a piece of cardboard or a pillow around the injured bone can also act as a splint. This will prevent movement and help the broken bone to heal.
- A **sling** made from a triangular piece of cloth can be used for support.

Oral Questions

Choose the correct answer.

1. For cuts and scratches, clean the affected area with cotton wool soaked in water / oil / an antiseptic lotion.
2. A piece of cardboard or a pillow around an injured bone can act as a splint / tourniquet / sling.
3. A crack or a break in a bone is called a wound / fracture / sprain.
4. Apply a splint / ice-pack / tourniquet to give support to a broken bone.

FOR BURNS

One can suffer burns from hot objects, fire, steam, boiling water, crackers, electric points and chemicals like acids.

Minor burns

Though minor burns are very painful, they can be treated at home.

- Let running cold water flow over on the burn until the pain subsides.
- Apply an antiseptic lotion or cream to prevent infection.
- If an antiseptic lotion is not available apply a paste of baking soda and water.

Severe burns

Sometimes the skin gets severely burnt and blisters are formed. Never try to prick a blister. An open blister is an open wound. It can catch infection.

- Gently cover the burn with a clean piece of cloth or sterile gauze to protect it from germs and dust.
- If the victim is in a state of shock, give him a warm drink. Never try to give a liquid to an unconscious person.
- Dip a sterile piece of cloth in a solution of baking soda and use it as a wet compress.
- Severe burns must be treated by a doctor.

Chemical burns

- Remove any clothing from the affected area. Use plenty of water to wash off the chemical.
- Cover the burn with sterile gauze and send for the doctor.

SPLINT a piece of wood or cardboard used to hold a broken bone in position
SLING a bandage passing over the shoulder to support an injured upper limb

Fig. 3.7 If a building catches fire inform the nearest fire station.

Fig. 3.8 Throw sand on a petrol fire.

Fig. 3.9 If a person's clothes catch fire wrap a blanket around him.

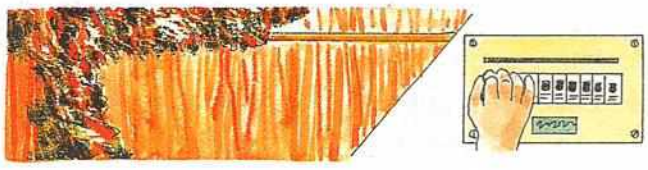


Fig. 3.10 Put off the main switch in case of an electric fire.

FOR FIRE FIGHTING

- In case there is a fire in a building, inform the nearest fire station.
- In case of fire caused by petrol, do not throw water on it. Water will flare up the fire. This is because petrol being lighter than water floats above water and keeps burning. Put out the fire by throwing lots of sand or mud on it.

If a person's clothes catch fire

- do not allow him to run around in panic. This fans the flames.
- make him roll on the ground.
- cover him with a thick blanket. This can put out the fire by cutting off oxygen.

If a fire has been caused by defective wiring or an electric gadget,

- do not throw water on it. This can cause **electrocution**. Immediately turn off the main switch.
- smother the fire by throwing sand.
- use a **fire extinguisher**.

FOR ANIMAL BITES

- Wash the wound with soap and water to remove germs, as the virus which causes rabies or hydrophobia may be carried in the saliva of an infected animal. Dogs, wolves, bats and cats are known to carry the rabies virus.
- Apply an antiseptic lotion to prevent infection. Bandage the wound with a sterile gauze. Rush the victim to a doctor.

FOR SNAKE BITES

A poisonous snake injects poison with its sharp fangs, causing a lot of pain and swelling. Treatment must be given

immediately as the poison can kill.

- Apply a tourniquet just above the bite to stop the flow of blood to the heart. This may help to slow down the spread of the poison.
- Immediately rush the victim to a doctor.
- It is always better to take precautions when you walk through areas where snakes are found. Wear high boots to protect your feet.

FOR POISONING

Do you know that certain things in your house may be poisonous? Nail polish, naphthalene balls, paints, detergents and some medicines are poisonous.
Remember these rules.

- Keep all medicines locked, away from the reach of little children.
- Read the label very carefully before taking any medicine. Destroy all medicines which have crossed their expiry dates.
- Properly wash vegetables and fruits before eating them. They may have been sprayed with harmful insecticides and pesticides.
- In case of any kind of poisoning, try to make the victim vomit.
- Rush the victim to a doctor.

A CALL AWAY

Keep the telephone numbers of your nearest police station, fire station, doctor and chemist handy. In case of an emergency you can immediately call for help.

Being alert and prepared will help you avoid accidents and handle emergencies.

Let us say it again

- We must obey safety rules on the road and follow road signs.
- Help given to a patient before the arrival of a doctor is called first aid.
- Never neglect a wound as germs may cause infection.
- Any unnecessary movement of a broken bone should be prevented.
- Treat a burn by washing it with running cold water and applying an antiseptic lotion. Cutting off the air supply helps to put out a fire.
- Snake bites must be treated immediately.

A fire extinguisher

Let us answer

A. Tick (✓) the correct answer.

1. If you get cut by a dirty or rusted object you may get
   a. a fracture.
   b. a sprain.
   c. rabies.
   d. tetanus.

2. The rabies virus is carried by
   a. cockroaches. b. hens. c. dogs. d. rabbits.
3. For putting out a fire caused by petrol, we should
   a. switch off the electricity supply. b. turn off the gas supply.
   c. throw water on it. d. throw lots of sand on it.
4. Nail polish, naphthalene balls and paints may contain
   a. sugar. b. salt. c. poison. d. juice.

B. Fill in the blanks.

1. When the skin is cut by a rusted object, the injection one must take is called a _____ injection.
2. _____ causes swelling and sometimes discolouration of the skin.
3. An easily available object like sheets of newspaper or a pillow can be used as _____ to give support to a broken bone.
4. If a fire is caused by an electrical gadget, do not throw _____ on it.
5. Destroy all _____ which have crossed their expiry dates.

C. Write short answers.

1. What is a tourniquet?
2. Which articles could be used as a splint in case of a fracture?
3. What is a sling?
4. Name the disease caused by a virus carried by dogs and cats.
5. When someone's clothes catch fire, we must not let him run around in panic. Why?

D. Answer these questions.

1. What first aid should be given in case of a minor wound?
2. How would you help someone with a bleeding nose?
3. What is a splint? How and why should it be used?
4. We must not prick blisters. Why?
5. How will you put out a fire caused by defective wiring?
6. What first aid should be given in case of an animal bite?

HOTS questions

E. Think and answer.

1. Puneet is a four-year-old boy. His mother keeps all medicines on the top shelf of the rack. Why?

2. Firemen crawl on the floor of a room that is filled with smoke. Why do they do this?

Let us do

ENRICHMENT ACTIVITIES

F. Read the clues and fill in the boxes.

1. a cut by a rusted object may cause this — t _ t _ _ _ s
2. a crack or a break in a bone — f _ _ _ _ u _ e
3. a tight bandage for stopping the flow of blood from a wound — t o _ _ _ _ _ _ _ t
4. used to give support to a broken bone — s p _ _ _ t
5. a virus carried by dogs, cats and bats carry this virus — r _ _ _ _ s
6. causes swelling and sometimes discolouration of the skin — s p _ _ _ _
7. can happen when you throw water on fire caused by defective wiring — e l _ _ _ _ o _ _ _ _ _ _ n

G. Draw a line to match these road signs with their meanings.




no entry
no pedestrians
no honking
no left turn
cycle prohibited
no right turn
no U-turn
speed breaker




H. Make a chart.

With the help of an adult find out the telephone numbers of your nearest police station, fire station, doctor and chemist. Write down all these numbers on a sheet of chart paper and pin up this chart at any convenient place in your house.

A life skill 

I. How safe are you in your house? Discuss with your partner and check from the following list.

1. Is there a first-aid box in your house?
2. Are medicines kept in a safe place?
3. Do people use sterile cotton wool to clean wounds?
4. Does anyone wear synthetic clothes in the kitchen?
5. Are all vegetables and fruits washed before being eaten?
6. Is the telephone number of your family doctor easily available?
7. Can you read the expiry date on the medicine bottle/strip?

Let us meet 

Susruta (6th century BC) was able to perform eye operations and operations to remove stones from the human body. Before operating, he gave wine to his patients to numb their senses. This way they did not feel the pain much. Susruta wrote *Susruta Samhita* a unique encyclopaedia of surgery, which was translated into Arabic in the 8th century AD. Acharya Susruta is considered to be the father of plastic surgery.

TEACHER'S NOTES: Teach children to recognize road signs and learn safety rules. Children must be able to give first aid in the case of a fracture, a bleeding wound, burns, bites, etc.

Check Your Understanding

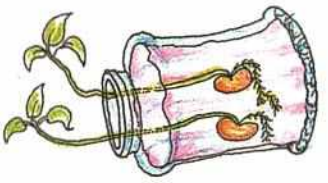
Enrichment Activities

A. Plants need sunlight to grow.

Things required: some beans seeds, an empty jam bottle, cotton wool and blotting paper

Method:

- Soak some bean seeds in water for a few hours.
- Line an empty jam bottle with blotting paper.
- Spread a little cotton wool at the bottom. Pour water into it to moisten the cotton and the paper.
- Place a few soaked seeds between the paper and the bottle at different positions. Regularly sprinkle water on it.



Watch the roots and the shoots grow out of the seeds! After a few days, turn the bottle on its side and observe the direction of growth of the roots and the shoots.

Write a report in ten sentences and discuss with your partner.

B. Class project

Divide the class into three groups—Vitamin A, Vitamin B and Vitamin C. Each group will find out details of the food items that are rich in that particular vitamin, diseases caused by the deficiency of that vitamin and its symptoms. Now make charts and display them in your class. You can also make presentations and show them in your computer lab.

C. Dial 101 for Fire Brigade.

Things required: an empty jar, baking soda, two candles of different length and some vinegar

Method:

- Sprinkle some baking soda in an empty jar with a wide mouth.
- Fix two candles of different lengths in the jar and light them.
- Carefully pour a little vinegar from the side of the vessel.

Observe what happens. The candles stop burning one after the other. Vinegar and baking soda react together and form carbon dioxide, which being heavier than air, pushes out the air. The candles stop burning as carbon dioxide rises up in the vessel.

Discuss the results with your partner.

4

Houses All Around

AIMS

To enable the student to

- know the factors that determine the type of house someone makes
- know points to be kept in mind before, during and after the construction of a house

AIDS

- film clips or CDs on different countries showing different types of houses
- models or pictures of different types of houses in different regions
- an architect's blueprint

Razia lives in Srinagar. Her house has a fireplace and a sloping roof. Bhanwar Singh lives in Jaisalmer. His house has a flat roof and thick walls. In Assam and Arunachal Pradesh houses are mostly made of wood and bamboo. In some places, where it rains a lot, houses are built on stilts.

Why do you think these houses are so different from each other? There are three main factors which determine the type of house we build. These factors include

- the **climate** of the place,
- the **materials** to be used, and
- the **budget** available to us.

CLIMATE

In places where the climate is hot, houses have thick walls and flat roofs. Thick walls keep the inside of the house cool. Flat roofs can be used by people for sleeping outdoors.

A HOUSE WITH A SLOPING ROOF | A HOUSE WITH A FLAT ROOF | A HOUSE ON STILTS

Fig. 4.1 The type of house depends on the climate, the material used, and the budget.

BUDGET (ba-jet) a plan of how available money will be spent over a period of time

In places where it rains a lot and the climate is hot and damp, houses are often built on stilts. These houses, built a few feet above the ground on raised platforms, remain safe from floods. The sloping roofs of houses on hills do not allow rainwater or snow to collect and make the houses damp and cold. Most houses in cold areas have fireplaces to keep the inside of the house warm.

BUILDING MATERIAL

Bricks and **stones** keep a house cool in hot weather. Houses in hilly areas need to be built easily and quickly. Therefore, houses here are built of **bamboo** and **wood**. In those places which have frequent earthquakes, houses are mostly built of wood. There is less damage if they collapse.

Mud, **bamboo** and **palm** leaves are used to make *kachcha* houses called **huts**. These building materials are cheap and easily available. Some other common building materials are **concrete**, **glass**, **iron** and **thatch**.

Fig. 4.2 High-rise buildings cost a lot of money to make.

IT'S A FACT!

In the language of Eskimos igloo simply means house. Eskimos use snow to make these strong and warm shelters. However, igloos are rare because Eskimos build them as temporary shelters only when they go hunting. Eskimos live in houses made of stone or mud.

Oral Questions

Choose the correct answer.

1. Houses in hot / cold / rainy areas have thick walls and flat roofs.
2. Houses in hilly areas are built using bamboo and wood / concrete / glass.
3. Houses made of mud, bamboo and palm leaves are called *kachcha* / *pucca* / mud houses.

BUDGET

The money available or the budget is the third factor which determines the size and design of a house. Less money is needed to build a small hut. On the other hand, lakhs of rupees are needed to build a permanent house.

In big cities where there is a shortage of space, people build high-rise buildings. Sometimes they form cooperative housing societies to save on space and money.

THINGS TO REMEMBER

There are some points to be kept in mind **before**, **during** and **after** the construction of a house.

CONCRETE (kon-kreet) building material that is made by mixing together cement, sand, small stones and water

Before building a house an architect makes a plan of the house depending upon the space available and on the needs of the people who are going to live there. The plan also depends on the amount of money available for construction.

These points need to be kept in mind during the construction of a house.

- A sun-facing house gets a lot of sunlight.
- The walls of the house must be strong, damp-proof and well plastered. Insects do not breed on such walls.
- Doors and windows must be in a direction such that fresh air and sunlight can enter every room. They must have wire-netting so that flies and mosquitoes cannot get in.
- A house can be made safe by fitting the doors and windows with grills.
- The floor of the house must be levelled and made smooth. It must have a good drainage system. Covered drains and outlets seal out foul smells and germs.

Once the construction is over, proper care must be taken of the house. The house must always be kept clean. The floors must be swept and mopped every day.

- The walls, windows, doors and other parts of the house must be dusted regularly. They may need to be painted periodically.
- The kitchen, the bathrooms and the latrine must be washed and disinfected regularly. The area surrounding the house must be kept clean.

A clean and well-kept house is a joy to live in.

Let us say it again

A door with wire-netting

- The climate of a place, the material available and the budget determine the type of house to be built.
- The place and the climate determine the design of the house.
- Materials like brick, stone, concrete, wood, iron, steel, glass, bamboo, grass, leaves and mud are used to build a house.
- The budget determines the size and the design of the house to be built.
- Certain important points must be kept in mind before, during and after building a house.

Let us answer

A. Tick (✓) the correct answer.

1. The construction of a house does not depend on
   a. the land available.
   b. money available.
   c. members in the family.
   d. neighbours around the house.

ARCHITECT (ar-ki-tekt) a person who designs buildings

2. Mud, bamboo and palm leaves could be used to make
   a. bungalows. b. huts.
   c. flats. d. high-rise buildings.
3. Cooperative housing societies help to save
   a. space. b. money. c. space and money. d. water.
4. Igloos are shelters made by Eskimos for
   a. temporary use. b. permanent use. c. summer. d. holidays.

B. Write T for True or F for False.

1. Most houses in cold areas have fireplaces for warmth. ____
2. In places which have frequent earthquakes, houses are built of concrete, glass, iron and thatch. ____
3. In big cities where there is a shortage of space, people build huts. ____
4. To avoid insect breeding the walls of the houses must be strong and damp-proof. ____
5. A house can be made safe by fitting the doors and windows with grills. ____

C. Write short answers.

1. What are the three factors that determine the type of house to be built?
2. Name any six materials used for building a house.
3. Before building a house, who makes the plan of the house?
4. Name three characteristics of a good house.

D. Answer these questions.

1. Houses in hot places need to be cool from inside. What are the special features of such houses?
2. What are the special features of houses where it rains heavily?
3. How are the houses in the hills different from those in the plains?

HOTS questions

E. Think and answer.

1. Mr Rongpi lives in Cherrapunji. He got his house constructed with a flat roof. What disadvantage is he going to face?
2. The Gupta family have moved to a new house. Mrs Gupta is pleased with the large glass windows which give a good view but she is worried about security. What advice would you give her?

F. Class project

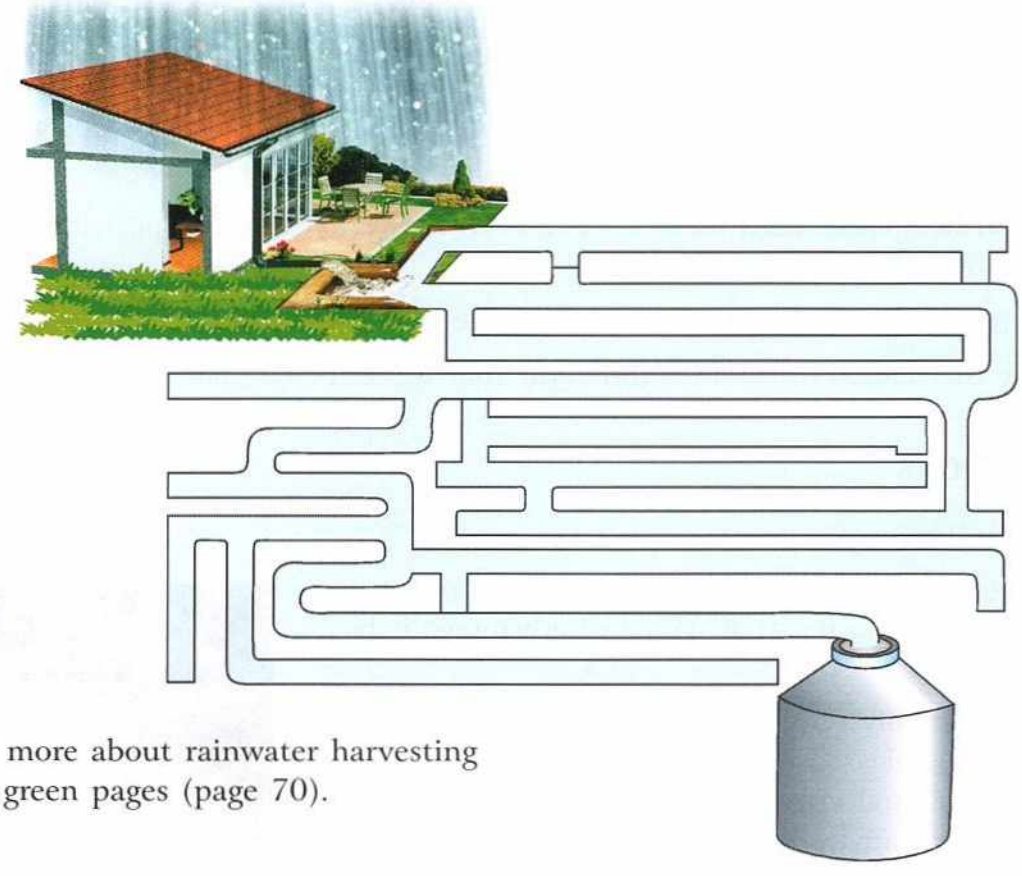
Divide the class into four groups. Each group should collect information from the school library and from the Internet. You can choose these topics.

- Houses for Eskimos
- Material for construction of houses
- Techniques for constructing houses in areas where there are frequent earthquakes
- Techniques for houses in areas with heavy rainfall

G. A house of your own.

Make a model of a hut or a house on stilts. Use green and brown paper, a shoebox, empty matchboxes, cardboard, broomsticks and straw. Place the model in a tray containing some soil. Sow a few soaked coriander seeds and have a garden in a few days.

H. Mr Kumar wants to conserve rainwater. Trace the path of the rainwater to take it to the container.



Read more about rainwater harvesting from green pages (page 70).

I. We need to take care of certain points before (B), during (D) and after (A) building a house. Write B, D or A against each statement.

1. Doors and windows must have wire-netting. ☐
2. Floors must be swept and mopped every day. ☐
3. The walls and roof must be well plastered. ☐
4. A plan of the house must be drawn. ☐
5. Doors must be painted periodically. ☐
6. The floor of the house must be levelled properly. ☐

J. Visit a construction site. TO VISIT

Visit a construction site where a mason, a carpenter and a plumber are working. Observe them at work. What tools or instruments are they using? Write your observations in your notebook.

A life skill

K. Do you love your neighbourhood? Tick (✓) the correct boxes and find out for yourself.

	ALWAYS	SOMETIMES	NEVER
1. Do you keep the area around your house clean?			
2. Do you greet the elders in your neighbourhood?			
3. Do you encourage the gardener not to burn dry leaves?			
4. Do you throw stones at stray animals?			
5. Do you write or scratch on cars parked near your house?			
6. Do you visit people in your neighbourhood?			
7. Are you helpful to visitors looking for a particular house?			

What will be your reaction if stranger tries to talk to you?

a. talk to him b. inform your parents c. play with him

TEACHER'S NOTES: Discuss with children, the role of climate, material and budget in the context of building a house.

5

Solids, Liquids and Gases

AIMS

To enable the student to

- differentiate between atoms and molecules
- understand the arrangement of molecules in solids, liquids and gases
- learn about the solubility of solids, liquids and gases in water
- distinguish between physical and chemical changes

AIDS

- chalk, water, potassium permanganate, glycerine, paint, turpentine
- spirit lamp, beaker
- fishes, boiled water, fresh water
- coconut oil, wax
- paper, magnesium coil

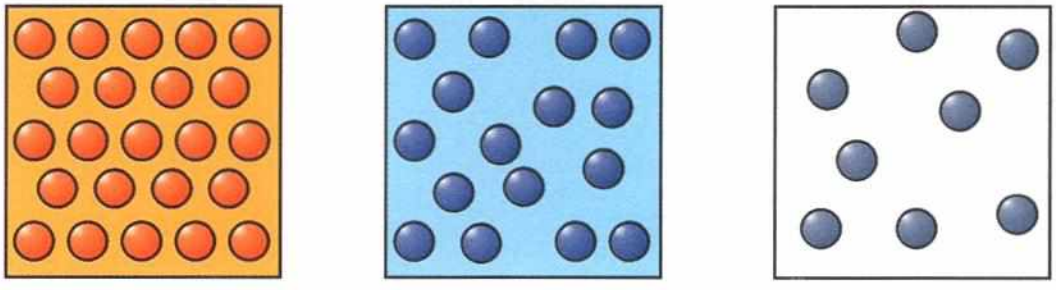
WHAT IS MATTER?

Matter is anything that occupies space and has weight. It can be a **solid** (chalk), a **liquid** (water) or a **gas** (oxygen).

What is matter made up of? All matter can be split into tiny units that are not visible to the naked eye. These tiny units are called **molecules**. A molecule is the smallest unit of a substance that has all the properties of that substance. For example, a salt molecule is the smallest particle of salt. Each salt molecule has the properties of salt.

MOLECULES ARE MADE UP OF ATOMS

A molecule can be further broken down into still smaller units called **atoms**. Atoms are the **building blocks of matter**. All kinds of matter in the world is made up of about 117 kinds of atoms. Atoms of the same kind form **elements**. Atoms of different kinds combine and form compounds.



SOLID LIQUID GAS

Fig. 5.1 Arrangement of molecules in solids, liquids and gases

MORE ABOUT MOLECULES

Molecules are always in a state of motion. They never stop moving. They are constantly attracted towards each other.

In **solids**, the molecules are very close to each other. They attract each other with great force. So, a solid is hard, rigid and has a definite shape and volume.

In **liquids**, the molecules are less closely packed. The attraction between the molecules in liquids is less as compared with that in solids. Molecules can move around freely. That is why liquids can flow. A liquid has a definite volume, but no definite shape. It takes the shape of its container.

In **gases**, the molecules are separated by large empty spaces. They have a lot of freedom to move about. The molecules in a gas move faster than the molecules in a solid or a liquid. That is why a gas has no definite shape or volume.

SOLIDS IN WATER

We have learnt that substances like sugar and salt are soluble in water. This means their molecules find space between the molecules of water. Add a few crystals of potassium permanganate to water. See how the colour spreads. Is potassium permanganate soluble in water? Can you name some substances that are insoluble in water?

LIQUIDS IN WATER

Activity 1 Take a beaker half-filled with water. Add a tablespoon of glycerine to it. Stir well. The two liquids mix together and appear as one liquid.

We say that these two liquids have dissolved in each other. They are said to be **miscible**.

Alcohol is another liquid that is miscible in water. Kerosene, however, cannot be dissolved in water and is called **immiscible**. Have you seen a painter removing paint off his hands using turpentine? Why does he not use water?

GASES IN WATER

Gases like oxygen, nitrogen, ammonia and carbon dioxide can dissolve in water. Fish and other animals that live in water breathe in the oxygen dissolved in water.

Water in the oceans, rivers and lakes contains dissolved oxygen and nitrogen.

What happens when water starts boiling? Bubbles are formed on the sides of the

Fig. 5.2 A liquid takes the shape of its container.

Fig. 5.3 Potassium permanganate is soluble in water.

Fig. 5.4 When water boils, dissolved gases are separated.

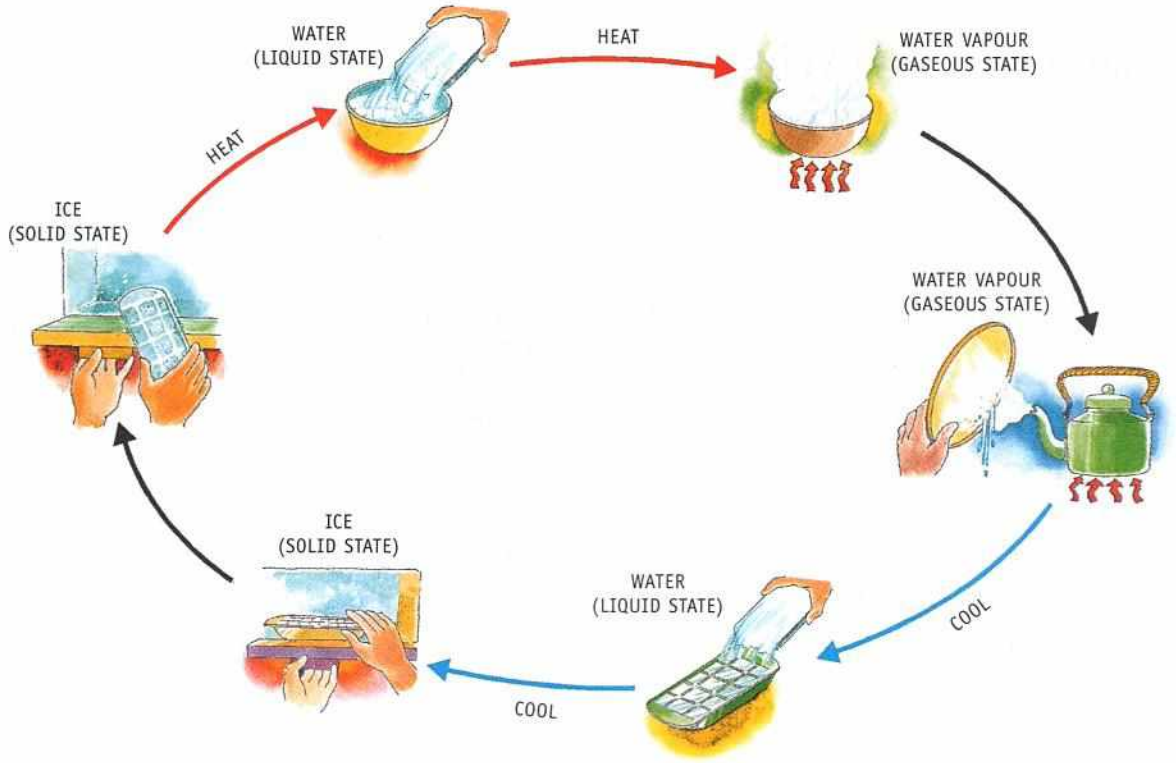


Fig. 5.5 If there is a change in the state of matter only, it is called a physical change.

vessel and at the bottom of the water. Why are these bubbles formed? These bubbles are of the dissolved gases that separate from water on heating. How are aerated drinks different from orange juice or *nimbu pani*? The gas that bubbles out of an aerated drink is carbon dioxide. It is dissolved in water under great pressure.

Oral Questions

Choose the correct answer.

1. Matter / Atom / Molecule is anything that occupies space and has weight.
2. Molecules / Atoms / Elements are the building blocks of matter.
3. In solids / gases / liquids, molecules are separated by large empty spaces.
4. When two liquids mix together, they are said to be miscible / immiscible / reversible.

HEATING AND COOLING

Heating or cooling brings about changes in matter. Sometimes matter changes its state, for example, ice on heating changes to water, that is, the state of water changes from solid to liquid. Sometimes matter changes altogether to form a new substance.

Physical change

A **physical change** is a temporary change which can be reversed.

Let us check out some examples of physical changes.

$$\text{water} \underset{\text{heating}}{\overset{\text{cooling}}{\rightleftharpoons}} \text{ice}$$

$$\text{water} \underset{\text{cooling}}{\overset{\text{heating}}{\rightleftharpoons}} \text{water vapour}$$

$$\text{soild wax} \underset{\text{cooling}}{\overset{\text{heating}}{\rightleftharpoons}} \text{liquid wax}$$

The above are called physical changes because these changes

- are only in the state of matter,
- are temporary, and
- can be easily reversed.

Fig. 5.6 Melting of wax is a physical change.

Fig. 5.7 Burning of a paper is a chemical change.

Chemical change

In a **chemical change**, heating or cooling results in a permanent change in the state of matter. A new substance is formed and we cannot get back the old substance. For example, when a piece of paper is burnt it changes into ash. The molecules of paper are different from the molecules of ash.

Chemical changes

- are permanent.
- cannot be reversed.
- result in the formation of new substances.

There are many chemical changes which keep on occurring inside our body all the time.

Let us say it again

- Matter exists in three states—solid, liquid and gas.
- Matter is made up of molecules. Molecules are made up of atoms.
- Atoms of the same kind combine and form elements. Atoms of different kinds combine and form compounds.
- The arrangement of molecules differs in different states of matter.
- Some solids like salt and sugar dissolve in water. When one liquid dissolves in another, both are said to be miscible. Gases like oxygen and ammonia dissolve in water.
- Heating or cooling brings about changes in matter. Some changes are temporary while others are permanent.

Let us answer

A. Tick (✓) the correct answer.

1. Which of the following is a physical change?
   a. melting of butter
   b. rusting of iron
   c. burning of paper
   d. changing of wheat to bread

2. Milk turning sour is a
   a. physical change.
   b. reversible change.
   c. chemical change.
   d. none of these
3. _____ and salt are soluble in water.
   a. Sugar
   b. Chalk
   c. Sand
   d. Kerosene
4. In ice, the water molecules are/can
   a. stuck together.
   b. very close to each other.
   c. move around freely.
   d. move very fast.
5. The gas that bubbles out of an aerated drink is
   a. nitrogen.
   b. oxygen.
   c. hydrogen.
   d. carbon dioxide.

B. Match each word with its description.

1. matter	a. has a definite shape and volume
2. molecule	b. has no definite shape, but a definite volume
3. gas	c. sugar
4. miscible in water	d. attraction between molecules is the least
5. solid	e. anything that takes up space and has weight
6. liquid	f. smallest unit of a substance

C. Write short answers.

1. What is matter?
2. What are molecules?
3. What are molecules made up of?
4. Name any two solids, two liquids and two gases that can dissolve in water.

D. Answer these questions.

1. Why do solids have a fixed shape?
2. Why do liquids flow?
3. Write two differences between liquids and gases.
4. When do we say that liquids are miscible?
5. What is a physical change? Give two examples.
6. What is a chemical change? Give two examples.
7. Give three characteristic features of a chemical change.

HOTS questions

E. Think and answer.

1. Bubbles appear when you open a bottle of soda but not when you open a bottle of mineral water. Why?
2. A painter removes paint from his hand using turpentine. Why?

Let us do 

ENRICHMENT ACTIVITIES

F. Be a scientist.

Collect sugar, pepper, flour, honey, cooking oil and milk. First try to guess what will happen when you mix any of these with water. Then mix them in water and carefully observe what happens. Now fill the table given below.

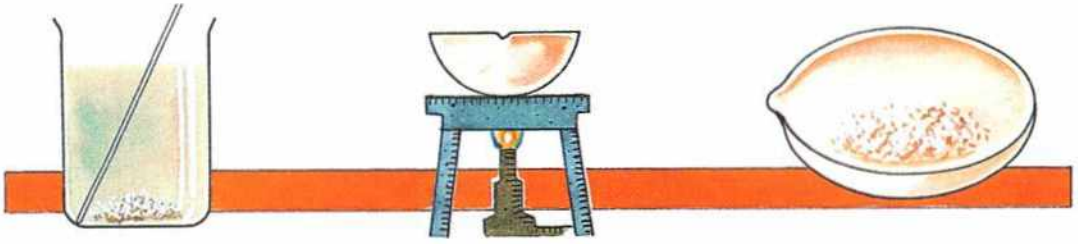
MATERIAL	PREDICTION	OBSERVATION

G. Separate salt crystals from a salt solution.

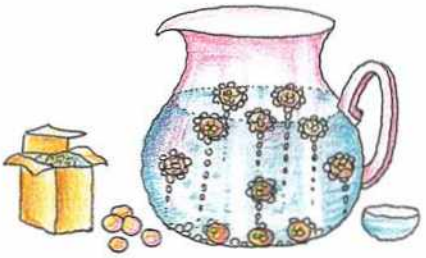
Things required: salt, water, beaker, china dish, stirring rod and spirit lamp

Method: Take some water in a beaker. Add some salt to it. Stir it well. Keep on adding more salt to the solution till no more salt dissolves. Warm the solution in a china dish so that more salt may dissolve. Now allow the solution to cool.

After an hour you see salt crystals at the bottom of the china dish.



H. Dancing balls



Things required: a jar of water, mothballs, vinegar and baking soda

Method:

Put two spoonfuls of vinegar and two spoonfuls of baking soda in a jar of water and stir. Drop a few mothballs into it. Do they sink to the bottom?

After an hour watch the mothballs dance as they bob up and down in the jar. The baking soda and the vinegar react together to produce carbon dioxide which comes out in the form of bubbles. The bubbles of carbon dioxide cling to the balls and make them dance.

A life skill

I. Water is precious.

All living beings need water. Check from the following list how many of these suggestions you can follow to avoid wastage of water.

1. Keep water in earthen pots outside your house for passersby. Remember to keep the pots covered.
2. Keep an earthen bowl outside your house or on your balcony for birds or squirrels to drink water from.
3. Let there be no stagnant water in potted plants. Do you know why?
4. Ensure that water from the cooler tank does not overflow or leak.

A subject link

(MATHEMATICS)

J. Mr Karan Kumar has an ice factory in Gurgaon. The ice factory needs 750 litres of water every day for making ice.

1. How much water would they use in 2 weeks?
2. How much would 225 packs of ice cost if one pack costs ₹ 15?
3. How many cubes would be there in 9 packs if one pack contains 4 dozen cubes?

TEACHER'S NOTES: The concept of molecules and atoms should be very clear to the child. Conduct experiments to show how solids, liquids and gases dissolve in water. Physical and chemical changes should be explained with the help of experiments.

6

Soil Erosion and Conservation

AIMS

To enable the student to

- identify factors that cause soil erosion
- realize the harmful effects of soil erosion
- take steps to prevent soil erosion

AIDS

- films or CDs on landforms, deforested areas
- pictures showing eroded land
- model of terraced field or a visit to a place where there are terraced farms

Soil is the uppermost layer of the earth. It supports plants which provide food to all living things on this planet. Thus, soil is the foundation of all life on earth. Below the soil there is solid rock.

When the earth was formed, there were only water, air and hard rocks. The sun heated the rocks. The rain made them cold, and the wind blew over them. This continued for thousands of years. As a result, the rocks broke into small pieces. These small pieces broke into still smaller pieces. They were carried around by wind and water. They rubbed against each other till they became tiny particles. It took millions of years for these tiny particles to change into the loose material which we call soil.

SOIL EROSION

Natural forces like wind, rain and running water help in soil formation. But they can

Fig. 6.1 Soil is the foundation of all life on earth.

SOIL EROSION the process of wearing away of soil over a period of time

Fig. 6.2 Soil erosion caused by water

Fig. 6.3 Soil erosion caused by wind

harm the soil as well. At places covered by natural vegetation, there is a balance between the formation of soil and the loss of soil. Often this balance is disturbed by human or natural forces. Then the top soil is removed from the surface of the earth. The condition of wearing off or carrying away of soil by the action of water or wind is known as **soil erosion.**

As a result of soil erosion the land loses its fertility. Land affected by soil erosion cannot produce enough to feed all the living beings who dwell on it. Farmers reap poor harvests. We should therefore, know the agents responsible for soil erosion and try to stop or control their actions.

Running water causes soil erosion

Heavy rains cause floods. Flooded rivers and running water remove the top soil. Running water washes the soil off the hill slopes. This makes the slopes unfit for cultivation. The Chambal Valley of Madhya Pradesh is one such example.

A river coming down the hill carries a lot of mud with it. Upon reaching the plains, the flow of the river slows down. It leaves part of the soil on its way. Over a period of time soil accumulates and makes the river change its course. You may have heard of the Yellow River in China, called Hwang Ho. It was known as the **Sorrow of China,** because it changed its course very often. This resulted in loss of life and property. In Bihar, River Kosi which changes its course frequently caused great havoc in 2008 when lakhs of people were affected.

Wind causes soil erosion

In desert and semi-desert regions where strong winds blow, a lot of top soil is carried away. This affects the farmers because manure too is blown away. Quite often the roots of plants lose their soil cover and the plants die.

Human beings also cause soil erosion

Roots of trees and plants hold the soil together. Felling of trees or deforestation is a major cause of soil erosion. When trees are cut down the soil becomes loose and is easily carried away.

Ploughing of hill slopes is yet another human factor that leads to soil erosion. Overgrazing by cattle also causes soil erosion.

DEFORESTATION (d-for-s-tay-shun) felling trees in large numbers

Fig. 6.4 Deforestation is a major cause of soil erosion.

Fig. 6.6 Cutting the slope into steps or terraces can reduce soil erosion.

Oral Questions

Choose the correct answer.

1. The soil / rock / sky is the uppermost layer of the earth.
2. River Kosi caused havoc in Bihar / Assam / Orissa in 2008.
3. Heavy rain causes deforestation / flood.

SOIL CONSERVATION

Nature took millions of years to form soil. It is our responsibility to preserve and protect it. The protection of soil against erosion is called **soil conservation**.

We cannot stop natural forces like wind and water from causing soil erosion. However, soil can be conserved by controlling the actions of these agents of erosion. This can be done in a number of ways.

On flat, open grounds

After harvesting and before raising the next crop, fields lie bare. This is when the wind blows off the top soil. To prevent the soil from getting blown away, farmers grow cover crops such as grass and creepers. The roots of plants of these cover crops hold the soil particles together and prevent them

Fig. 6.5 To prevent the soil from blowing off, farmers grow cover crops.

Fig. 6.7 To prevent floods, embankments are built along river banks.

SOIL CONSERVATION (con-zer-way-shun) prevention of loss of soil

from being blown away. Trees and bushes are grown along the boundary of the fields. They act as a shield against strong winds.

On hill slopes

Cutting the slope into steps or terraces can reduce soil erosion. Steps slow down the flow of water. As the water flow slows down, some soil from one step is left on the next step, reducing the amount of soil lost.

Afforestation or **growing trees** is another effective method of soil conservation on hill slopes.

On fields near rivers

During the monsoon many rivers overflow and flood the fields. To prevent floods, embankments along river banks are built. This holds the water between the banks and prevents soil erosion.

THINK GREEN!

Celebrate Earth Day every year on 22 April in your school. Discuss and suggest ways to save the earth and its resources. Follow the three Rs—Reduce, Reuse and Recycle—to protect the environment.

Let us say it again

- Soil is the foundation of all life on earth.
- The wearing down and carrying away of soil is called soil erosion. Erosion is caused by natural and human factors.
- The protection of soil against erosion is called soil conservation.
- Soil is conserved by growing cover crops in plains, making terraces on hills, and building embankments along river banks.

Let us answer

A. Tick (✓) the correct answer.

1. The wearing off or carrying away of soil by the action of water or wind is called
   a. storm. b. flood. c. soil erosion. d. deforestation.
2. This may lead to soil erosion.
   a. terrace farming b. growing of crops c. afforestation d. deforestation
3. Soil is mostly conserved by
   a. afforestation. b. deforestation. c. making dams. d. overgrazing.
4. The Hwang Ho river which changes its course every year is in
   a. Holland. b. China. c. India. d. Sri Lanka.

AFFORESTATION (a-for-s-tay-shun) the process of growing more trees by planting saplings
EMBANKMENT wall along a river bank

5. Afforestation is a term which means

a. felling of trees. b. overgrazing. c. growing trees. d. making dams.

B. Fill in the blanks.

1. Running water washes away soil off _____ (hill slopes / plains).
2. _____ (Artificial / Natural) forces like wind, rain and running water help in soil formation.
3. Plants and trees hold the soil together by their _____ (roots / stems).
4. At places where strong winds blow, _____ (manure / seeds) too is/are blown away along with top soil.

C. Match the columns.

1. loss of soil	a. afforestation
2. Sorrow of China	b. deforestation
3. cutting down trees	c. Hwang Ho
4. protection of soil	d. soil erosion
5. planting more trees	e. soil conservation

D. Write short answers.

1. What is meant by soil erosion?
2. What is soil conservation?
3. What is meant by afforestation?
4. When is 'Earth Day' celebrated every year?
5. What do the three Rs stand for?

E. Answer these questions.

1. Why do we say that soil is the foundation of life?
2. How was soil formed from rocks?
3. How does water act as an agent of soil erosion?
4. Why do some rivers change their course?
5. How is man responsible for soil erosion?
6. List three ways by which soil can be conserved.

HOTS question

F. Think and answer.

1. Ramu, the gardener, is trying to pull out weeds. However, he has to apply great force. Why do you think he has to apply so much force?

G. Some of the following activities encourage soil erosion (SE) and others encourage soil conservation (SC). Colour the box brown for SE and green for SC.

1. planting more trees ☐
2. overgrazing by cattle ☐
3. deforestation ☐
4. building embankments ☐
5. fencing fields ☐
6. planting grass in open areas ☐
7. floods ☐
8. terraced farming ☐
9. storms ☐
10. growing trees along field boundaries ☐

H. Stop soil erosion!

- Take two shallow trays filled with soil.
- One tray of soil must be without grass and the other with grass covering its surface.
- Keep both the trays slightly tilted. Water them regularly for three days.

Which tray has lost more soil? Why?

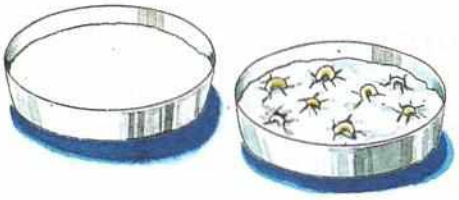
I. Can plants break up rocks?

Things required: a pot, some Plaster of Paris, water and about 12 peas, beans or corn seeds

Method:

- Soak the seeds in water for 4–8 hours.
- Mix the Plaster of Paris with water to make a thick paste in the pot.
- Plant the seeds quickly before the plaster hardens.
- Make sure that the seed is 1 cm below the surface of the plaster.
- Keep the pot in a warm place but in shade.

Observe the pot for a week. As the seeds germinate, see what happens to the 'plaster rock'.



J. Visit the hills.

TO VISIT

If possible your teacher will organize a trip to the hills to show you terraced farming. Visit rsgr.in/lsc-5 and click on LINK 1 to know more about terraced farming.

A life skill

K. Be a child conservationist!

Follow the three Rs to protect your environment.

Reduce: Reduce means consuming less, reducing our needs and buying only as much as we need.

Recycle: Send old and unwanted paper, glass bottles and plastic to a recycling centre if there is one in your town.

Reuse: Whenever possible, reuse old things in an imaginative and useful way.

Make use of old newspapers, magazines, greeting cards, empty tins, bottles and envelopes to make interesting articles. Here are some ideas for you.

1. Cover an old tin with colourful paper or fabric and make an attractive 'waste-paper basket' for your room.
2. Old envelopes and greeting cards may be used to make 'bookmarks'.
3. Fold old newspapers on both sides and paste with glue. Fold inside from the mouth of the bag. Punch holes and thread a colourful sturdy cord to carry your bag. You can decorate your bag and gift it to your mother.

Let us meet

Sundarlal Bahuguna: In 1973, villagers in the Garhwal Himalaya hugged trees to stop them from being cut down. This is known as the 'Chipko Movement'. Once, when trees were being felled in the Henwal Valley, Sunderlal Bahuguna with other villagers protested. Known as the 'Friend of Trees', Bahuguna pledged to devote himself to the protection of the Himalayan environment. He spread the message 'Save Trees to Save Mankind' by walking to many Himalayan villages. He along with others planted trees in the mountains. Sometimes he fasted to protest against the felling of trees.

TEACHER'S NOTES: A visit to a place where soil is eroded will be helpful to make children familiar with the process of soil erosion and realise its harmful effects. Make a model of terraced farming. Guide children to re-use things. Encourage them to use their own ideas, and enhance their imaginative skills.

7

Rocks and Minerals

AIMS

To enable the student to

- identify the different kinds of rocks
- understand the use of natural resources and its conservation

AIDS

- National Geographic films on different regions of the earth
- different kinds of rocks
- pictures of oil wells and coal mines

WHAT ARE ROCKS MADE OF?

Rocks are made of **minerals**. A mineral is a natural non-living substance. A rock may contain one or more minerals. The type of a rock depends on the quality, the quantity and the arrangement of minerals in it.

According to their formation, rocks are divided into three groups—**igneous**, **sedimentary** and **metamorphic**.

KINDS OF ROCKS

Igneous rocks

Igneous rocks form the base of all forms of land—plains, mountains and ocean beds. They are formed by the cooling and hardening of hot liquid rock material. The hot liquid rock that lies in huge underground pockets of the earth is called **magma**. The hot material is pushed upward by the pressure of other rocks.

Some of it cools and hardens below the surface of the earth while some flows out on the earth's surface and then hardens to form igneous rocks. The magma that reaches the surface of the earth is called **lava**.

The type of igneous rock formed depends

Fig. 7.1 Lava coming out of a volcano

Fig. 7.2 Igneous rocks form the base of all forms of land.

on the kind of mineral the magma contains and the size of the mineral particles.

GRANITE: Granite is the most common igneous rock on the earth's surface. The three main minerals in granite are quartz, feldspar and mica. The colour of granite, grey or pink, depends upon the content of its feldspar. This hard stone is used for making buildings, statues and streets.

PUMICE: Pumice is another light-coloured igneous rock. It has many holes and pockets which are formed by the gases trapped inside at the time of its formation. This light lava rock is light grey or cream-coloured. Dentists use powdered pumice for polishing our teeth.

OBSIDIAN: Obsidian is another lava rock. It looks almost like black glass. Because of its sharp edges it is used to make cutting tools.

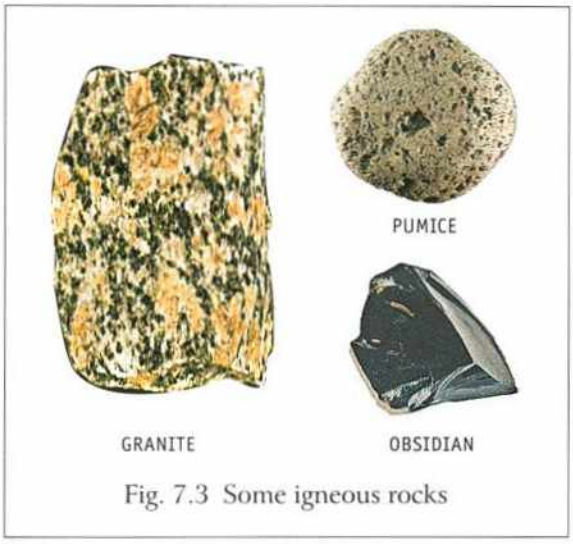


Fig. 7.3 Some igneous rocks


Fig. 7.4 Sedimentary rocks form a major portion of the earth's surface.

Sedimentary rocks

A major portion of the earth's land surface is covered with sedimentary rocks. These are formed from pebbles, sand, mud or clay that are deposited in oceans. These sediments are brought to the shore by flowing water or floating ice and are piled up in layers. The layers are cemented together by minerals. There are many kinds of sedimentary rocks. Certain kinds of sedimentary rocks are formed from the shells of tiny sea creatures. Others are formed from dissolved minerals that settle by the side of oceans.

IT'S A FACT!

There are more than 500 active volcanoes in the world. This excludes those under the sea. A few, like Stromboli, a volcanic island near Sicily, are active all the time. It has been in eruption for about 2000 years. But most volcanoes remain dormant (go off to sleep) for some years before they erupt again.

SANDSTONE: Sandstone is a common sedimentary rock. It is made from particles of sand that get cemented together. It mostly contains quartz grains. Sandstone may be yellow, brown, red or pink-coloured.

Fig. 7.5 Some sedimentary rocks

Fig. 7.6 A starfish fossil in sedimentary rock

The Red Fort in New Delhi is made of sandstone.

CONGLOMERATE: Conglomerate is a rock of uneven texture. It is formed from pebbles and gravel cemented together by minerals and sand and carried by water. Conglomerate is found mostly in shades of grey and orange. It is used as an ornamental rock and for polishing ornaments.

SHALE: Shale is made up of clay and mud particles that are piled up in layers. Because of its clay content it is used to make tiles and bricks.

LIMESTONE: Limestone is made up of a mineral called calcite, which was once a part of animal shells. It is mostly grey or white. Chalk is one form of limestone. Limestone is used for making bricks and glass, and for separating pure metals from their ores.

Scientists can find out about life on earth by studying sedimentary rocks, because the traces of ancient plant and animal life, called **fossils**, are found in them. These may be shells, bones of animals, prints of leaves or footprints.

Metamorphic rocks

Metamorphic rock is the result of the transformation of an existing rock, in a process called metamorphism, which means 'change in form'. Most metamorphic rocks were once either igneous or sedimentary. Tons and tons of pressure, which favours heat build-up, changed them to metamorphic rocks. In some rocks the minerals are broken into smaller ones, while in others the minerals are stretched into flat particles. There are many kinds of metamorphic rocks.

SLATE: Slate is a metamorphic rock made from shale. It breaks into thin layers. It is used to make slates and blackboards.

GNEISS: Gneiss is a metamorphic rock that is formed from granite. It has light and dark bands.

MARBLE: Marble is a widely used metamorphic

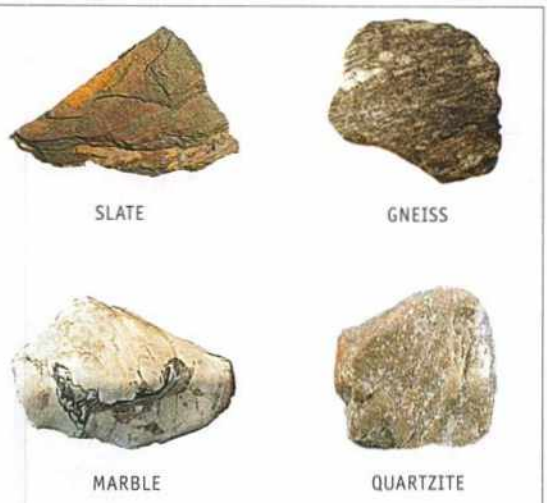


Fig. 7.7 Some metamorphic rocks

rock. It is found in different colours, white being the most common. Polished marble gleams so it is used to make statues and buildings.

QUARTZITE: Quartzite was once sandstone. Quartzite is too hard to be used as a building stone but it is used for making statues.

Oral Questions

Choose the correct answer.

1. The molten fluid that reaches the surface of the earth is called lava / petrol / marble.
2. Sandstone / Coal / Obsidian is a common sedimentary rock.
3. The Red Fort in New Delhi is made of sandstone / shale / limestone.
4. Limestone is made up of a mineral called calcite / zinc / iron.
5. Slate / Gneiss / Marble is a metamorphic rock made from shale.

MINERALS

Minerals are underground natural resources. Some minerals found in rocks are **metallic** and some are **non-metallic**.

Metallic minerals

Some useful metals can be profitably obtained from metallic minerals called **ores**, such as haematite, bauxite, pyrite and calamine. We get **iron**, **aluminium**, **copper** and **zinc** respectively from these ores. These metals are commonly used for making utensils, machines, furniture, wires, coins and coaches of trains and aeroplanes. Precious metals like **gold**, **silver** and **platinum** are used for making jewellery.

Non-metallic minerals

Coal and petroleum are valuable underground resources. They contribute greatly to our total energy supply.

COAL: Coal is one of the most valuable minerals stored in the earth. It has been used as a fuel for hundreds of years. Asia has more than one-third of the world's coal.

Millions of years ago land was low-lying, and covered with thick swampy forests. As plants died, they fell into the swamp and began to decay. New vegetation pressed the dead plants to the bottom. Due to extreme pressure the vegetable matter changed into peat, lignite and coal.

In India, coal mines are situated in Sohagpur (Madhya Pradesh), Dhanbad (Jharkhand), Raniganj (West Bengal), Neyveli (Tamil Nadu) and Singareni (Telangana).

Coal is used as a fuel

- for cooking,
- for heating homes and buildings,
- for producing electricity in power plants,
- in steam engines, and

Fig. 7.8 Some petroleum products

- in blast furnaces in the steel industry.

PETROLEUM: Half of the energy used in the world today comes from petroleum, a fossil fuel.

Petroleum or crude oil has several names like rock oil, fossil fuel, black gold and liquid sunlight. This fossil fuel is formed from the dead remains of ancient land and sea creatures. Millions of years ago the dead remains of these living things got buried in layers and gradually changed into oil and gas.

In India, petroleum is obtained from many places. Some of these are Ankleshwar in Gujarat, Digboi in Assam and Bombay High on the Mumbai coast.

The main use of petroleum is as fuel in different forms. It is also used for dry-cleaning. It is used for making lubricating oil, printing ink and medicines. Paraffin wax obtained from it is used to make candles, waterproof cartons and polish.

Oral Questions

Choose the correct answer.

1. Precious metals like gold, silver and aluminium / iron / platinum are used for making jewellery.
2. Silver / Coal / Gold is used as a fuel in blast furnaces in the steel industry.
3. Petroleum or crude oil is also called black gold / white gold / black diamond.

CONSERVE NATURAL RESOURCES

"The earth has enough for everybody's need but not enough for everybody's greed," said Mahatma Gandhi.

We must conserve natural resources.

- To save fuel at home we must keep our stoves and machines in good condition.

FOSSIL FUEL fuel like coal, oil and natural gas formed from the dead and decaying parts of animals or plants buried in the soil

- We should use coal and oil very carefully. We should also use inexhaustible sources of energy like the sun, wind and water.
- Mineral deposits in the earth are limited. They should not be used carelessly or wasted while mining.
- Animals and plants too are gifts of nature to human beings. Since they depend on each other for their survival, the balance between the two must not be disturbed.

Let us say it again 

- The earth is made up of rocks. Rocks are made of minerals.
- Rocks are of three kinds—igneous, sedimentary and metamorphic.
- Igneous rocks are formed by the cooling of magma. Sedimentary rocks are formed from sediments. Igneous or sedimentary rocks change into metamorphic rocks.
- Other useful underground resources are minerals, metals, coal and petroleum.
- Coal is formed from vegetable matter.
- Petroleum is formed from dead remains of land and sea creatures.
- We should conserve natural resources.

Let us answer 

A. Tick (✓) the correct answer.

1. The base of plains, mountains and ocean beds is
   a. metamorphic rocks. b. sedimentary rocks. c. igneous rocks. d. none of these
2. This is not a main mineral of granite.
   a. quartz b. calcite c. mica d. feldspar
3. The traces of ancient plants and animals found in rocks are called
   a. vessels. b. fossils. c. tonsils. d. none of these
4. This is formed from trees and other plants which died millions of years ago.
   a. sandstone b. coal c. granite d. slate
5. Which of the following is obtained from petroleum and is used for making candles and waterproof cartons?
   a. coal b. pumice c. marble d. paraffin wax

B. Write T for True or F for False.

1. Precious metals like gold and silver are used for making utensils. ____
2. Asia has more than one-third of the world's coal. ____

3. Fossil fuel and black gold are some other names of coal.
4. Dentists use powdered pumice for polishing our teeth.
5. Shale is used as an ornamental rock.

C. Write short answers.

1. What are rocks made up of?
2. What are minerals?
3. What is slate commonly used for?
4. Name two valuable underground resources.
5. Name any two places in India where coal mines are situated.

D. Answer these questions.

1. How are igneous rocks formed?
2. What are ores? Name any four common ores.
3. Why are coal and petroleum important to man?
4. Why is petroleum called a fossil fuel?
5. Write two uses of limestone.

HOTS questions

E. Think and answer.

1. Mrs Sinha wants to buy a ring for her daughter's wedding. Which rock would she like in the ring?
2. She has also bought some metal utensils for the house. Which metals do you think these utensils could be made of?

Let us do

ENRICHMENT ACTIVITIES

F. Make a forest in your classroom!

You will need a large metal tray, small pebbles, gravel, sand, soil, small plants, a spoon, a small plastic or plasticine animals. Put the gravel and the pebbles in the tray. Add a few inches of sand and soil in the tray. Sprinkle some water on it. Stir the soil till it is evenly moist. Push the plants into the soil. Place the animals. Your mini forest is ready!

G. Can you name them?

1. Fossils are found in between the layers of these rocks. _____
2. This rock is made from the remains of plants. _____
3. Pebbles and gravel are cemented together in this sedimentary rock. _____

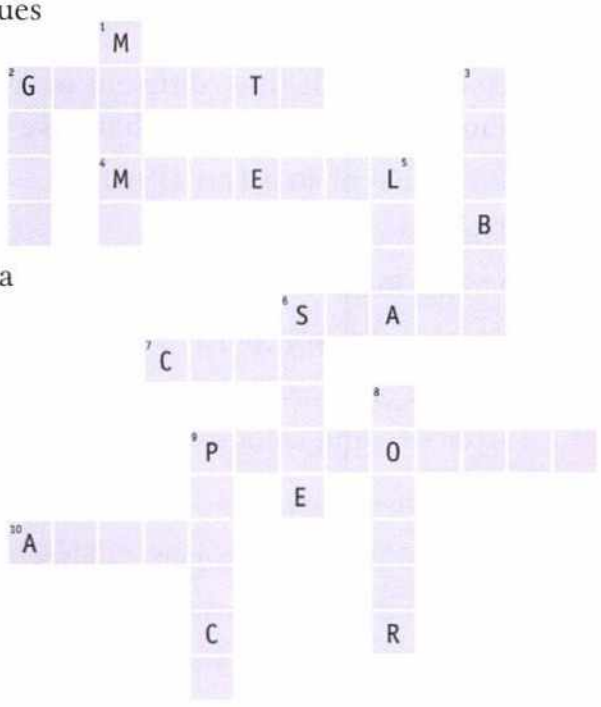
H. Read the clues and complete the crossword.

Across

2. Hard stone used for making buildings and statues
4. A natural non-living substance
6. A rock used for making tiles and bricks
7. Used as a fuel
9. Also known as fossil fuel
10. Oil wells have been found in this place in India

Down

1. Molten rock in underground pockets
2. A precious metal used in jewellery
3. Taj Mahal is made up of this rock
5. Magma that reaches the surface of earth
6. A rock used to make blackboards
8. A metal used in electrical wires and coins
9. An igneous rock used for polishing teeth



I. Visit any old monument or building.

TO VISIT

Visit any old monument or building in your town and find out about the material used to build it. Write your findings in your notebook.

A life skill

J. Save precious resources.

We must save 'cooking gas' that comes from petroleum. Check if these are being followed in your kitchen to save this fuel.

1. Is the pan covered with a lid during the cooking of food?
2. Is the cooking done in a pressure cooker? (It takes less time and hence saves fuel.)
3. Is the food cooked in just enough water?
4. Does your mother use a solar cooker sometimes?
5. Are cereals/pulses soaked before cooking?

TEACHER'S NOTES: Show the children samples of different rocks. Emphasize the importance of natural resources and the need to conserve them.

Check Your Understanding

Enrichment Activities

A. Class project

Find out about three different rock sculptures around the world. Collect information about the kinds of rocks that have been used in these sculptures.

- Taj Mahal or Red Fort (INDIA)
- The Petra (JORDAN)
- Mount Rushmore (USA)

You can visit **rsgr.in/lsc-5** and click on LINK 2, LINK 3 and LINK 4 for more information.

Make a chart using the information. Paste photographs and/or draw to make your chart attractive and colourful.

B. Make use of waste.

Make a 'pouch' with paper plates.

- Paint and decorate two paper plates and allow them to dry.
- Cut one plate (as shown) and add a fringe with crepe paper.

  Cut out flowers from an old greeting card and glue them on to the plate.
- Staple the two plates from the sides or glue them together.
- Decorate the plates with crayons, glitter, sequins or beads. Attach a long ribbon to form the string of your 'pouched bag'.

C. It is crystal clear.

Things required: salt and a cup of hot water

Method: You can easily make crystals of salt.

- Stir some salt into a cup of hot water till it gets dissolved.
- Go on adding more salt, a little at a time, till no more can dissolve in it.
- Place a string with one end in the salty water. Leave it for some time to cool. As it dries, salt crystals start forming on the string.

  Many minerals are found in such bright and clear crystal form that they can be used in jewellery and are called gemstones. Diamonds, rubies and emeralds are some gemstones.

Half-Yearly Test Paper

(based on Lessons 1 to 7)

A. Tick (✓) the correct answer.

1. Seeds of this are light and have hair so that they can be easily carried by the wind.
   a. mango b. pea c. coconut d. cotton
2. Fresh fruits and vegetables are good sources of
   a. fats. b. proteins. c. vitamins. d. carbohydrates.
3. A splint may be used to give support to a broken
   a. cup. b. bone. c. nail. d. bat.
4. In places where the climate is hot, thick walls keep the inside of the house
   a. warm. b. cool. c. hot. d. moist.
5. It is the most common igneous rock on the earth's surface.
   a. sandstone b. marble c. granite d. coal

B. Write T for True or F for False.

1. Gases like oxygen, ammonia and carbon dioxide can dissolve in water. ____
2. Goitre is caused by deficiency of iron in food. ____
3. Sprains cause swelling and sometimes discolouration of the skin. ____
4. Sedimentary rocks are formed from pebbles, sand, mud or clay. ____
5. As it nears the plains, the flow of a river becomes fast. ____

C. Match the columns.

1. Correct postures improve the flexibility of our	a. matter.
2. Mattresses, linen and clothes should be exposed to	b. electrocution.
3. Anything that occupies space and has weight is	c. sunlight.
4. As a result of soil erosion, the land loses its	d. joints.
5. Throwing water on an electric fire can cause	e. fertility.

D. Answer these questions.

1. All new plants do not grow from seed. Certain new plants grow from other parts of the parent plant. Give any two examples.
2. Proper rest helps our body. How?
3. How would you help someone with a sprain?
4. What is the difference between miscible and immiscible liquids?
5. How can one conserve soil?

SAVE THE EARTH

Nature's Song

Wild Flowers

Wild flowers grow best in out of the way places,
in cool shady covers beneath rocks,
near hidden springs. It will be a bleak sort
of world, if wild flowers are no longer able
to grow free on our earth.
I will protect the flowers, Lord.
I will pause in my walk and step aside
rather than crush a daisy in the grass.

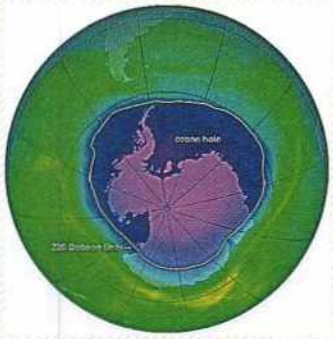
RUSKIN BOND

Nature Notes

- Plastic is not biodegradable as it does not rot and mix with the earth. Use paper bags for shopping or reuse plastic bags.
- Save water! Turn the tap off while you brush your teeth or wash your hands and face. Turn it on only to rinse.
- Reduce air pollution. Do not burn leaves that fall from trees. They rot naturally and mix with the soil to make it fertile. So spread them on flower-beds.
- Take only as much food as you can eat so that you do not have to throw away any. Eat everything on your plate.
- When you go on a picnic, make sure that you carry the rubbish home or throw it in a dustbin.
- Save paper! For doing rough work, use a slate and chalk.
- The next time it rains, collect some rainwater in a bucket. Use it to wash your cycle, car or to water plants.

Nature Cure

- Treat a burn by dipping the burnt part of the body quickly in cold water. Spread some honey over the burn. No blisters will form. Gently rubbing the hurt part with a potato slice or wheat flour dough also helps.
- For bruises or cuts, clean the hurt part carefully. Spread honey over the wound. It is cooling and a natural antiseptic.
- Do you have a sore throat? Chew a piece of ginger with a little salt.
- Have some special tea to cure a cold. Drop a few peppercorns, 1 black cardamom, a small piece of cinnamon, a clove, a little salt and some jaggery in a pan of water. Boil it well. Sip it while it is hot.



Ozone Hole The ozone layer in the earth's atmosphere acts like a protective umbrella. It blocks the harmful rays of the sun and protects living things on the earth. But in the 1980s, scientists found a hole in this protective layer, the cause of which is known to be the CFC Monster. These are man-made gases formed from using fridges, ACs and aerosol cans. They eat away the ozone layer. The harmful rays that reach the earth through this hole are called UV rays. These rays cause skin cancer, eye problems, damage to the body's immune system and decrease photosynthesis in plants.

Acid Rain Burning of fossil fuels in factories, power plants and motor vehicles produces harmful gases like sulphur dioxide and nitrogen dioxide. Up in the sky, these harmful gases become a part of rainwater in the clouds and form acid. When it rains, the acid rain poisons the earth's environment. It sinks into the soil causing trees and plants to wither and die. It erodes buildings and kills fishes in lakes and rivers.

This beautiful monument at Agra is a victim of acid rain. Its white marble is turning black. Name it.

Nature's Friend

One day, Gaura Devi was picking firewood in a forest. Suddenly she spotted men creeping in with saws and axes to cut down trees. She ran back to her village Reni in Garhwal Himalaya and gathered a group of 21 women and 7 little girls. There were no men in the village to help them. So, the woman brigade rushed to stop the woodcutters from felling the trees. The brave women blocked the path leading to the forest.

No amount of threats from the woodcutters could scare them away. They finally left without touching a single tree. Gaura Devi was awarded the title of **Vrikshamitra** (Friend of Trees) by the Government of India for her courage and contribution to protection of the environment.

Rainforests are very special as they get a great deal of rain and are very wet and warm. These are the habitat of a large variety of amazing animals, birds and insects which find food, space to live, air, water and shelter here. Some valuable plants which give us food as well as medicines and several other things, grow here. These forests give us a lot of life-giving oxygen, clean the air and create rain. Today the rainforests of the earth are in danger as people are cutting and burning them down at a very fast rate. The animals living in them are dying too. Rain forests are unique and precious for survival of life on the earth. We must protect our earth's natural green cover.

Rainwater Harvesting

Rainwater harvesting is a simple and economical way of preserving every drop of water that falls on the earth. Rainwater can be collected directly and recharged into the ground.

Rainwater harvesting

- raises the water level in wells and borewells that are drying up.
- improves the quality of groundwater and reduces soil erosion.
- is an ideal solution to water shortage problems.
- also helps to prevent flooded roads and choked drains.

Rainwater can be harvested in two ways:

- Collecting rainwater directly for domestic use like watering plants.
- Recharging rainwater into the ground to improve groundwater storage.

By using the domestic waste water from the kitchen and bathrooms for gardening, the groundwater may be increased. To meet an increasing demand of water in urban areas, to improve the quality of groundwater and its storage, rainwater harvesting is required.

Bio Gas This source of energy is made from cattle dung, human wastes and waste vegetable matter, all of which are biodegradable. These are treated in a special way to produce a clean, non-smelly gas which is used for cooking. See, even waste has power!

Compost Pit Composting is nature's way of recycling. Most natural things are biodegradable as they rot and break down one-time under the action of weather, air, water, insects, worms and tiny microbes. They mix with the soil and make it fertile. We all can make use of this and recycle our kitchen waste by composting it in a special pit. Make one such pit in your neighbourhood or garden with the help of adults.

Dig a pit about 0.5 metre wide, 1 metre deep and as long as you can make it. Line it with straw or dried leaves and grass clippings. Dump kitchen waste like used tea-leaves, over-ripe fruits and vegetables, peels, spoilt food and eggshells in it. Cover with dried leaves and soil. Water once or twice a week to keep it wet. Turn this mixture over every 15 days to aerate it. In about 3 to 4 months, the compost will be ready for use in the garden or for potted plants.

Garbage Besides harming our health, the rubbish we throw around causes environmental pollution. The part of it that does not rot away naturally is non-biodegradable. This remains in our environment and continues to pollute it. Plastic does not rot away naturally but wastes like fruit and vegetable peels, leftover food and paper do. We must find ways of producing less garbage.

Let's Do This: Take three cardboard boxes and mark them as Box 1, Box 2 and Box 3. Throw garbage into these boxes.

Box 1. For vegetable matter

- Use these for composting. (You now know how to do it.)

Box 2. For sharp and dangerous things

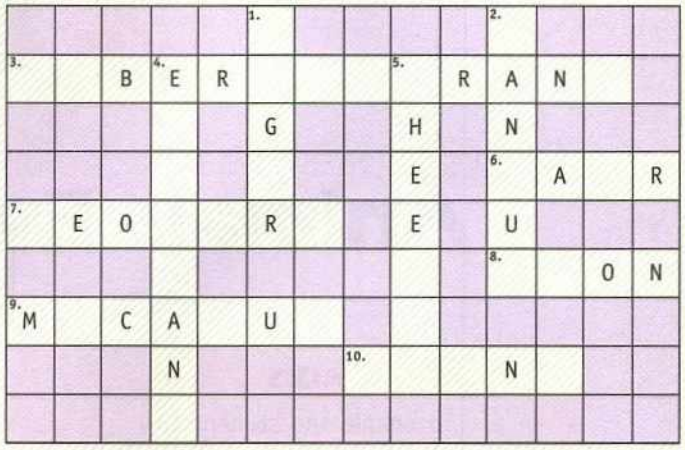
- Can you think of ways of disposing them safely?

Box 3. For non-biodegradable things

- See if you can reuse these things.

Nature Quiz

An animal or a plant that is in danger of dying out and disappearing from the earth, is said to be endangered. If it dies out totally, it is said to be extinct. This happens because people destroy their natural homes by cutting down forests or by killing them for selfish reasons. Solve this crossword puzzle and discover some endangered and some extinct animals of the world.



Across

3. Graceful migratory bird that used to visit India every winter season. (8,5)
6. Another name for the Indian bison. (4)
7. Quick reacting mammal, smaller than a lion or a tiger. (7)
8. The lord of the jungle today has its only natural home in Asia in the Gir forests. (4)
9. The lion-tailed monkey is also known as . . . (7)
10. Its horn is wrongly thought to have powers of bringing down fever. (5)

Down

1. Large striped cat hunted for its body parts which are wrongly thought to have medicinal value. (5)
2. A red deer which has its natural home in Asia. (6)
4. The largest land mammal hunted for its ivory tusk. (8)
5. Fastest land animal, now going to be extinct. (7)

Nature's Nook

HORNBILL

Located in the Vindhya hills of Madhya Pradesh is the Bandhavgarh National Park. It's a natural protected home for tigers. But wildlife lovers can also see other animals like chinkara, nilgai, chausingha, wild boar, jackal, fox and gaur.

Some rare birds such as the white-bellied drongo, paradise fly-catcher, parakeet and hornbill can also be spotted.

SOS*

GREAT INDIAN BUSTARD

The Great Indian Bustard is a heavy ground bird, almost the size of a young ostrich. Its feathers form a pattern of black bars and dots. The head looks like a crown and the neck is snow white. Hunting and disturbing its natural home has made this bird almost extinct. Once this bird was found in almost all parts of the country. Now it is found only in the desert areas of Rajasthan and Gujarat and in Maharashtra.

8

Animals Everywhere

AIMS

To enable the student to

- study the different ways in which animals breathe
- study the feeding habits of animals
- relate the types of limbs to the types of movement in animals
- appreciate the amazing phenomenon of migration

AIDS

- slides or films on animal behaviour
- pictures or charts showing claws and beaks of birds and the teeth of herbivores and carnivores
- pictures or charts showing movements such as walking, running, hopping, swimming and flying

Look carefully at the pictures of the animals below. Can you guess why they are grouped in four separate columns? Discuss with your partner. We see animals on land, on trees, in water and in air. The natural home or surroundings of an animal where it lives, eats, grows and has babies is called its **habitat.** The large animal kingdom consists of different types of animals. They have different habits, behaviour and body features. It is very interesting to study the habits and features of different animals.

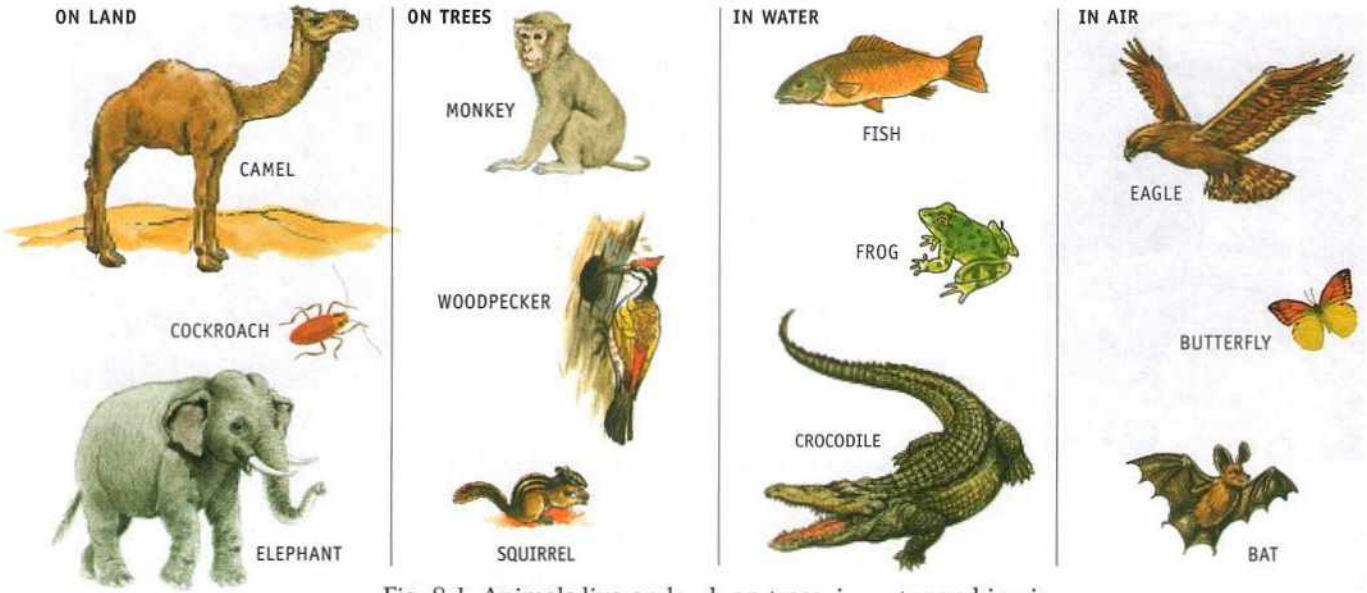


Fig. 8.1 Animals live on land, on trees, in water and in air.

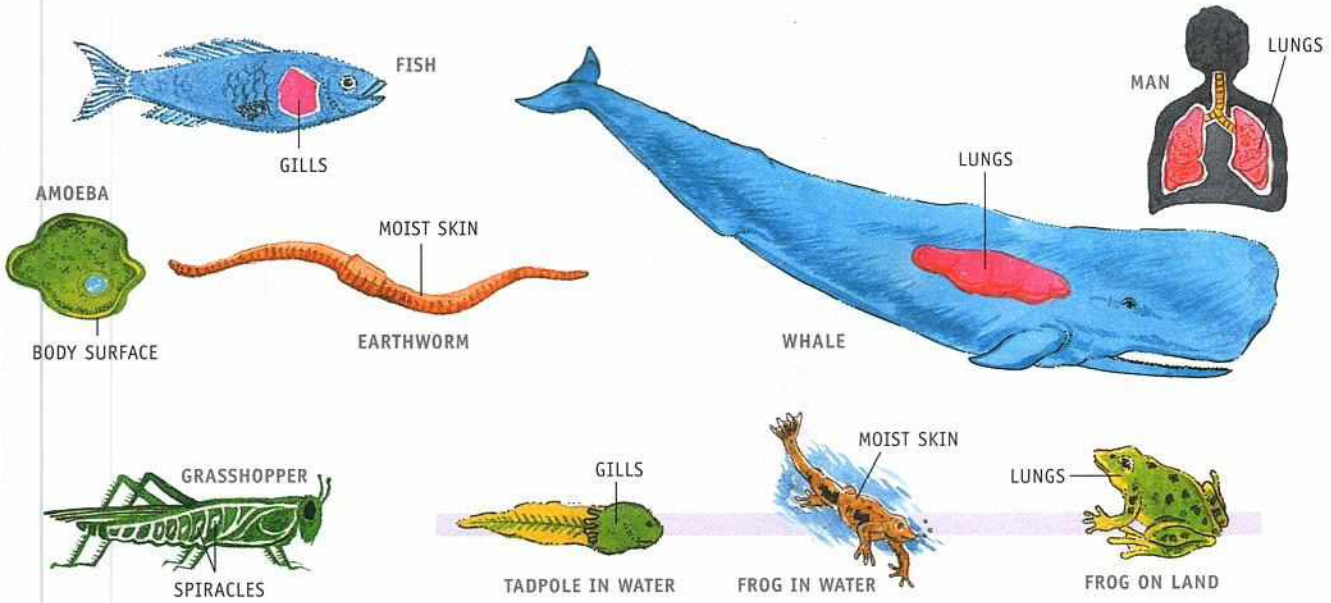


Fig. 8.2 Different animals have different organs for breathing.

BREATHING IN ANIMALS

Animals need to breathe to get oxygen. Oxygen burns the food within their bodies and releases energy for various activities. Animals get their supply of oxygen from their surroundings. Land animals breathe in oxygen from the air while fishes and other aquatic animals take oxygen from water.

Organs of breathing

Microbes or microscopic animals, like amoeba and paramecium, breathe through their body surface. Insects breathe through air holes on their bodies. These holes are called **spiracles**. The blood of insects does not contain the oxygen carrier called **haemoglobin**. This is why their blood is not red in colour. How is oxygen then carried to the various parts of an insect's body? The spiracles lead to air tubes which form a fine network that reaches every tissue of the body. Air enters the body through this network. The body tissues absorb oxygen and give out carbon dioxide which is expelled from the body.

A fish breathes through its **gills**. So do prawns, crabs, oysters and tadpoles. Gills are special organs that are richly supplied with blood vessels. When water flows over the gills an exchange of gases takes place. The gills absorb oxygen from the water and release carbon dioxide from the blood.

A frog is an amphibian. A baby frog or a tadpole breathes through its **gills**. An adult frog breathes through its **lungs** on land and through its moist skin in water.

Birds, reptiles and mammals breathe with the help of **lungs**.

Man is a mammal. We take in air through the nose. This air enters the lungs through the windpipe. The lungs are richly supplied with blood vessels. When the air reaches the lungs an exchange of gases takes place between the air and the blood. Oxygen from the air passes into the blood and carbon

HAEMOGLOBIN (he-mo-glow-bin) a substance in blood that gives it the red colour and carries oxygen

Fig. 8.3 Beaks of some birds

Fig. 8.4 Animals that gnaw or nibble

Fig. 8.5 Herbivorous animals

Fig. 8.6 Carnivorous animals

Fig. 8.7 Birds of prey

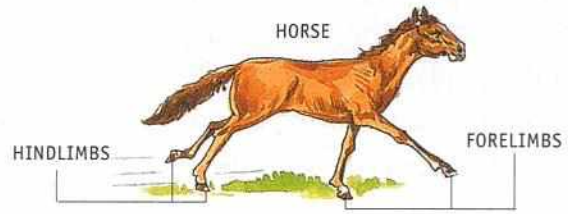


Fig. 8.8 Most mammals have four limbs.

Fig. 8.9 Fins of a fish

Fig. 8.10 Animals that swim

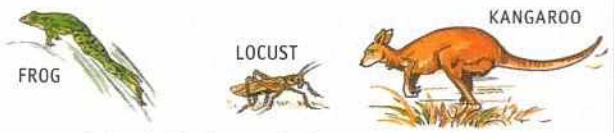


Fig. 8.11 Animals that jump or hop

dioxide from the blood passes into the air. Then the lungs contract and the air containing carbon dioxide comes out through the nose. Whales and dolphins are also mammals. Therefore, they are lung breathers even though they live in water.

Oral Questions

Choose the correct answer.

1. Amoeba / Whale / Dolphin breathes through its body surface.
2. A baby frog or a tadpole breathes through air tubes / body surfaces / gills.
3. Birds / Crabs / Prawns breathe through lungs.

FEEDING HABITS IN ANIMALS

Animals need food to grow, to get energy and to stay healthy. Different animals eat different types of food. Their feeding habits depend on the type of food they eat. Their mouth parts are suited to the type of food they eat.

Organs of feeding

You learned in Class 3 that the beaks and claws of **birds** are modified according to the kind of food they eat.

Rodents like rabbits, mice and squirrels have small and sharp front teeth. They gnaw seeds and fruits.

Herbivores like cows, goats and giraffes have **sharp** front teeth for biting and strong **broad** teeth for chewing. They eat green plants.

Carnivores like the lion, tiger and cat have very **sharp**, **pointed** and **curved** front teeth for tearing flesh. They also have strong **grinding** teeth to chew the flesh and the bones. They feed on the flesh of other animals. Flesh-eating birds like eagles, kites

RODENTS (ro-dents) animals that gnaw or nibble at their food

and vultures have strong, sharp and hooked beaks and claws to catch their prey and to tear flesh.

MOVEMENT IN ANIMALS

Animals need to move in order to **search for food, protect themselves and their babies from being hunted,** and **build resting and breeding places.**

Animals have different types of body parts or limbs for movement and different ways of moving from one place to another.

Land animals

Most mammals have four limbs. The two at the front are called **forelimbs** and the two at the back are called **hindlimbs.** Some animals use all the four limbs to move while others use only the hind pair. Can you name the most famous animal which walks on two legs?

Water animals

Fish have **fins** for swimming. The two paired fins are used to move forward. The unpaired fin maintains balance and the tail fin helps to change the direction of movement.

Turtles have four **paddle-like limbs** to push water back and to swim. Penguins use their two forelimbs as flippers to push water and to swim. Frogs have **webbed feet** to swim. But when on land, they jump with the help of their long hindlegs.

Insects

These six-legged creatures usually use their legs for movement. Insects like ants and cockroaches crawl on their legs.

A grasshopper uses its long hindlegs for

Fig. 8.12 Most birds use their wings to fly.


Fig. 8.13 Birds use their legs for many activities.

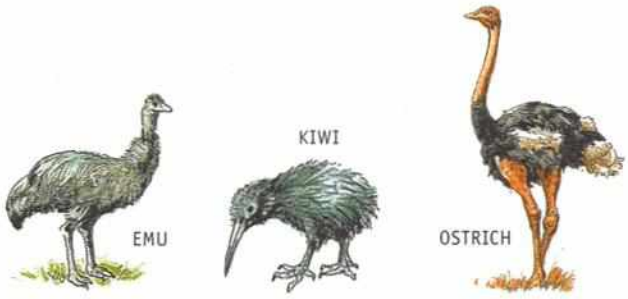


Fig. 8.14 Some birds do not fly.

Fig. 8.15 All insects have six legs.

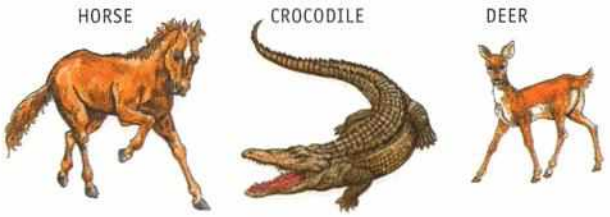


Fig. 8.16 Animals use their legs for moving.

Fig. 8.17 Man is the most developed among all animals.

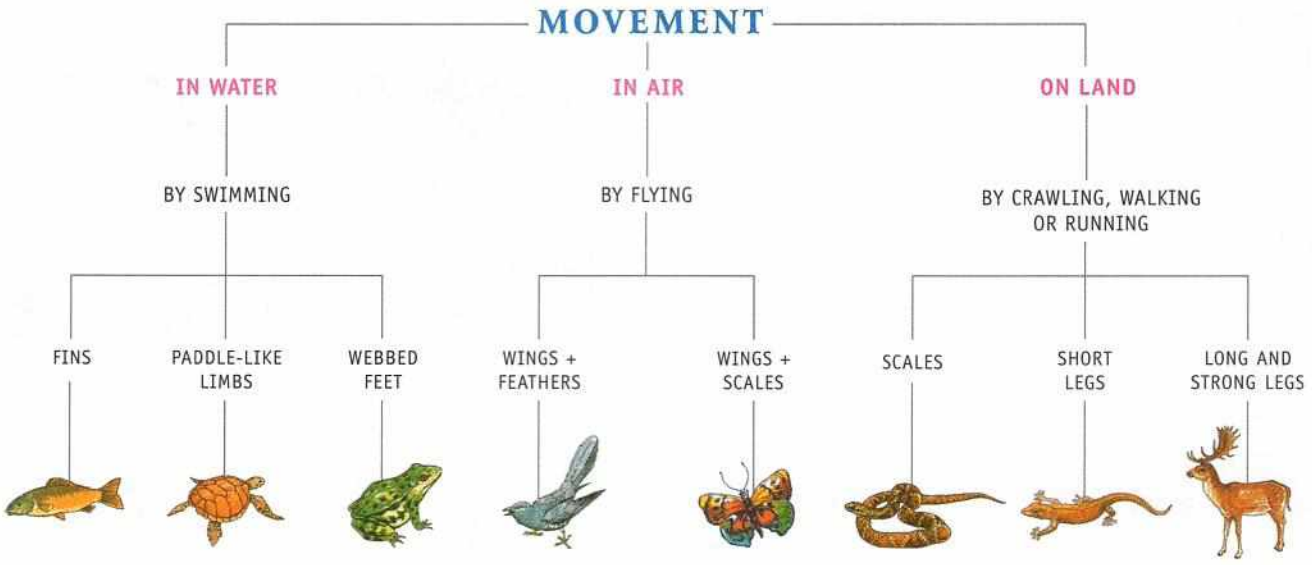


Fig. 8.18 Animals have different ways and different body parts for movement.

hopping. Water insects like water boatmen use their legs as oars for swimming.

Some insects have one or two pairs of wings and can fly. The wings of insects are different from those of birds. They have no feathers or bones or strong muscles. Their wings are made of tiny coloured scales. They move with the help of their chest muscles. Insects such as lice and bedbugs do not have wings. They cannot fly. They move by crawling.

Birds

The forelimbs of a bird are in the form of wings which help it to fly. The wings have feathers. The wings are attached to the breastbone of the bird with the help of strong muscles. These muscles enable the bird to flap its wings and to fly. When a bird lands after a flight, it uses its hindlimbs. It also uses them to walk, run, hop and perch. The hindlimbs are also used to scratch the ground, catch prey and attack enemies. Though all birds have wings, some are unable to fly because their wings are too weak for flying. The emu, the ostrich, the rhea, the penguin and the kiwi are flightless birds (Fig. 8.14).

Activity 1 Ask your parents or teacher to take you to a zoo. Write the names of different animals you see there and group them according to their movements like flying, running, swimming and crawling.

Reptiles

Lizards, crocodiles, turtles and tortoises are reptiles. They have a dry scaly skin and lay soft-shelled eggs on land. Though they have limbs, they crawl. Snakes are reptiles. They do not have legs. They have **scales** or **plates** on the underside of their bodies. These plates are attached to their ribs. When snakes move, these plates act like feet and the ribs act like legs. Besides plates they have strong muscles and a flexible backbone which helps them to move forward.

Humans

Compared to the limbs of animals, the limbs of human beings are highly developed. They use only one pair of limbs (lower limbs) to support their body while walking and standing. This is why, unlike other animals, humans have an erect posture. They stand, walk and run with only one pair of limbs called **legs**. This is an advantage. For example, when in danger, they can use their **legs** to run and escape, and their arms or upper limbs for defence or attack.

Our hands are adapted to hold objects. The arrangement of the thumb opposite the fingers enables us to hold tools and do many kinds of work. So, we can say that humans are the most developed among all animals (Fig. 8.17).

Oral Questions

Choose the correct answer.

1. Most mammals have two limbs / four limbs / six limbs.
2. Turtles / Penguins / Frogs use four paddle-like limbs to push water back and to swim.
3. The emu / crow / Arctic tern is a flightless bird.

MIGRATION AMONG ANIMALS

Some animals move great distances at certain times of the year. This mass movement of animals from one place to another is known as **migration**. Animals migrate to escape harsh weather, to search for food and to reach their breeding grounds. Some birds like storks, Siberian cranes and mallard ducks from other countries visit India every winter.

Migratory fishes like eels spend their life in rivers. They travel from the river to the sea to lay eggs. When the eggs hatch, the parent eels die and the young ones travel back to the river from where the parents had started their journey.

Locusts are harmful migratory insects. Swarms of locusts settle on standing crops and destroy them. Many kinds of butterflies also migrate. The monarch butterflies fly from Canada to Mexico.

Migration is most common in birds. The Arctic tern travels a distance of nearly 35,000 km between the Arctic and the Antarctic twice a year. The European stork travels from Europe to Africa every winter. When spring comes, it returns to Europe to

Fig. 8.19 Some migratory birds

Fig. 8.20 Birds migrate to escape harsh weather, to search for food, and to reach their breeding grounds.

the same nest. The Siberian cranes nest in Western Siberia and migrate to India. Their migration route stretches to about 6450 km. It is a great mystery how migrating animals decide where to go and in which direction to fly. Some animals take the help of sea currents. The reindeer find their direction with the help of the sun's rays. Birds follow the coastline.

Scientists use various old and new methods to study migration. Rings and tiny transmitters are fixed on animals to track their movement patterns. We should look after our feathered friends and protect them from any harm.

IT'S A FACT!

- Birds like the purple moorhen and the pelican are local migratory birds of India.
- Some animals make long journeys quickly. Sea turtles can swim all day as fast as an athlete runs!

Let us say it again

- The natural home or surroundings of an animal where it lives, eats, grows and has babies is called its habitat.
- Different animals have different breathing organs like lungs, gills and spiracles.
- Feeding organs like beaks, teeth and mouth parts of animals are modified according to the kind of food they eat.

- Limbs in the form of fins, paddles, wings or legs help animals to move.
- Migration means mass movement by certain animals at certain times of the year.

Let us answer

A. Tick (✓) the correct answer.

1. A frog is an amphibian because it can live
   a. only on land.
   b. only in water.
   c. on land and in water.
   d. none of these
2. Whales and dolphins are classified as
   a. fishes.
   b. reptiles.
   c. mammals.
   d. amphibians.
3. This animal has scales on its body.
   a. fish
   b. deer
   c. zebra
   d. ostrich
4. This bird cannot fly.
   a. owl
   b. duck
   c. Arctic tern
   d. ostrich
5. Locusts are harmful migratory
   a. birds.
   b. rodents.
   c. fish.
   d. insects.
6. The water boatman uses its legs as
   a. antennae.
   b. radars.
   c. fans.
   d. oars.

B. Change the underlined words to make correct statements. Rewrite the correct statements in your notebook.

1. Animals get their supply of oxygen from food.
2. The blood of an insect does not contain the carbon dioxide carrier called haemoglobin.
3. The mass movement of animals from one place to another is known as hibernation.
4. Gills are special organs with which all mammals breathe.
5. Mammals like ants and cockroaches crawl on their legs.

C. Write short answers.

1. Why do animals need to take in oxygen?
2. Why do animals need to move?
3. What is the difference in the way a tadpole and a frog breathe?
4. What are the characteristic features of teeth in herbivores?
5. Why do some animals migrate?

THE MONARCH BUTTERFLY

D. Answer these questions.

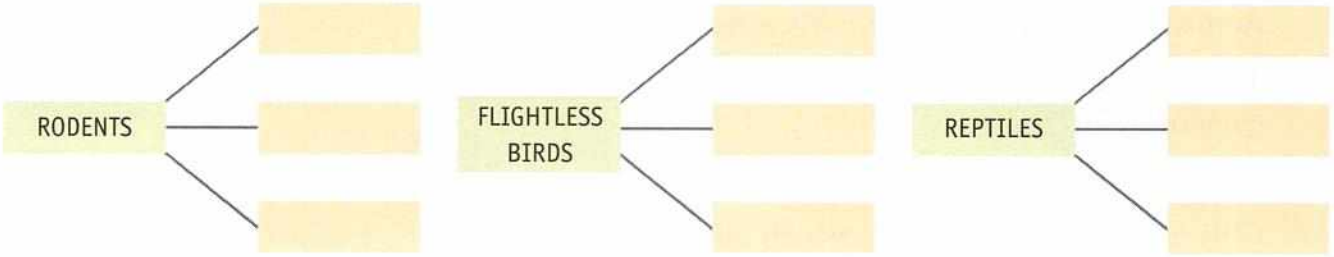
1. Name a few animals found around you. Write one characteristic feature of each animal.
2. How is the breathing process of an insect different from that of a fish?
3. What special features help water animals to move?
4. How do insects move?
5. Snakes are reptiles without any legs. How do they move?

E. Write in the correct columns the names of the animals given in the box.

camel pigeon monkey fish crocodile elephant crow bat grasshopper man tadpole butterfly snake whale amoeba prawn woodpecker paramecium

LUNGS	GILLS	SPIRACLES	BODY SURFACES

F. Fill in the names in the boxes.



HOTS questions

G. Think and answer.

1. Which of these is really a fish? (silverfish / starfish / jellyfish)
2. What is the difference between an owl and an ostrich?
3. A bat and a bird can fly, yet they are different from each other. How?
4. A dolphin lives in water whereas a monkey lives on land. Yet they are similar to each other in at least one respect. What is it?

Let us do

H. Class project

Divide the class into four teams.

TEAM 1: Find information on five migratory birds.

TEAM 2: Find information on five migratory mammals.

TEAM 3: Gather information on why animals migrate, the most popular routes they take and the instincts they follow while migrating.

TEAM 4: Find out five interesting facts on migration, and migratory birds and animals.

Now put all your information together and make a class display.

Visit rsgr.in/lsc-5 and click on LINK 5 to know about the migration of birds.

I. Visit a national park, a wildlife sanctuary or a bird sanctuary.

TO VISIT

In our country there are many national parks, wildlife sanctuaries and bird sanctuaries where animals live without fear of being hunted by man. Visit one of these if it is near your town. Watch animals in their natural environment.

Look at the map of India shown alongside and name the following.

1. One bird sanctuary situated in
   - ❖ Haryana _____
   - ❖ Karnataka _____
2. One National Park situated in
   - ❖ Uttarakhand _____
   - ❖ Assam _____
3. One wildlife sanctuary situated in
   - ❖ Telangana _____
   - ❖ Kerala _____

J. Some animals have interesting feeding habits. Complete the table about the food, feeding organs and feeding habits of these animals.

ANIMAL	FOOD	FEEDING ORGANS	FEEDING HABITS
			
			
			
			
			

K. Find the meaning of the word 'ornithologist' from your dictionary.

Visit rsgr.in/lsc-5 and click on LINK 6 to know about different varieties of birds in India.

Let us meet

Salim Ali is a famous ornithologist of our times. He spent his whole life studying birds. He travelled, watched birds, and wrote down his observations. He collected a lot of new information on drongo birds and water birds. *The Book of Indian Birds* is an interesting work by Salim Ali.

Valmik Thapar is a well-known tiger expert. His efforts to protect the tiger are commendable. He is the executive director of Ranthambore Foundation and author of many books on tigers including, 'The Tiger's Destiny' and 'The Secret Life of Tigers'. He is also the presenter of the BBC television series 'Land of the Tiger'.

TEACHER'S NOTES: Explain with the help of diagrams the different ways of breathing in different animals. The movement and feeding habits of some animals can be explained through video films. Migration may be explained with pictures.

9

Our Skeletal System

AIMS

To enable the student to

- understand that our body is a wonderful machine
- recognize the different kinds of bones and joints and learn about their functions
- realize the importance of well-developed muscles

AIDS

- CDs on the human skeleton, organ systems and the working of the muscles
- plastic model of the human skeleton
- charts and posters showing different kinds of bones and joints in the body
- posters showing the working of muscles in the human body

Think of the things a computer can do. Now think of all the things you can do. Isn't your list much longer? Our body is more efficient than any man-made machine. Now think of all the functions that your body performs, and so many of them at the same time. How do we hear? How do we see? How does our heart beat? How is our food digested? How do we remember things? Let us understand how our body works.

Fig. 9.1 The human body is a good machine.

ORGAN SYSTEM

Our body is made up of many parts, each of which performs special functions. The lungs, the heart, the kidneys and the brain are some of the major **organs** of our body. These organs have to work like a team in order to keep the body fit. The teamwork of our bones and muscles is amazing. Working together, they make our body an efficient machine.

A group of organs together make up an **organ system**. For example, the digestive system helps in the digestion of food and the muscular system keeps our muscles strong and gives us strength. The nervous

Fig. 9.2 The skull

Fig. 9.3 The facial bones

Fig. 9.4 The backbone

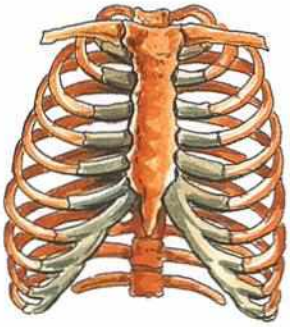


Fig. 9.5 The rib cage

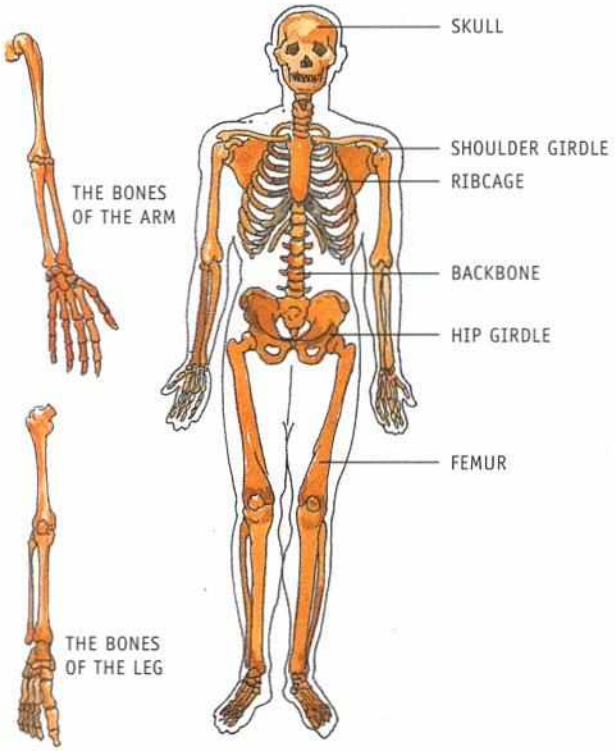


Fig. 9.6 The human skeleton

system controls the working of the internal organs, our movements and even our thoughts and emotions. The circulatory, the respiratory and the reproductive systems perform their own special functions.

THE SKELETON

The human skeleton is a framework of bones. This framework of bones encloses and protects all the internal organs and gives support, strength and shape to the body. An adult human has 206 bones of different sizes and shapes in his body.

The human skeleton consists of the skull, the backbone, the rib cage and two pairs of limbs—the forelimbs or arms and the hindlimbs or legs. These limbs are attached to two pairs of girdles—shoulder girdle and hip girdle respectively.

The skull

The skull is made up of 22 bones. Eight flat bones, interlocked together, enclose the delicate brain inside it. There are 14 bones in the facial region and among them only the lower jaw is movable. It enables us to eat and talk.

The backbone or spine

The skull is attached to the backbone, which forms the main axis of the skeleton. It is made up of 33 small bones, called vertebrae, which form a strong column called the **vertebral column**. The vertebral column protects the delicate spinal cord.

The rib cage

There are 12 pairs of bow-shaped ribs which

VERTEBRA (ver-tib-ra) each small bone of the vertebral column

IT'S A FACT!

Bones are not the hardest substance in our body. The enamel coating on our teeth is harder than bones. However, bones can be repaired if broken but enamel cannot.

form a cage and enclose the heart and the lungs. The ribs are delicate, curved bones which are joined to the backbone and the breastbone. The lowest two pairs, called **floating ribs**, are joined only to the backbone.

The limbs

The forelimbs or the arms are joined to the spine with the help of the shoulder girdles, consisting of a pair of shoulder blades and a pair of collarbones.

The powerful thigh bone, called **femur**, bears the weight of the whole body. It is the longest bone in our body. The femur fits into the hip girdle with a ball-and-socket joint and is connected to the lower leg at the knee joint. The long bones of the skeleton are hollow and are filled with a soft, fatty substance called **bone marrow**.

Functions of the skeleton

The bones of the skeleton give shape, strength and support to our body. They also protect our internal organs. The skull covers the delicate brain. The eyeballs rest inside the bony eye sockets. The backbone protects the spinal cord and the rib cage protects the lungs and the heart. The urinary bladder lies inside the hip girdles. Muscles are attached to bones and make

Fig. 9.7 Muscles along with bones help in the movement of our body.

movement possible. White blood cells and red blood cells are produced by the bone marrow in hollow bones. White blood cells fight foreign organisms that invade our body.

Oral Questions

Choose the correct answer.

1. A group of organs together make up an organ system / a tissue / a cell.
2. The skull is made up of 20 / 22 / 23 bones.
3. The backbone is made up of 33 small bones called bone marrows / ribs/ vertebrae.

JOINTS

A joint is the meeting point of two bones held together by strong tissues called **ligaments**. There are several joints in our body.

All the joints except those in the skull are movable. The bones in the skull are interlocked, making the joints immovable.

BONE MARROW (bone-mae-row) the soft, spongy material found inside the cavities of long bones
LIGAMENTS (li-ga-ments) strong tissues that bind the bones at a joint

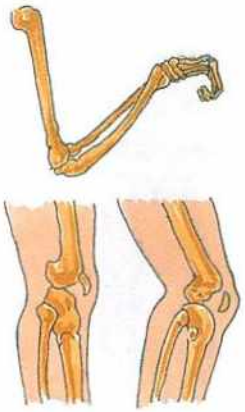


Fig. 9.8 Hinge joint

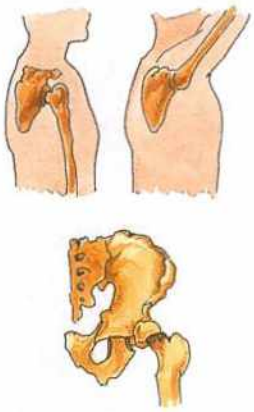


Fig. 9.9 Ball-and-socket joint

Fig. 9.10 Pivot joint

Fig. 9.11 Gliding joints

The movable joints

The bones at the joints move smoothly because of a fluid which acts like a lubricant. There are four types of movable joints in our body.

THE HINGE JOINT: A hinge joint is like the hinges in a door. It can move the bones only in one direction. The elbows, knees, fingers and toes have hinge joints.

THE BALL-AND-SOCKET JOINT: A ball-and-socket joint allows maximum movement, as displayed by ballet dancers. One bone that ends in a ball fits into the socket of the other. Hip and shoulder joints are of this type.

IT'S A FACT!

The uppermost vertebra called atlas is named after the Greek god who is said to carry the earth on his shoulders.

THE PIVOT JOINT: A pivot joint is found between the skull and the first two vertebrae of the spine. The uppermost vertebra in the neck is called **atlas**. We can move our head sideways, upward and downward with the help of the pivot joint.

THE GLIDING JOINT: The gliding joint allows movement at the wrist and ankle, and also between any two vertebrae of the spine. It allows our back to bend, twist and turn at each joint. What would happen if your backbone was made up of just one long bone? It would make you look as stiff as a scarecrow!

MUSCLES AND MOVEMENT

The muscles in the body tighten and relax to produce movement. There are about 650 muscles in the body, and each one causes a particular movement.

Muscles bend our arms and knees, push food into the digestive canal, allow us to inhale air into our lungs, help us to chew our food, and make our heart beat. Muscles are attached to the bones by strong fibres called **tendons**. These fibres become stronger with regular exercise.

TENDONS (ten-dons) strong fibres with which muscles are attached to bones

Types of muscles

Some muscles like the muscles attached to our skeleton are under our control, so we call them **voluntary muscles**.

Muscles not under our control are called **involuntary muscles**. They control actions like the movement of food in the alimentary canal, the flow of blood and the movement of the eye muscles.

The third kind of muscles are found in the heart, which are involuntary in function, but they are structured like voluntary muscles. These muscles are called **cardiac muscles**.

How do muscles work?

Muscles produce movement in the body by pulling on the bones. When a muscle contracts, the bones come close to each other. When the knee bends, one muscle contracts and gets shorter, whereas the other one relaxes. When the leg stretches, the reverse happens. Well-developed muscles give a graceful appearance to the body.

Fig. 9.12 The muscular system

To keep the muscles in good shape, we must maintain a good posture while we sit or stand or walk.

Our body is amazing. We must look after it well. We must exercise and rest properly. We must have a healthy diet. We must not eat junk food.

Let us say it again

- Our body is made up of many parts, each of which performs special functions.
- The skeleton is the framework of bones in our body. Bones differ in shape and size.
- Bones give shape, support and strength to our body.
- Bones give protection to the internal organs and help us move.
- The backbone protects the spinal cord. The skull protects the brain.
- A joint is the meeting point of two bones held together by strong tissues called ligaments.
- The joints in the skull are immovable. There are four kinds of movable joints in the body.
- Voluntary muscles are under our control, whereas involuntary muscles are not.

VOLUNTARY (vo-lun-tary) **MUSCLES** muscles under our control
INVOLUNTARY (in-vo-lun-tary) **MUSCLES** muscles not under our control
CARDIAC (car-di-ek) **MUSCLES** muscles of the heart

Let us answer

A. Tick (✓) the correct answer.

1. The working of the internal organs of our body is controlled by this system.
   a. reproductive b. circulatory c. respiratory d. nervous
2. This joint allows the maximum movement.
   a. ball and socket joint b. pivot joint
   c. hinge joint d. gliding joint
3. Muscles are attached to the bones with fibres called
   a. ligaments. b. tendons. c. bone marrows. d. ribs.
4. These muscles are under our control.
   a. muscles attached to the alimentary canal b. muscles attached to our skeleton
   c. cardiac muscles d. none of these

B. Fill in the blanks.

1. The human skeleton encloses and protects all the _____ organs of the body.
2. The vertebral column protects the delicate _____ cord.
3. The muscles which are not under our control are called _____ muscles.
4. The _____ are the strong tissues which hold the bones together.
5. The powerful _____ bone bears the weight of the whole body.

C. Match the columns.

1. vertebral column	a. heart and lungs
2. knee	b. spinal cord
3. rib cage	c. brain
4. skull	d. hinge joint

D. Write short answers.

1. What is a joint?
2. Name the different kinds of movable joints in your body.
3. Which part of the facial region is movable? How does it help us?
4. What is bone marrow?
5. What are tendons?

E. Answer these questions.

1. How is our skeleton useful to us?
2. What is the difference between voluntary and involuntary muscles?

3. How do muscles work?
4. How can we keep our muscles in good shape?

HOTS questions

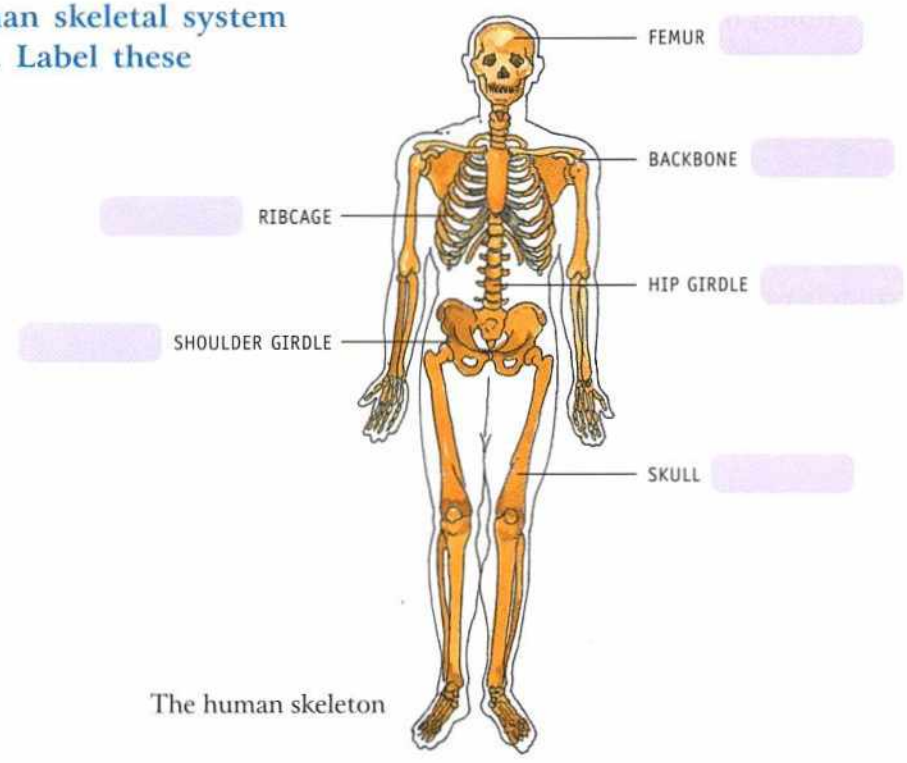
F. Think and answer.

1. What disadvantage would you face if your backbone is made up of just one long bone?
2. Imagine your neck joint to be a hinge joint. What kind of movement would you find very difficult to make?

Let us do

ENRICHMENT ACTIVITIES

G. Some parts of the human skeletal system are incorrectly labelled. Label these parts correctly.



The human skeleton

H. Tanya was asked to write about some actions which are voluntary in nature. She has written some involuntary actions also. Circle the involuntary actions.

Chewing food Sitting upright on a table Digestion of food Beating of heart
Singing a song Pushing of food into the intestine Dancing Breathing

I. Visit a gymnasium. TO VISIT

Visit a gymnasium and observe people doing physical exercise there. Ask them which type of exercise they do to make muscles strong.

A life skill

J. Be friendly with all children.

I am Meena. I move around in a wheelchair. I have many friends who love me and play with me. I like them to do certain things for me but I don't like them to do certain things.

1. talking to me
2. sharing their books with me
3. showing pity
4. doing everything for me
5. eating with me
6. doing my homework for me
7. playing with me
8. not letting me do anything

A subject link

(ENGLISH)

K. Read this poem and write it in the form of a paragraph.

There are bones in my fingers,
There are bones in my toes.
When I feel my face,
I feel bones in my nose.
Fish have bones,
So do pelicans.
And when we put our bones together,
They make skeletons!

TEACHER'S NOTES: Use a model of a skeleton to demonstrate the kinds of bones in our body. Explain the different kinds of joints by moving them.

10

Our Nervous System

AIMS

To enable the student to

- know the importance of the human nervous system
- learn the functions that our brain performs
- understand the need to take care of our sense organs

AIDS

- CD or video clip on the working of the nervous system
- chart showing the parts of the brain
- models of nervous system
- model of human eye
- chart on caring for our eyes

Do you feel excited when your school team is about to win? When we feel excited or nervous, our body becomes tense. This is because our nervous system becomes overactive.

The **brain**, the **spinal cord** and the **nerves** form the nervous system. Our nervous system controls all the other systems of our body.

THE BRAIN

The brain is the control centre of the human body. It receives information from all the parts through different nerves.

An adult human brain weighs about 1.4 kg and contains millions of tiny cells. It is protected by a hard, bony skull. The space between the skull and the brain, and also the inside of the brain, is filled with a clear fluid which serves as a cushion against jerks and injuries.

Our brain is made up of three different parts. Each part has its own work to do.

The largest part of the brain is the **cerebrum**. Its dome-shaped surface is

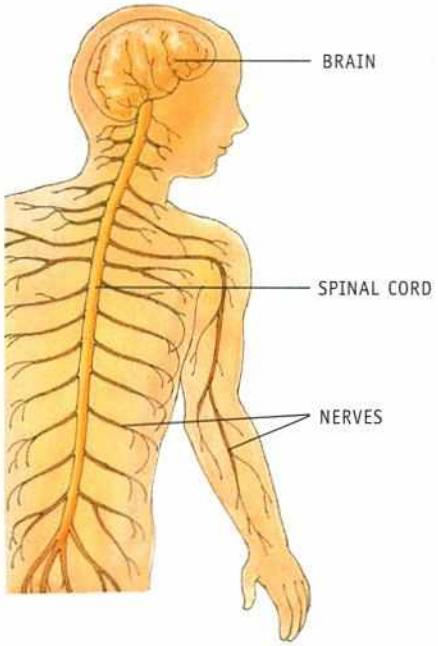


Fig. 10.1 Nervous system

CEREBRUM (sey-rey-brum) the largest part of the brain

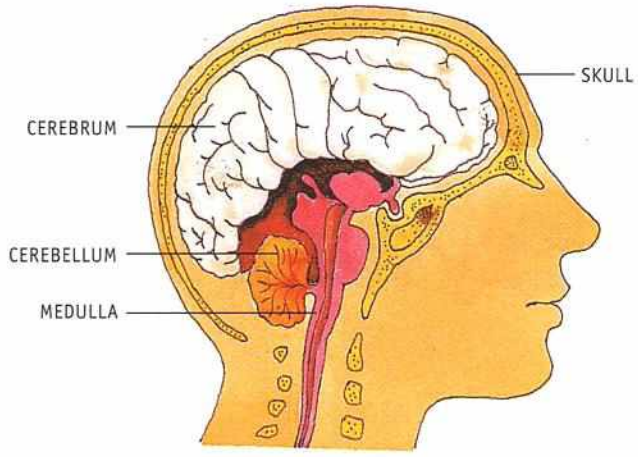


Fig. 10.2 The human brain

covered with deep ridges and grooves. It controls the working of our eyes, ears, nose and tongue. It also controls our voice. It is the centre of intelligence. We can think, learn, remember and recall because of the cerebrum.

Below the cerebrum is the **cerebellum**. It coordinates the actions of the muscles and makes them work together. It helps us to balance our body and keeps us in an upright posture. If the cerebellum does not function properly our body movements become jerky.

Beneath the cerebellum lies the bulb-shaped **medulla**. It connects the brain to the spinal cord. It controls involuntary actions like the movements of the lungs and the heart. The medulla is active even when we sleep.

IT'S A FACT!

Our brain uses approximately 20 per cent of the total oxygen pumped around our body. About 750 mL of blood pumps through our brain every minute. Each half of the brain controls the opposite half of the body.

The brain needs a continuous supply of blood and oxygen. A person faints if his heart is not able to send enough blood to his brain. We must get enough sleep to rest our brain.

THE SPINAL CORD

The spinal cord extends from the base of the brain to almost the lower end of the backbone. It is enclosed inside a tough, bony but flexible spine. It connects the rest of the body to the brain through the nerves.

NERVES

Nerves are long thread-like structures that carry messages between the brain and the other parts of the body. Nerves from the region of the head and the neck join the brain directly. However, nerves from the other parts of the body join each side of the spinal cord. The spinal cord leads to the brain. Nerves are made of bundles of fibres.

Kinds of nerves

There are three kinds of nerves.

SENSORY NERVES: The nerves which bring messages from the sense organs to the brain or the spinal cord are called **sensory nerves**.

MOTOR NERVES: The nerves which carry 'orders' from the brain or the spinal cord to the muscles or glands are called **motor nerves**.

MIXED NERVES: The nerves which carry messages to the brain as well as bring

CEREBELLUM (sey-rey-bell-um) lies below the cerebrum
MEDULLA (mey-dew-la) lies below the cerebellum

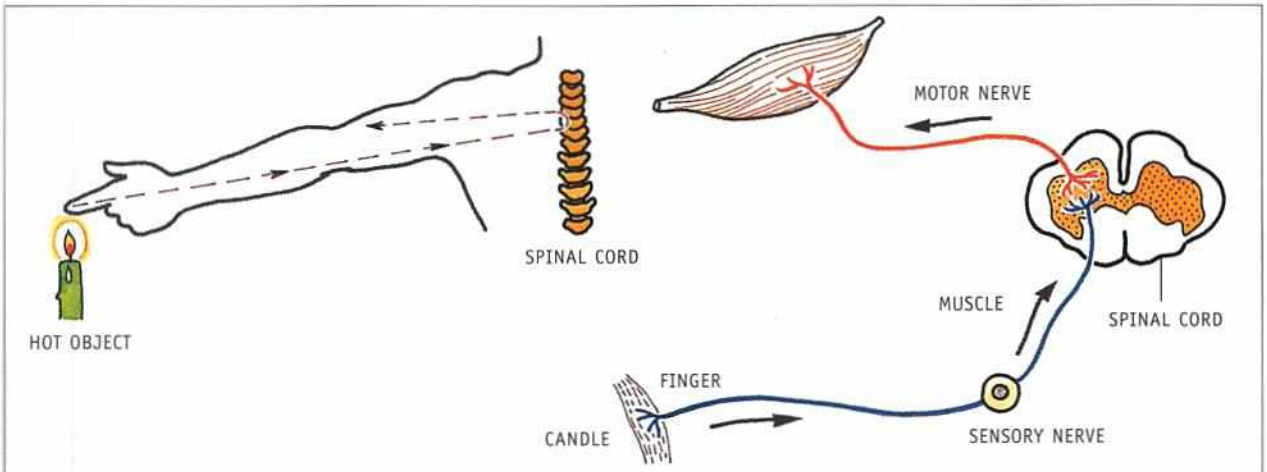


Fig. 10.3 How messages are sent and received

orders from the brain are called **mixed nerves**.

The nervous system controls all our actions. Some of our actions are automatic. We do not have to think before doing them. These actions are called **reflex actions**. Such actions are controlled by the spinal cord. For example, when our finger comes too close to a hot object, the sensory nerves immediately pass a message to the spinal cord. The spinal cord sends orders through the motor nerves for the muscles to tighten up. We pull our hand away from the hot object even before we feel the pain. Blinking of the eyes and watering of the mouth are two other examples of reflex actions.

Oral Questions

Choose the correct answer.

1. The bulb-shaped medulla / nerve / cerebrum connects the brain to the spinal cord.
2. The brain needs a continuous supply of blood and oxygen / nitrogen / carbon dioxide.
3. Blinking of the eyes is an example of a voluntary / reflex / involuntary action.

SENSE ORGANS

The organs which connect us to the outside world are known as **sense organs**. The five sense organs are the eyes, the ears, the nose, the tongue and the skin.

The eyes

The eyes are our most important sense organ. Each eyeball is safely set in a deep bony socket and is further protected by the eyelids and the eyelashes. These help to keep dust and dirt out of our eyes.

In the front portion of the eye, there is a circular, transparent area called the **cornea**. The coloured circle in the eye is the **iris**.

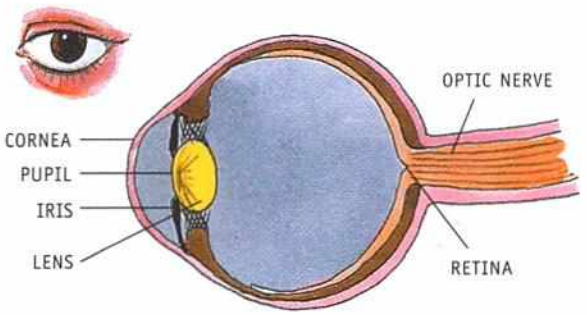


Fig. 10.4 The human eye

IRIS (eye-ris) the coloured circle inside the eye

THINK GREEN!

Close your eyes. Put some slices of cucumber (*kheera*) on your eyelids for some time. This will relax your eyes.

Activity 1 Keeping your head, neck and spine erect, rotate your eyeballs clockwise (5 times). Now close your eyes. Rotate the eyeballs anticlockwise (5 times). Slowly open your eyes.

The **pupil**, which looks like a black spot, is an opening through which light enters the lens. A sensory nerve called the **optic nerve** connects the eye to the brain.

CARE OF THE EYES: We must try to avoid any kind of injury to our eyes. Follow these rules.

- Wash your eyes regularly with clean water.
- Do not work in dim light or very bright light. This tires the eyes. Let the light fall from the left side of the reading material.
- Do not read in a moving vehicle. This will strain your eyes.
- Always sit at least six feet away from the television set. Do not watch TV or play games on the computer for long periods.
- Do not read while lying down. Sit erect and hold the book about a foot away from your eyes.
- Never rub your eyes with a dirty towel or dirty hands. This can cause infection. Do not use anyone else's towel or handkerchief if you have an eye infection.
- Tell your teacher or parent if you cannot read what is written on the blackboard.

The ears

Our ears help us to hear sounds. They also enable us to keep our balance. The outer ear helps us to receive and direct sound waves to the inner ear. Follow these rules.

CARE OF THE EARS:

- Never clean your ears with a pointed object like a matchstick or a hairpin. You may injure the eardrum inside.
- Use a dry towel to clean your ears. Do not let water enter your ears.
- Go to a doctor if you have an earache.

The nose

We breathe and smell through our nose. The sense of taste and the sense of smell are linked. There are many nerve endings in

Fig. 10.5 The outer ear

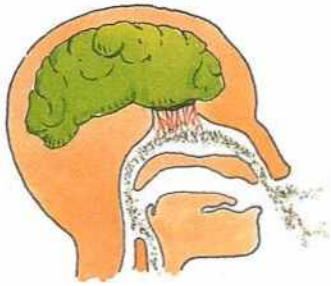


Fig. 10.6 The nose

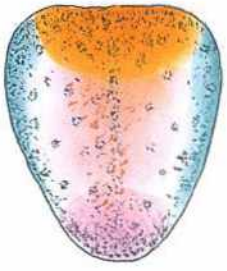


Fig. 10.7 The tongue

the upper part of our nose. These are sensitive to smell.

CARE OF THE NOSE:

- Keep your nostrils clean by blowing your nose gently.
- The hair inside the nose keep out dust that is present in the air, so breathe through your nose.
- Do not pick your nose.
- Inhale steam to clear a blocked nose.

The tongue

The tongue is the main organ of taste and it enables us to speak. The surface of the tongue is covered with tiny bumps. Inside these bumps are some cells called **taste buds**. The nerve endings in the taste buds detect the four major tastes: sweet, salty, sour and bitter. Food tastes better when we can smell it. When a cold blocks our nose food does not taste so good.

The skin

The skin forms the outermost covering of our body. It protects the internal organs.

We can feel the sensation of touch, heat, pain or pressure because of our skin. The pores on the surface of the skin allow some body waste to come out as sweat.

CARE OF THE SKIN:

- Soap and water are enough to remove dirt and sweat from the skin.
- Dry yourself thoroughly after bathing and wear clean and comfortable clothes. Clothes should be loose enough for the passage of fresh air when the weather is warm.
- A scratch or cut on the skin should be treated with an antiseptic lotion to prevent infection.

Let us say it again

- The nervous system consists of the brain, the spinal cord and the nerves.
- The three main parts of the brain are the cerebrum, the cerebellum and the medulla.
- The brain is the control centre of the human body.
- The spinal cord controls our reflex actions. Reflex actions are automatic actions.
- The organs which connect us to the outside world through our senses are known as the sense organs. We should take proper care of our sense organs.

Let us answer

A. Tick (✓) the correct answer.

1. Our nervous system consists of the brain, the spinal cord and the
   a. blood vessels.
   b. kidneys.
   c. lungs.
   d. nerves.

2. A person might faint if his heart does not send enough blood to his
   a. feet. b. house. c. kidneys. d. brain.
3. When we happen to touch a hot object, the sensory nerve immediately passes a message to the
   a. brain. b. hands. c. spinal cord. d. eyes.
4. To clean a blocked nose we must inhale
   a. perfume. b. ice. c. steam. d. none of these

B. Write T for True or F for False.

1. The system that controls the other systems is called the respiratory system. ____
2. The cerebellum coordinates the actions of the muscles and makes them work together. ____
3. The actions controlled by the spinal cord are called reflex actions. ____
4. The part of the brain that controls our senses is called the cerebrum. ____
5. The motor nerves bring messages from the sense organs to the brain or the spinal cord. ____
6. The pupil is an opening in our eye through which light enters. ____
7. The ears enable us to keep our balance. ____

C. Complete the series.

1. bundles of fibres : nerves :: taste buds : _____
2. memory : cerebrum :: heartbeat : _____
3. cerebellum : muscles :: cerebrum : _____
4. eyes : sight :: skin : _____

D. Write short answers.

1. The brain needs a continuous supply of blood and oxygen. Why?
2. What are sensory nerves?
3. How is our brain protected from injuries?
4. What could happen if we clean our ears with a pointed object?
5. What is a reflex action?

E. Answer these questions.

1. What does the nervous system consist of ?
2. Name the different parts of the brain. What work does each part do?
3. What are nerves and what are their functions?
4. How does food taste if we have a cold?
5. How can you keep your skin healthy?

HOTS questions

F. Think and answer.

1. Raju is playing in the dust. His eyes have become red. He is not able to breathe properly. Why do you think this is happening to him?
2. While driving a scooter one must wear a helmet. Why?

Let us do

ENRICHMENT ACTIVITIES

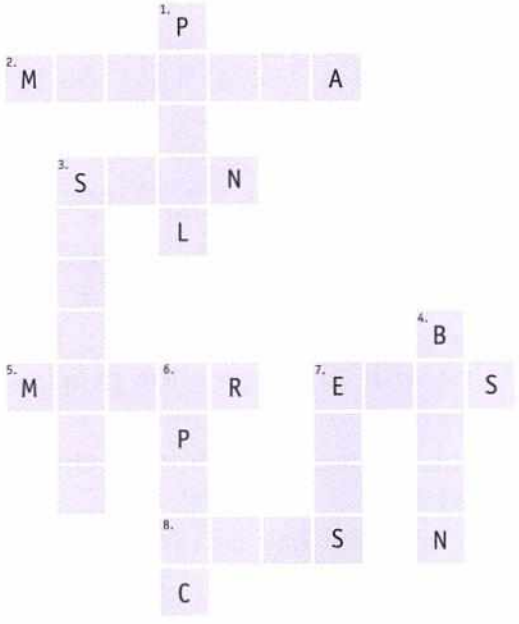
G. Fill in this crossword puzzle with the help of the given clues.

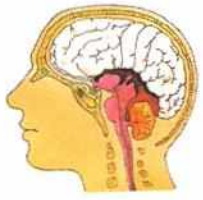
Across

2. Connects the brain to the spinal cord
3. The sense organ of touch
5. Nerves that carry messages from the brain to the muscles
7. These enable us to hear.
8. The coloured circle in the eye

Down

1. The opening through which light enters the eye
3. Nerves that carry messages from the sense organs to the brain
4. The control centre of the body
6. The nerve joining the eye to the brain
7. These enable us to see.





H. Play a guessing game with your partner.

Take turns to make your friend identify an object with closed eyes. Name the sense (sense of sight is not being used) organ that helps you to name the object.

Use objects like a pencil, or eraser, a flower, a toffee, a bell and so on.




NOTE: Find out how visually-challenged people use Braille for reading.

A life skill 

I. Take care of your eyes.

Which of these would you do if you find it difficult to read what is written on the blackboard? Discuss with your partner.

1. Rub your eyes with your hanky.
2. Wash your eyes with clean water.
3. Tell your teacher/parent.
4. Watch television from very near.
5. Have sufficient lights in your room.
6. Consult your doctor.

Let us meet 

Louis Braille became blind accidentally at the age of three. When he was twelve years old, one day, in school, Louis eagerly listened to what the captain of the French Army had to say about 'night writing'. It was a method of sending simple secret messages by punching dot marks on thick paper. It was wonderful that with a little practice, people could read even in the dark with their fingertips.

An idea flashed through Louis's mind! Why not develop an alphabet using a system of raised dots?

From 1821 onwards, Braille laboured day and night and finally developed the Braille Alphabet System in 1824. It now became possible for those who could not see to read by moving their fingers over raised dots. There were different dot patterns for different letters, numbers and punctuation marks. So, while most people read with their eyes, those who cannot see read with their fingers.

TEACHER'S NOTES: Parts of the brain and reflex action may be dealt with in the class by showing models. Emphasize the need to keep the sense organs clean.

11

Force and Energy

AIMS

To enable the student to

- know different types of forces
- identify the types of simple machines commonly used
- learn about the different types of energy

AIDS

- video clip or CD of a cricket match, a village scene of drawing water from a well
- levers such as a crowbar, claw hammer, bottle opener, nutcracker, ice tongs
- other simple machines like an inclined plane, pulley, wheel and axle, and screw

FORCE

In Class 4, we read that pushing or pulling an object means we are applying a 'force' on the object.

Look at the pictures below. See how force is being used to perform various activities.

Most of the actions that we perform in our daily lives involve pushing or pulling something. A force can be used to

- move a stationary object.
- stop a moving object.
- make a moving object move faster.
- slow down a moving object.
- change the direction of a moving object.
- change the shape and size of an object.

Fig. 11.1 Force is used to perform different types of tasks.

Types of forces

There are different types of forces.

MUSCULAR FORCE: When we push, pull or lift something we apply muscular force.

GRAVITATIONAL FORCE: On television you must have seen astronauts floating in space. They are able to float because there is no gravitational force pulling them down. We are able to stay on the ground because of gravitational force.

FRICTIONAL FORCE: Why does a rolling ball stop after some time? This is because of the force of friction. Frictional force slows down a moving object. We are able to walk because of frictional force.

ELASTIC FORCE: A stretched rubberband regains its original position on being released because of elastic force. Elastic force arises when a body deforms.

MECHANICAL FORCE: Most simple machines make use of mechanical force. For example, a pair of scissors uses mechanical force to cut something.

BUOYANT FORCE: If we push down a mug or a block of wood floating on water, we feel an upward thrust. The upward push of water on a floating object is called **buoyant force** or **upthrust**. This force acts on every object, even on you when you enter a swimming pool.

There are other types of forces like, magnetic force and electrostatic force about which you will learn in higher classes.

SIMPLE MACHINES

Simple machines are tools which make our work easier and faster. They help us to do work by applying force at a convenient point which either changes the direction of force or increases the force applied. Some examples of simple machines are lever,

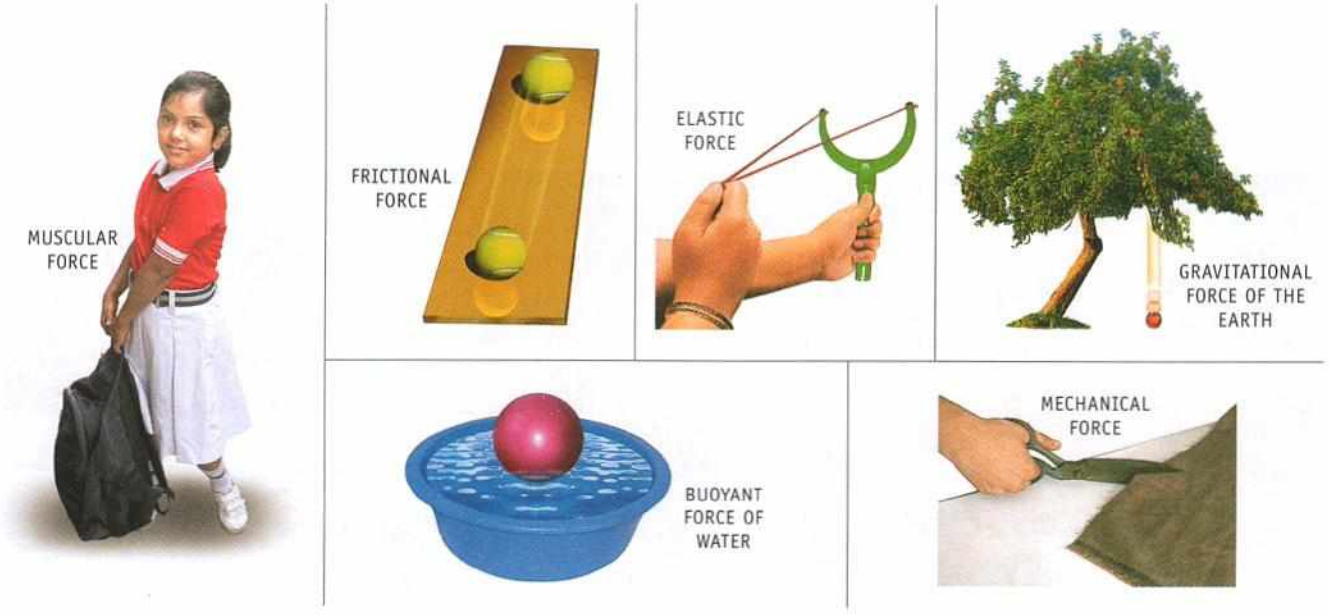


Fig. 11.2 Different types of force

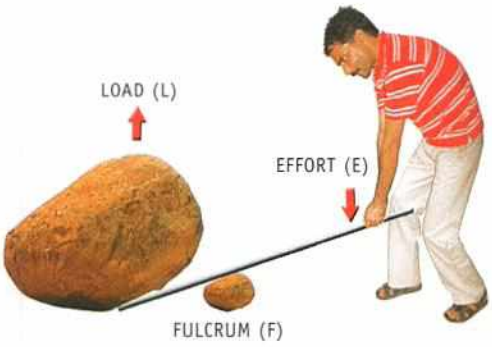


Fig. 11.3 A person using a rod to lift a heavy rock

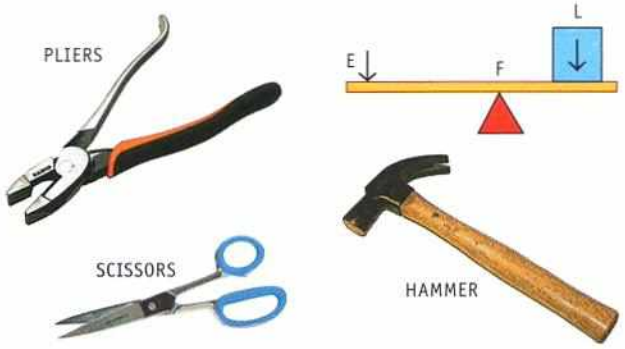


Fig. 11.4 Examples of first-class levers

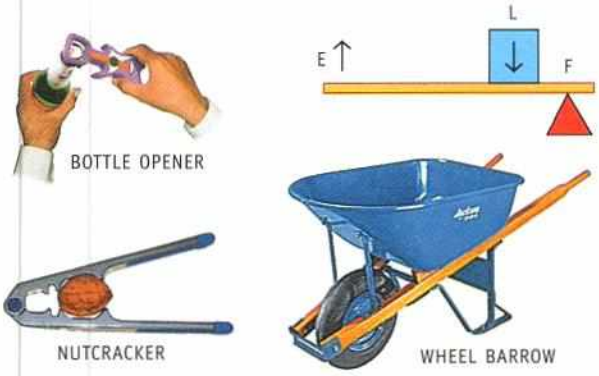


Fig. 11.5 Examples of second-class levers

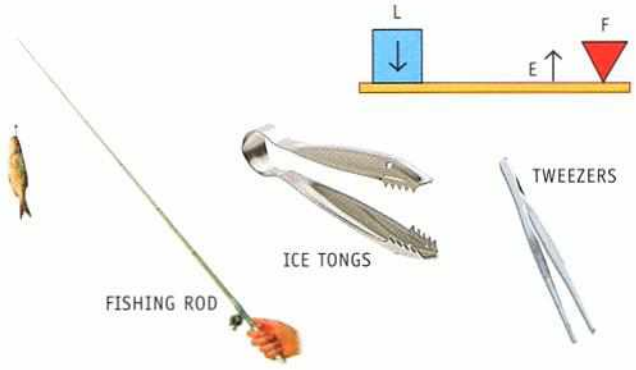


Fig. 11.6 Examples of third-class levers

inclined plane, wheel and axle, pulley and screw.

Levers

Commonly used tools like scissors, pliers, screwdrivers and hammers are **levers**.

Have you seen someone using a rod to lift a heavy rock? He pushes one end of the rod under the rock to be lifted.

A small stone is kept as a support for the rod, very close to the rock under the rod. He uses a downward force on the other end of the rod. The rock is lifted upwards. Here the rod is a lever. The weight lifted by the person is the **load** (Fig. 11.3). The point of support or the pivot point of the rod where it touches the small stone is the **fulcrum**. The force used is the **effort**.

Levers can be classified according to the position of the fulcrum, the load and the effort.

When the fulcrum is in between the load and the effort it is a **first-class lever**.

When the load is in between the fulcrum and the effort, it is a **second-class lever**.

When the effort is in between the fulcrum and the load, it is a **third-class lever**.

The inclined plane

Walking up a slope is easier than climbing a ladder to the same height. An **inclined plane** is a slope which makes work easier. When workers have to load or unload a truck they use a plank of wood as an inclined plane. In hospitals and some other buildings inclined planes called ramps are

provided next to staircases. This helps in pushing up wheelchairs.

Did you enjoy 'rides' down a slide when you were younger? A slide is an inclined plane.

The pulley

A **pulley** is a small wheel with a groove around its outer edge. The groove can hold a rope in position. A pulley together with a chain or a rope is used to lift objects.

There are two types of pulleys—a fixed pulley and a movable pulley.

The pulley used for drawing water from a well is a **fixed pulley**. It is fitted to some support. A rope is passed over the pulley. The bucket is tied to one end of the rope. A downward effort is applied at the other end of the rope and the bucket of water comes up. A fixed pulley makes work easier by changing the direction of force. A small pulley is also used on a flagpole to hoist a flag (Fig. 11.7). **Movable pulleys** along with fixed pulleys are used to lift loads.

The wheel and axle

We know that pushing a load on wheels is easier than carrying it. But the wheel by itself is not a simple machine. It becomes one only when a rod or an axle is attached to it. A wheel with a rod attached to it is known as a **wheel-and-axle** arrangement. Wheel-and-axle arrangements are used in most big machines. Find out about the wheel-and-axle arrangement used in vehicles, sewing machines, egg beaters and cycles.

The screw

A **screw** is a simple machine used to hold things tightly together. Why is a screw better than a nail? When we join things together with a screw they are held together through a longer distance and thus cannot be forced apart easily. On the other hand, when we join things with a nail, they are held together only for a short distance, that is through the length of the nail.

Bigger screws, called screwjacks, are used to lift cars and other heavy objects. Have

Fig. 11.7 Pulleys

Fig. 11.8 Wheel and axle

Fig. 11.9 Inclined plane

Fig. 11.10 Screws

Activity 1 Take a sheet of paper. Cut out a right-angled triangle, colour the edge opposite to the right angle. That will be the longest side. Wrap the edge around a pencil. The coloured inclined edge forms the edges of the screw. This proves that a screw is an inclined plane.

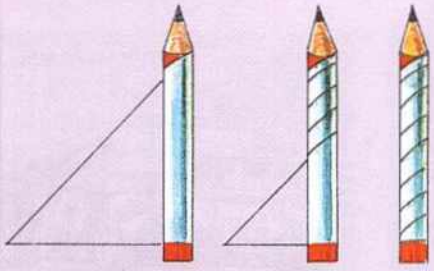


Fig. 11.11 A screw is an inclined plane.

you noticed the screws used in revolving stools, chairs and ear studs? Can you think of a big machine in which a screw is not used?

All big machines are combinations of some of these simple machines.

Oral Questions

Choose the correct answer.

1. When the fulcrum is in between the load and the effort it is a first-class / second-class / third-class lever.
2. A pulley / screw / lever is a small wheel with a groove around its outer edge.
3. A pulley does not reduce the effort. It changes the direction / magnitude of applied force.

ENERGY

You hear the word 'energy' many times in your daily life. You need to have lots of milk, vegetables and fruits to grow strong and have 'energy'. **Energy** is the ability to do work. Energy is everywhere in nature—sunlight, wind, water, plants and animals. We use energy every day.

Different forms of energy

MECHANICAL ENERGY: Mechanical energy is the energy which is possessed by an object due to its motion or due to its position. Mechanical energy can be either kinetic energy (energy of motion) or potential energy (stored energy of position). A moving car possesses mechanical energy due to its motion (kinetic energy). A drawn bow possesses mechanical energy due to its stretched position (elastic potential energy).

SOLAR ENERGY: Solar energy is the most readily available source of energy. It is the most important source of energy because it is non-polluting. When we hang our clothes to dry in the sun, we use the energy of the sun. Similarly, solar panels absorb the energy of the sun to provide heat for cooking.

GEOTHERMAL ENERGY: The word geothermal comes from the Greek words geo (earth) and therme (heat). So, geothermal energy is heat from within the earth. We can use the steam and hot water produced inside the earth to heat buildings or generate electricity. Geothermal energy is a renewable energy source because the water is replenished by rainfall and the heat is continuously produced inside the earth.

WIND ENERGY: Wind energy is plentiful, renewable, widely distributed, clean and non-polluting. Therefore, it is considered by experts to be more environment friendly than many other energy sources. Wind power is the conversion of wind energy into a useful form, such as electricity, using wind turbines.

BURNING COAL GIVES HEAT AND LIGHT ENERGY.

A BULB RUNS ON ELECTRICAL ENERGY.

A FAN RUNS ON ELECTRICAL ENERGY.

WIND ENERGY IS CLEAN AND NON-POLLUTING.

SOLAR PANELS ABSORB THE ENERGY OF THE SUN.

A DRAWN BOW POSSESSES POTENTIAL ENERGY.

A RUNNING CAR POSSESSES KINETIC ENERGY.

Fig. 11.12 Different forms of energy

HYDROPOWER (WATER ENERGY): Of the renewable energy sources that generate electricity, hydropower is the most often used. It is one of the oldest sources of energy. It was used thousands of years ago to turn a paddle wheel to grind grain. Because the source of hydropower is water, hydroelectric power plants must be located on a water source.

HEAT ENERGY: Heat is a form of energy. We use it for a lot of things like warming our homes and cooking our food. Most of the heat energy we use comes from burning fuels like coal, kerosene and petrol.

LIGHT ENERGY: Light is nature's way of transferring energy through space. Some sources of light energy are the sun, bulbs, tubelights and a burning candle.

SOUND ENERGY: Sound is vibration transmitted through a solid, liquid, or gas. Sound is produced when a force causes an object or a substance to vibrate. Some sources of sound energy are music systems, musical instruments and radios.

ELECTRICAL ENERGY: Electrical energy is the movement of electrical charges. Electrical charges moving through a wire is called electricity. Most of the appliances that we use these days like washing machines, televisions, computers, tubelights, bulbs and fans run on electricity.

Law of conservation of energy

Energy can neither be created nor destroyed. Energy just changes from one form to another. The total energy of an object never decreases or increases.

Let us say it again 

- When we push or pull something we apply force.
- A force can be used to move a stationary object, stop a moving object, make a moving object move faster, slow down a moving object, change the direction of a moving object and change the shape and size of an object.
- Forces are of different types—muscular, gravitational, frictional, elastic, mechanical and buoyant.
- Simple machines make our work easy. Simple machines can be grouped under lever, inclined plane, wheel and axle, pulley and screw.
- Energy is the ability to do work.
- Mechanical energy can either be kinetic energy or potential energy.
- According to the law of conservation of energy, energy can neither be created nor destroyed but it always changes from one kind to another.

Let us answer 

A. Tick (✓) the correct answer.

1. We are able to stay on the ground because of
   a. gravitational force.
   b. elastic force.
   c. buoyant force.
   d. frictional force.
2. A screwjack used to lift a car is a
   a. first-class lever.
   b. pulley.
   c. second-class lever.
   d. screw.
3. The most readily available source of energy is
   a. wind energy.
   b. solar energy.
   c. geothermal energy.
   d. water energy.
4. The upward push of water on a floating object is called
   a. buoyant force.
   b. volume.
   c. density.
   d. pressure.

B. Fill in the blanks.

1. Most simple machines make use of _____ force.
2. There is no _____ force in space.
3. Simple machines change the _____ of applied force.
4. A moving car possesses mechanical energy due to its _____
5. An inclined plane is a _____ which makes work easier.

C. Change the underlined words to correct these statements.

1. A stretched rubberband regains its original position on being released because of gravitational force.
2. Geothermal energy is a non-renewable source of energy.
3. The pulley used for drawing water from a well is a movable pulley.
4. Simple machines make our work complicated.
5. We are able to walk because of elastic force.

D. Write short answers.

1. Name the different types of forces.
2. What are simple machines?
3. Why is geothermal energy referred to as a renewable source of energy?
4. From where does most of the heat energy come?
5. Name four different forms of energy.

E. Answer these questions.

1. What is a lever? On what basis are levers classified?
2. What is an inclined plane? How is it useful for us?
3. Does a screw join two pieces of wood better than a nail? How?
4. What does the law of conservation of energy state?
5. How is wind energy more environment friendly than heat energy?

HOTS questions

F. Think and answer.

1. What will happen if on a see-saw, one child gets up suddenly? Why?
2. You need to be more careful when you cycle down a hill than when you cycle up the hill. Why?

Let us do

ENRICHMENT ACTIVITIES

G. Make a fulcrum!

Place an empty tin or a cylindrical piece of wood with its rounded side on a folded handkerchief. Balance a ruler on the curve of the tin. Place an empty matchbox on one side of the ruler. Place two matchboxes on the other side of the ruler. Change the position of the boxes on either side of the ruler to balance the weight of the single box with the weight of the two boxes. The tin or the piece of wood acts as the fulcrum. Repeat the activity by using other things like pencil boxes in place of matchboxes.

H. Rohit was asked to make a chart on the uses of simple machines. He had to paste pictures of some activities where simple machines are being used. Circle the pictures in which simple machines are not being used.

A life skill

I. Is your family an energy-saving family? Tick (✓) the things you and your family do.

1. Instead of sitting out in the sun, you use a room heater all day in winter.
2. Lights are left switched on all night in the balcony or veranda of your house.
3. Your car engine is turned off when the traffic light is red.
4. The bathroom geyser is switched on only when needed.
5. The TV is left switched on even when no one is sitting in the room.
6. The bulbs used in your house are 'energy-efficient'.

Let us meet

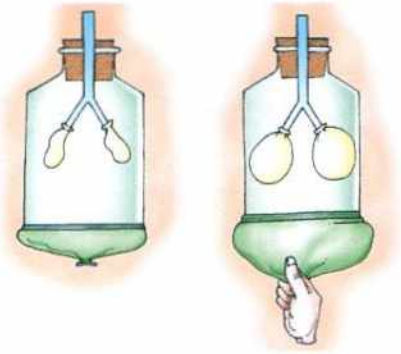
Homi Jehangir Bhabha: The Bhabha Atomic Research Centre (BARC) is a tribute to one of India's greatest modern scientists—Homi Jehangir Bhabha. Nuclear physicist, space scientist, microbiologist, electronics expert—he was all. Early in his career Bhabha solved the 'mystery' of the cosmic rays and became world famous. Many great science institutions, like Tata Institute of Fundamental Research (TIFR), Mumbai, are a result of Bhabha's efforts.

TEACHER'S NOTES: Demonstrate the force being used while explaining the kinds of forces. Teacher may use some simple machines while teaching the classification of levers.

Check Your Understanding

Enrichment Activities

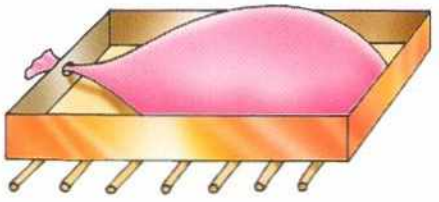
A. Make a model of the lungs of a mammal. Work in groups of four.



To make a model of a mammal's lungs you need a Y-shaped hose connector, a plastic bottle, a plastic tube, three balloons, plasticine, scissors, rubberbands, etc.

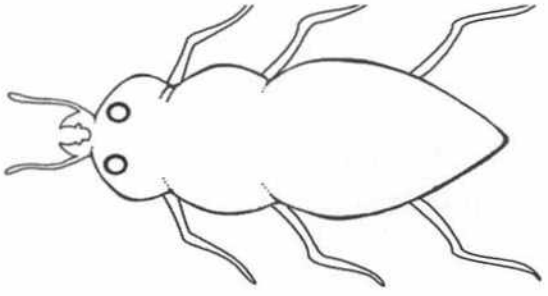
- Remove the bottom of the bottle with scissors.
- Fix the plastic tube to one end of the Y-shaped connector.
- Fix two balloons to the other two ends.
- Fix the Y-shaped connector to the bottle neck taking it into the bottle from the bottom.
- Make the mouth of the bottle airtight with plasticine.
- Make a knot at the closed end of the third balloon and fix its mouth to the bottom of the bottle. Make use of a rubberband to fix the balloon tightly.
- Pull the knot of the balloon down and leave it to go up repeatedly.
- We see the other two balloons working like lungs. Display your model at the school science exhibition.

B. Pencil rollers



Make a hole of about 6 mm diameter in one side of a shoebox. Place a balloon in the box with its neck poking out of the hole. Blow it up. Hold the end tightly so that the air does not escape. Place the box on a table and let the air out of the balloon. Does the box move? Repeat by placing the box on some pencil 'rollers'. Your box should now slide across. The rollers reduce friction between the box and the table. Write about this experiment in ten lines.

C. A colourful ant



Draw an outline of an ant's body, colour the head black and stick two red eyes (use paper or orange dal). Use black dal to fill in the rest of the body with the help of glue. Use black thread or wool for the legs.

D. Class project

Divide the class into four groups—Solar, Wind, Geothermal and Hydropower.

Let each group collect information and photographs on their respective topics and make charts on that. Now organise a class presentation and each group should be ready to answer questions asked by the other group.

12

Our Life Supports

AIMS

To enable the student to

- know the composition of air and its uses
- observe the properties of air by experimenting
- understand the simple process of removal of impurities from water

AIDS

- a video or DVD film on air travel and water travel
- films, slides or charts on the uses of water
- glass jars and candles
- empty tumblers, balloons
- beakers, filter paper

AIR AROUND US

Human beings cannot live without air for more than a few minutes. They cannot live without water for more than a few days. All living things need air to breathe. The thick blanket of air that surrounds our planet is called **atmosphere**. This atmosphere is held around the earth by the earth's gravity.

The atmosphere is a mixture of gases. It has the air we breathe, the wind and rain, and the clouds in the sky. It is life giving, it retains heat and blocks out the harmful rays (ultraviolet radiation) of the sun.

The atmosphere also prevents meteors from hitting the surface of the earth. The oxygen present in the atmosphere supports

Fig. 12.1 Air supports our life in many ways.

ATMOSPHERE (at-mos-fear) the blanket of air surrounding the earth

life. In places such as mountain tops or deep in seas and oceans where there is not enough air or oxygen, we need to carry oxygen cylinders for breathing. Air also contains carbon dioxide which plants use to prepare food.

Air is needed for breathing

The fresh air we breathe in is called **inhaled** or **inspired air**. The air we breathe out is called **exhaled** or **expired air**. In our lungs, oxygen from the inhaled air is taken by the blood. Carbon dioxide from the blood is given out with exhaled air. Exhaled air has a higher percentage of carbon dioxide than inhaled air. It is also warmer than inhaled air.

Air is needed for burning

Air contains oxygen which is needed for burning.

Activity 1 Fix three candles on a table and light them. Cover the second and the third candle with glass jars. The glass jar on the third candle should be bigger than the one over the second.

What do you observe?

Air is needed for _____

More air allows the candle to burn _____

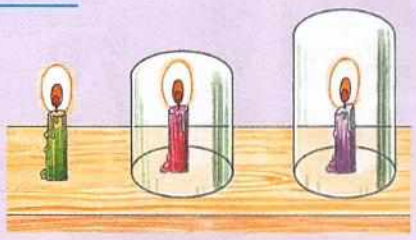


Fig. 12.2 Air is needed for burning.

Other uses of air

Moving air can support parachutes, gliders and kites. Air is used to inflate footballs and tubes of vehicles. It can also push sailboats, turn the blades of a windmill to draw water, or generate electricity.

LAYERS OF ATMOSPHERE

The atmosphere is divided into five layers.

- **Troposphere:** This is the first layer above the earth's surface. Changes in the weather occur in this layer.
- **Stratosphere:** This is the second layer. Many jet aircraft fly in this layer. Ozone gas is present in this layer. Ozone absorbs harmful ultraviolet rays from the sun. These rays can cause skin cancer.
- **Mesosphere:** This is the third layer. Meteorites or the small rocks moving about in space burn out in this layer and therefore do not reach the surface of the earth.
- **Thermosphere:** This is the fourth layer. Space shuttles move about in this layer.
- **Exosphere:** This is the fifth layer of the atmosphere.

COMPOSITION OF AIR

The air we breathe contains various gases. Clean air consists of about 78 per cent nitrogen, 21 per cent oxygen, and less than 1 per cent of argon, carbon dioxide, and

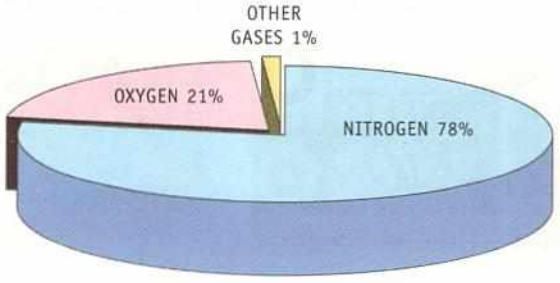


Fig. 12.3 Composition of air

other gases. It also contains water vapour, dust and smoke. The percentage of dust, smoke and water vapour in the air may vary according to the environment.

Oxygen

The most important gas for the survival of living beings is oxygen. All living beings need oxygen. Oxygen is also needed for burning.

Nitrogen

Living beings do not use nitrogen directly from the air. Plants get this nitrogen with the help of bacteria in the soil. Nitrogen is also added to the soil by using chemical fertilizers. Animals get nitrogen from plants, meat and fish.

Carbon dioxide

Carbon dioxide is an important gas for plants. Plants prepare their food with the help of carbon dioxide, water and sunlight. The process is called **photosynthesis**.

Other gases

Traces of some other gases such as hydrogen, ozone, helium, neon, argon and krypton are also present in the air.

You must have seen glowing and colourful neon electric lights. Argon is also used to produce the colourful glow in glass tubes.

Water vapour

Water vapour is formed because of the evaporation of water from the surface of water bodies like seas, rivers and lakes. Water vapour in the air can cause changes in the weather. It condenses to form clouds, rain, fog and snow. The amount of water vapour present in the air is called **humidity**. When there is more water vapour, we say that the air is humid. When the air is dry we say it has low humidity. High humidity makes us feel uncomfortable as our sweat does not evaporate easily.

PROPERTIES OF AIR

Let us read about the main properties of air.

Air has weight

Activity 2 Blow air into two balloons of the same size and tie them at the two ends of a stick.

Balance the stick by shifting the positions of the balloons as shown in Figure 12.4.

Now prick a balloon and let the air escape from it.

What happens when all the air escapes? The stick tilts towards the air-filled balloon. What does this experiment show?

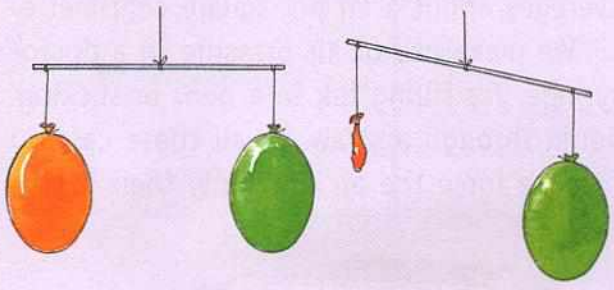


Fig. 12.4 Air has weight.

HUMIDITY (hew-mi-di-ti) amount of water vapour present in the air

Air takes up space

Activity 3 Take some water in a glass tub or a container. Take an ordinary transparent empty tumbler. Turn it upside down and dip it into the container so that its rim touches the level of water. Does water rush into the tumbler?
Lower the tumbler into the container. Why does the water not enter the tumbler now? Tilt the tumbler to one side. What do you observe? Tilt the tumbler still more. More air bubbles will come out and the water will fill the tumbler.

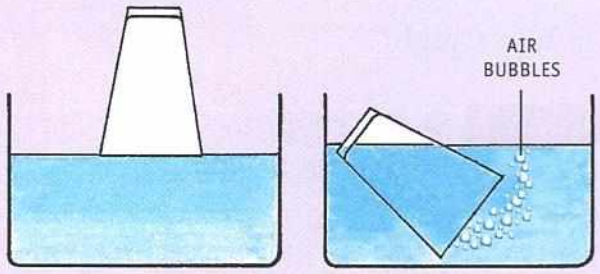


Fig. 12.5 Air takes up space.

Air exerts pressure

Since air has weight, it presses downward. As we go up a mountain, air pressure reduces. The air pressure at sea level averages about 1 kg per square centimetre.

We make use of air pressure in a doctor's syringe, for filling ink in a pen, or sucking liquid through a straw. In all these cases first we force the air out. Only then does the liquid starts flowing in. Try sucking through a straw with a hole near its top!

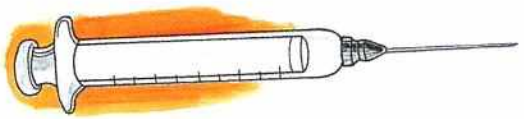


Fig. 12.6 A doctor's syringe makes use of air pressure for filling in liquid medicine.

Air exerts pressure in the upward direction

Activity 4 Take a glass tumbler and fill it with water to the brim. Make sure that there are no air bubbles in the tumbler. Cover the tumbler with a piece of stiff paper. Press the paper with your hand and turn the tumbler upside down. Remove your hand and observe. What happens?
What will happen if the glass is not filled up to the top? What does this experiment show?
Air exerts pressure in _____

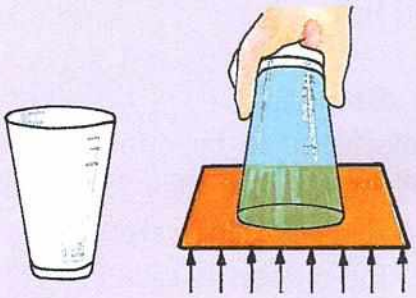


Fig. 12.7 Air exerts pressure in the upward direction.

Air exerts pressure in the downward direction

Activity 5 Take an empty plastic bottle, and make a hole on its side. Seal the hole with Sellotape and fill the bottle with water. Open the hole and observe what happens. Seal the hole again and fill the bottle with water. Screw the cap of the bottle tightly. Open the hole. What happens? What does the experiment show?
Air exerts pressure in _____

Air exerts pressure in all directions

Activity 6 Take an empty tin and insert a balloon into it. Blow hard into the balloon to make it fill up the inside of the tin. Tie its neck very tightly, and lift the balloon up. The air inside the balloon presses on all the sides, and can easily help to lift the tin up.
Therefore, we say that air exerts pressure

Oral Questions

Choose the correct answer.

1. Changes in the weather occur in exosphere / troposphere / mesosphere.
2. Ozone / Oxygen / Argon is used to produce colourful glow in glass tubes.
3. Weather / Air pressure / Humidity is the amount of water vapour present in the air.
4. Exhaled air has a higher / a lower / same percentage of carbon dioxide than inhaled air.
5. Air exerts pressure in one direction / all directions.

WATER TOO SUPPORTS LIFE

Water is as important as air for our survival. We need water to drink when we are thirsty. We cannot stay thirsty for long. Plants too cannot live long without water. Water is also needed for cooking, bathing, working and construction work.

It is important for us to drink pure water. The purest form of natural water is rainwater. Rainwater can dissolve substances from the air, collect dirt, certain living and dead things and other impurities. This water must be purified and made suitable for drinking.

Impurities in water

The water in wells and rivers is impure due to **a. insoluble impurities** which can be seen, **b. soluble impurities** which cannot be seen, and **c. disease-causing germs.**

Activity 7 Half fill a test tube with water and add two spoons of salt to it. Observe it minutely. Repeat this with sugar, sand, copper sulphate, gravel, tea leaves and talcum powder. What do you observe?

You will see that some solids dissolve in water but others do not. When a solid dissolves in a liquid, a solution is formed. Which of the above solids dissolve in water to form a solution?

Removal of insoluble impurities

Insoluble impurities present in water may be removed by sedimentation and decantation.

Activity 8 Take a mixture of soil and water in a beaker. Stir it well with a glass rod. Allow the mixture to stand for a few minutes. The heavier soil particles will settle down at the bottom of the beaker. This is **sedimentation**. Now carefully drain the clean water into another beaker. This is called **decantation** (Fig. 12.8).

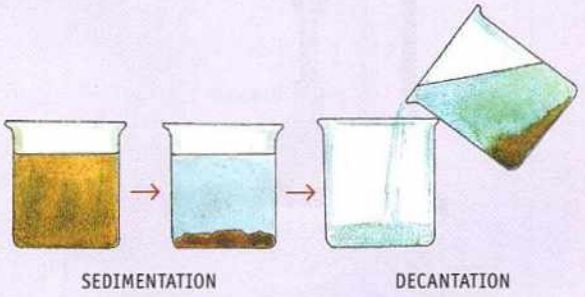


Fig. 12.8 Sedimentation and decantation

We can also separate the mixture of soil from water by using filter paper. This process is called **filtration** (Fig. 12.9).

Activity 9 Take a circular filter paper and make a cone by following the steps shown in Figure 12.9a. Place the cone inside a funnel. Place the funnel on the mouth of a conical beaker. Pour the mixture of soil and water over the filter paper by using a glass rod (Fig. 12.9b). What happens? Drops of clear water will trickle into the beaker and collect as clear filtrate. Soil particles will be left on the filter paper.

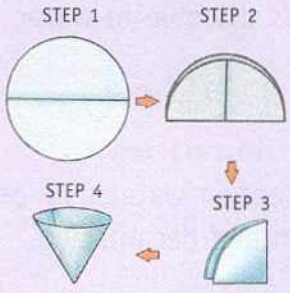


Fig. 12.9a Folding filter paper to form cone

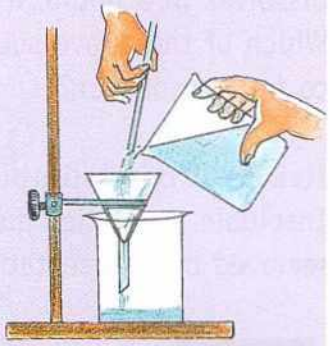


Fig. 12.9b Filtration

Removal of soluble impurities

Soluble impurities may be removed from water by evaporation and by distillation.

Activity 10 Take some water in a beaker and dissolve two teaspoons of salt in it. Take some of this salt solution in a dish and heat it. You will see that water evaporates leaving behind salt in the dish.

The process of changing of water or any other liquid to vapour by heating is called **evaporation**.

Distillation is a method which separates impurities from water.

In distillation, impure water is heated till it starts boiling. On boiling, the water evaporates and the impurities remain behind. The water vapour enters the condenser, which is kept cool by the cold water circulating around it. On entering the cool condenser the hot steam or water vapour changes into water again. It collects in the flask below. Distilled water is the

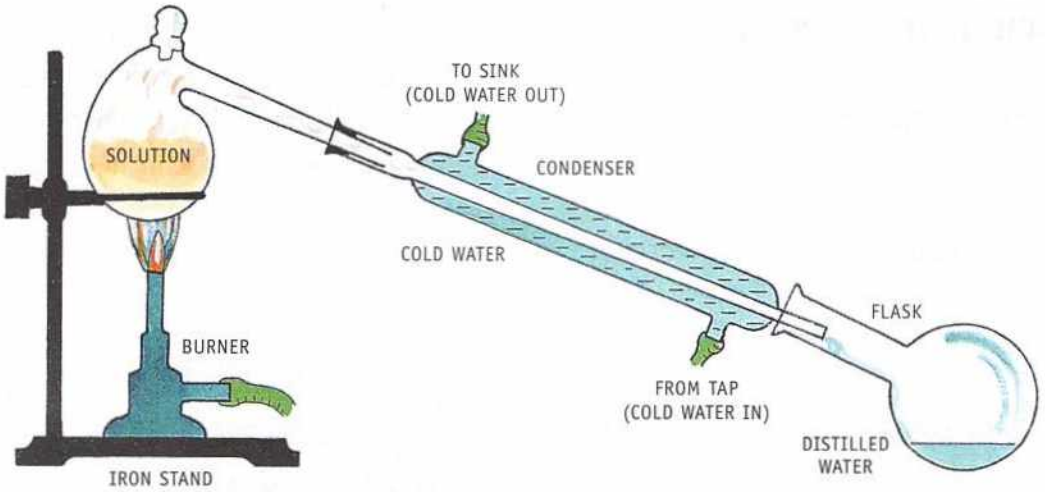


Fig. 12.10 Distillation

DISTILLATION (dis-til-ay-shun) purification of a liquid by changing it into vapour by heating and then condensing it into a pure liquid (by cooling)

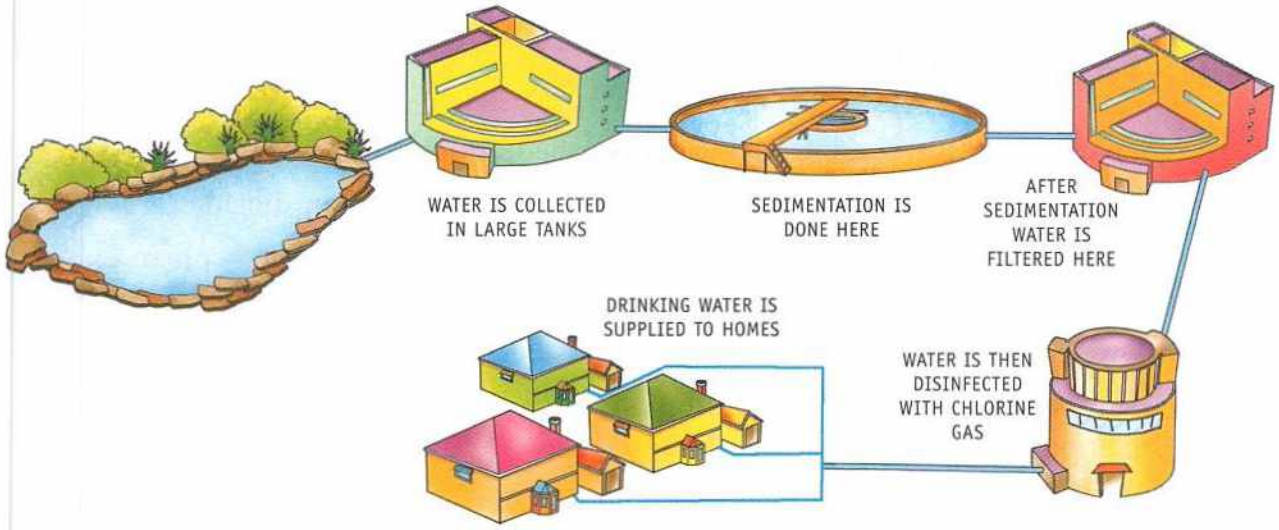


Fig. 12.11 Treatment of town water supply

purest form of water. It does not contain any impurities or germs. The impurities that were dissolved in the water are left behind in the heating flask. This water is mainly used in car batteries, science experiments and in medicines.

PURIFICATION OF DRINKING WATER

For healthy living clean water is necessary for drinking and cooking. Impure water contains many disease-causing germs like those of cholera, jaundice and dysentery. In large towns, the water supplied to the public is purified and filtered before being piped for domestic use.

Three methods are mainly used for treatment of water.

SEDIMENTATION: Water collected in large open tanks is left undisturbed for a few days. This way the heavier suspended impurities sink to the bottom. Air and sunlight kill many harmful bacteria. Chemicals like alum are also added to purify the water. This water is now safe for drinking.

FILTRATION: After sedimentation, the water is filtered through a clean sandbed to remove finer suspended particles.

CHLORINATION: Water is then disinfected with a very small quantity of chlorine gas to kill bacteria. This water is now safe for drinking.

We can purify water and make it fit for drinking by using the following methods.

- Boil water for at least ten minutes. Boiled water may be strained through a clean piece of cloth and stored in a clean container.
- Use a water filter to store drinking water. Clean the filter regularly as a dirty filter is a breeding ground for disease-causing germs.
- Add potassium permanganate crystals to wells for killing germs.

Underground water from deep springs and deep wells is usually free from insoluble impurities and safe to drink.

CHLORINATION (klo-ree-nay-shun) method of disinfecting water with a small amount of chlorine gas

Let us say it again 

- The blanket of air surrounding the earth is called atmosphere.
- Air is a mixture of many gases like nitrogen, oxygen and carbon dioxide.
- The five layers of atmosphere are the troposphere, stratosphere, mesosphere, thermosphere and exosphere.
- Air has weight, occupies space and exerts pressure.
- Water can be purified by sedimentation and decantation, filtration, evaporation or distillation.
- Disease-causing germs can be killed by boiling water or by adding chlorine to it.

Let us answer 

A. Tick (✓) the correct answer.

1. This gas is present in air in the maximum percentage.
   a. oxygen b. carbon dioxide c. nitrogen d. argon
2. Which of the following changes into clouds, rain, fog and snow?
   a. argon b. water vapour c. oxygen d. hydrogen
3. This process is used to remove insoluble impurities from water.
   a. sedimentation b. chlorination c. distillation d. evaporation
4. Impure water contains many disease-causing germs like those of
   a. cholera. b. jaundice. c. dysentery. d. all of these
5. This water is mainly used in car batteries, science experiments and in medicines.
   a. boiled water b. distilled water c. tap water d. sea water

B. Fill in the blanks.

1. The thick blanket of air is held around the earth by the earth's _____
2. Plants get nitrogen with the help of bacteria in the _____
3. _____ is used in making colourful electric lights.
4. The air we breathe out is called _____ air.
5. When there is more water vapour in the air we say that the air is _____
6. The higher we go, the _____ is the air pressure.
7. When a solid dissolves in a liquid, a _____ is formed.
8. _____ water is the purest form of water.

C. Write short answers.

1. Name any four gases present in the air.
2. How does water vapour form in the atmosphere?
3. Why should drinking water be purified?
4. Name three processes involved in the treatment of the town water supply.

D. Answer these questions.

1. How is air useful to us?
2. How is stratosphere a very important layer of atmosphere?
3. When a burning candle is covered with a glass, it gets extinguished. Why does this happen? What does this activity show?
4. What is sedimentation and decantation?
5. Explain filtration with the help of a diagram.
6. What is distilled water? What are its uses?

HOTS questions

E. Think and answer.

1. When oil from a tin is poured through a funnel placed tightly into the neck of a bottle, the oil stays in the funnel. Why?

   Raise the funnel a little and place it again on the bottle. Oil starts flowing into the bottle. Why does this happen?
2. Empty bottles of mineral water should be crushed before throwing them into the dustbin. Why?
3. A bottle of coke or soda should not be left in the freezer for a long time. Why?
4. On the night of Diwali, sometimes we have difficulty in breathing. Why?

Let us do

ENRICHMENT ACTIVITIES

F. Plants give off water from their leaves.

- Select a healthy potted plant with plenty of leaves.
- Cover the plant with a polythene bag and tie it tightly around the stem.
- Place this plant in a lighted area (not in direct sunlight).

Next day observe the inside of the polythene bag. What do you observe?
Try the same activity with a plant that has lost all its leaves.
Now compare the results.

G. Air pressure can crush a can. Request an adult to help you do this experiment.

Use an empty soft drink can for this simple experiment. Fill a little water in the can and heat it till the steam comes out. Seal the hole after removing it from the fire. Push the can into a bucket of water. What happens? Can you explain why it happened?

H. Make your own 'water filter'.

Things required: a clean plastic bottle, a glass, pebbles, gravel and sand

Method:

- Cut off the bottom of a clear plastic bottle. Stuff the neck of the bottle with clean cottonwool.
- Turn the bottle upside down and place it on a clean glass.
- Over the cottonwool, spread a layer of small pebbles, then gravel and above that a layer of sand. All pebbles, gravel and sand must be washed before putting in the bottle.
- Pour dirty water over these layers of filter.

Watch the water drops trickling down through the cottonwool. This way dirty water is being filtered and all the insoluble impurities are removed from the water. Remember, this water is still not fit for drinking. Do you know why?

I. Class project

We get water from different sources. We must ensure that the water we drink is absolutely clean and germ-free. Find out, how the water in your home is made clean and germ-free. Tick (✓) the method used in your kitchen.

- boiling ☐
- filtering ☐
- using water purifier ☐
- any other ☐

How do these help in keeping the water germ-free?

Check how drinking water in your school is made safe for drinking. From a newspaper or a magazine cut out any advertisement that guides you on pure drinking water and paste in your notebook.

TEACHER'S NOTES: All the experiments given in the book should be done either in the class or at home. Make a model of treatment of town water supply.

13

Our Earth's Natural Satellite

AIMS

To enable the student to

- know about the moon and the satellites
- distinguish between solar and lunar eclipses
- know the purpose of sending artificial satellites into space
- be aware of India's contribution to space research

AIDS

- CDs, films, pamphlets, pictures and posters on 'Man on the Moon'
- films and CDs on space
- a tennis ball, a rubber ball and a lamp (to show the formation of an eclipse)

In Class 4, we read about the earth, the planets and the seasons. Let us now study about the moon and other satellites.

As the earth goes round the sun, the moon goes around the earth. The moon is our earth's closest neighbour in **space**. The moon is the earth's natural satellite. A **satellite** is an object which revolves around a planet.

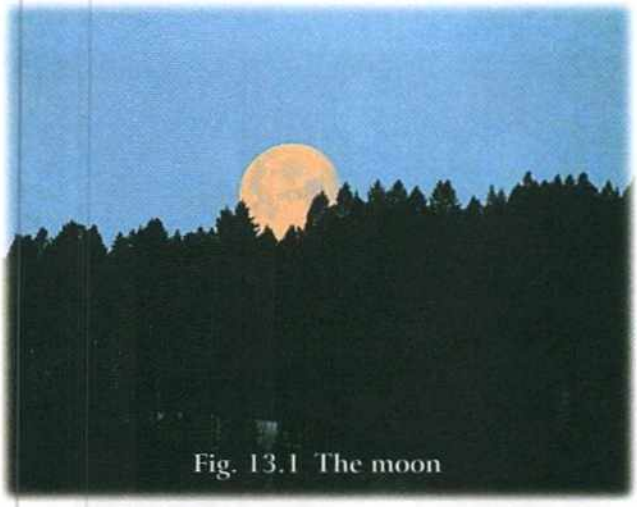


Fig. 13.1 The moon

WHY DOES THE MOON SHINE?

The full moon is the brightest heavenly body in the night sky. It does not have any light of its own, but shines because it reflects the light of the sun that falls on it. It is smaller than the sun though it appears to be of the same size. This is so because the moon is closer to us than the sun.

The moon is about 3,84,400 km away from the earth. It is smaller than the earth. The moon is a natural satellite of the earth.

SPACE region beyond the atmosphere
SATELLITE (sat-el-light) a small body revolving around a planet in space

THE SURFACE OF THE MOON

The surface of the moon is rough and uneven. It is made of great plains and huge mountains. There are big, round hollows called **craters** on the moon. These craters are formed when pieces of rocks called **meteorites** dash into the surface of the moon. The surface of the moon is scarred with millions of craters. The rocks that were brought back to earth by astronauts tell us that the surface of the moon is covered with dark grey dust. The moon is about 4,500 million years old, the same age as the earth.

PHASES OF MOON

The different shapes of the moon, as visible from the earth, are called its **phases**. The shape during a particular phase depends on the lighted part that can be seen by us at a time on earth.

THERE IS NO LIFE ON THE MOON

There is no air or water on the moon. No life can exist there. The moon's gravity is one-sixth of the gravity of the earth. On the moon you can easily lift objects that would be too heavy for you to lift on earth. There is no layer of atmosphere surrounding the moon's surface, so there is no protection from the strong rays of the sun. The side of the moon facing the sun is extremely hot and the side away from the sun is too cold to support life.

In the absence of air, no sound can be heard on the moon. The sky is always bleak and there are no clouds to hide the sun. It is a lonely and silent place, without any animals, plants or lakes.

The earth is surrounded by a layer of the atmosphere which absorbs a part of the strong heat of the sun and allows only a part to reach the earth during day. At night it does not allow the heat of the earth to escape. The atmosphere protects us from dangerous radiations and **meteors** which would otherwise have fallen on the earth.

LANDING ON THE MOON

The American spacecraft **Apollo 11** landed

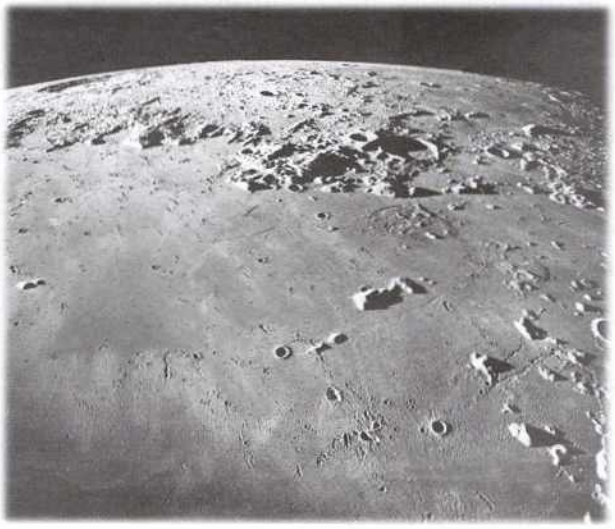


Fig. 13.2 The surface of the moon

Fig. 13.3 Phases of the moon

Fig. 13.4 The American spacecraft Apollo 11 that landed on the moon on 21 July 1969 with the three astronauts.

successfully on the moon on 21 July 1969. Neil Armstrong and Edwin Aldrin stepped on the moon's surface, while the third astronaut, Michael Collins, remained in the spacecraft to circle the moon and keep in touch with the earth.

Oral Questions

Choose the correct answer.

1. The satellite / meteor / sun is an object that revolves around a planet.
2. The craters on the surface of the moon are formed by pieces of rocks called meteorites / planets / ball of fires.
3. There is no air and life on the moon / earth.

ECLIPSES OF THE MOON AND THE SUN

An **opaque object** is one through which light cannot pass. When light falls on an opaque object its shadow is formed. The earth and the moon are opaque objects. When the sun's light falls on the earth and the moon, their shadows are formed and they 'play' hide and seek. Eclipses are nothing but the shadows of the earth and the moon.

The moon constantly revolves around the earth. At times during this journey the moon moves into the dark shadow of the earth and does not receive any sunlight. Then it gets hidden from view. We call this an eclipse of the moon or **lunar eclipse**.

When the moon is completely in the dark shadow of the earth, it is a **total lunar eclipse**. When the moon is only partly hidden by the dark shadow of the earth, it is a **partial lunar eclipse**. When the moon comes out of the shadow of the earth, the eclipse is over and the moon can be clearly seen. At the time of the eclipse, the sun, the earth and the moon are in a straight

IT'S A FACT!

Three Chinese astronauts made a jubilant return to Earth on 28 September 2008 after successfully completing the country's first-ever spacewalk. The sole task of mission commander Zhai Zhigang was to retrieve an experimental rack attached to the outside of the orbital module. He remained suspended in space for about 13 minutes!

ECLIPSE (ek-lips) blocking of the light of sun or moon by the shadow of another heavenly body

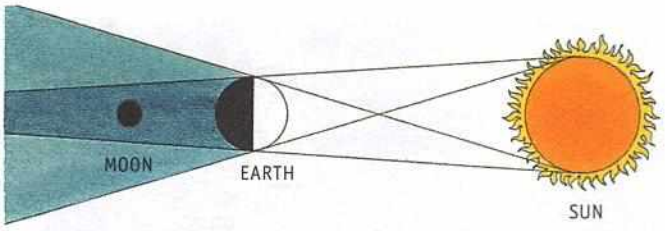


Fig. 13.5 A lunar eclipse

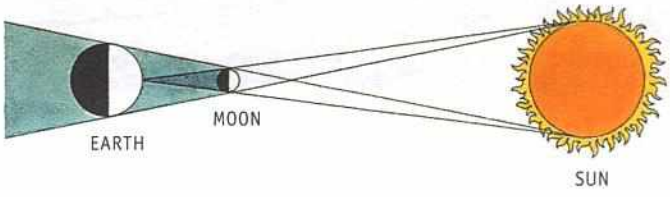


Fig. 13.6 A solar eclipse

line as shown in Figure 13.5. A lunar eclipse occurs only at night.

Just as the earth casts a shadow on the moon, the moon also casts a shadow on the earth. When people in the shadow of the moon cannot see the sun, it is an eclipse of the sun or a **solar eclipse** (Fig. 13.6).

When the sun is completely hidden behind the shadow of the moon, it is a **total solar eclipse**. When the shadow of the moon hides only a part of the sun, it is a **partial solar eclipse**.

At the time of the eclipse, the sun, the moon and the earth are in a straight line as shown in Figure 13.6. Once the moon moves out of the line the eclipse is over and we can see the sun again. A solar eclipse occurs only during the day.

You should not look at a solar eclipse with naked eyes. It can harm your eyes.

THE MOON AND THE TIDES

Although the moon's gravity is very weak, it has a noticeable effect on the earth. It pulls the waters of the seas and oceans of the earth, causing **tides**. Since the moon is closer to the earth than the sun, the moon's pull on the water is stronger than that of the sun. The water of the seas and oceans, on the side of the earth facing the moon, is attracted upwards. This attraction causes **high tides**. In the areas between the two high tides the water forms **low tides**.

The rotation of the earth causes two low tides every day. The intensity of the tides vary with the phases of the moon. The highest tides occur at the time of the new moon and the full moon.

ARTIFICIAL SATELLITES

Artificial satellites are man-made objects which revolve around the earth just as the moon does. The earth's only natural satellite is the moon. Like the moon, artificial satellites reflect the sun's light and can be seen clearly in the night sky. The space age

Fig. 13.7 An artificial satellite

TIDES the periodic rising and falling of sea and ocean water
ARTIFICIAL SATELLITE a man-made object, equipped with scientific instruments sent into space to orbit the earth or another planet

began in 1957 when the first man-made satellite, **Sputnik 1**, was launched to orbit in space by Russian scientists. Since then thousands of satellites have been sent into space. On 12 April 1961, Major Yuri Gagarin of Russia became the first man in the world to go into space. Valentina Tereshkova of Russia was the first woman to go into space. On 3 April 1984, Squadron leader Rakesh Sharma became India's first man to go into space. Who was the first Indian woman to go into space?

Aryabhata, launched in 1975, was the first Indian satellite. Bhaskara, Rohini, Apple, Insat 1A, Insat 1B, Insat 1C, Insat 1D, Insat 2A, Insat 2B, Insat 2C, Insat 3B, Insat 3C, Insat 3A and Insat 3E are some other Indian satellites. In April 2008, India launched CARTOSAT-2A, a remote sensing satellite, into space.

Uses of artificial satellites

A rocket is used to launch an artificial satellite into space. Initially, artificial satellites were designed for scientific research and to give us valuable information about the atmosphere surrounding the earth. Satellites which send messages from one country to another are called **communication satellites**. They are used to send signals of television programmes from one country to another.

Weather satellites take pictures of the movements of clouds and help us forecast weather. They can give us early warnings of dangerous storms or cyclones building over the seas, forest fires, floods or moving glaciers. Astronomers use satellites to take special measurements of our solar system, stars and galaxies.

Fig. 13.8 Astronauts wear spacesuits when they go into space.

SPACE TRAVEL

Space travellers like Rakesh Sharma, Kalpana Chawla and Sunita Williams have inspired young people to go into space.

Astronauts first learn about space. This takes years of hard work. There are telescopes on earth to give them a clear view of space. Nowadays there are Hubbles telescopes that float in space. They give a better view and more detail. The Mission Control on the earth sends spacecraft with astronauts into space by means of rockets.

In space stations, there are modules to work and modules to keep alive. Since there is no air in space the astronauts have to wear spacesuits. Actually these suits create a small atmosphere around their bodies. These special suits enable them to float.

Spacemen have to do different jobs. Some do experiments, some work inside the shuttle, some do repair outside the spacecraft. Some even fix satellites.

When the mission is over the astronauts come back in space shuttles. The shuttles can be used again and again but rockets can be used only once.

Let us say it again 

- The moon is the earth's closest neighbour in space.
- The moon is the only natural satellite of the earth.
- The surface of the moon is covered with plains, mountains and huge craters.
- There is no life on the moon as there is no air or water.
- Tides are caused in the oceans due to the gravitational pull of the moon.
- When the shadow of the earth hides the whole or a part of the moon, a lunar eclipse occurs.
- When the shadow of the moon hides the whole or a part of the sun, a solar eclipse occurs.
- India has sent many artificial satellites into space from the year 1975 onwards.
- Artificial satellites are very useful.

Let us answer 

A. Tick (✓) the correct answer.

1. The closest neighbour of the earth in space is
   a. the sun. b. Jupiter. c. the moon. d. Mars.
2. Moon is a lonely and silent place because it does not have
   a. flowers. b. air. c. music. d. fire.
3. An object through which light cannot pass is called
   a. solid. b. dark. c. opaque. d. shadow.
4. The first artificial satellite launched by India in 1975 was
   a. Sputnik I. b. Aryabhata. c. Charaka. d. Insat.
5. A person who goes into space is called an
   a. astronomer. b. astronaut. c. astrologer. d. agriculturist.

B. Fill in the blanks with the correct words from the brackets.

1. The surface of the moon is very _____ (smooth / rough).
2. The astronaut who stepped on the moon with Neil Armstrong was _____ (Edwin Aldrin / Michael Collins).
3. When the moon is completely in the dark shadow of the earth, it is a total _____ (lunar / solar) eclipse.

4. Tides are caused in the oceans due to the _____ (shadow / gravitational pull) of the moon.
5. The satellites that send messages from one country to another are called _____ (weather / communication) satellites.

C. Write short answers.

1. Who was the first man to go into space?
2. Who was the first woman to go into space?
3. Name the first man-made satellite.
4. Who was the first Indian astronaut?
5. Name the first person who landed on the moon.
6. What are space telescopes called?

IT'S A FACT!

The spacecraft, Chandrayaan-1 India's first unmanned scientific mission to the moon was finally called off on 30 August, 2009. In course of more than 3400 orbits in 312 days, the Chandrayaan has completed most of the scientific objectives of the mission.

D. Answer these questions.

1. Why does the moon shine?
2. How does the atmosphere surrounding the earth protect us?
3. How are tides caused?
4. How is a solar eclipse caused?
5. What is a partial lunar eclipse?
6. What are artificial satellites? How are these satellites useful to mankind?

HOTS questions

E. Think and answer.

1. We see astronauts floating in space but not on earth. Why?
2. Make a list of things you would need to take on a trip to the moon.

Let us do

ENRICHMENT ACTIVITIES

F. Spotlight dance

Cover the glass of two torchlights with red and green cellophane paper using rubberbands. Switch on the torches and focus them separately on a white sheet.

Now, make the patches overlap slightly. What colour or colours do you find in the common patch? Do this activity in a dark room for better results.

G. Make charts and models.

Divide your class into four teams.

TEAM 1: Use different-sized balls and wire to make models of the solar system.

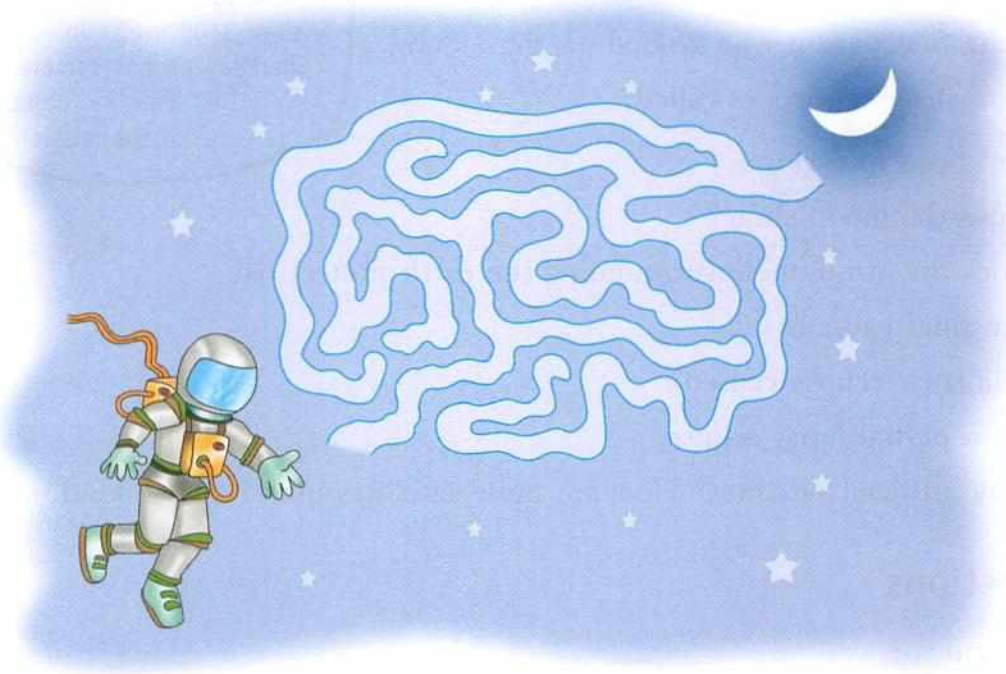
TEAM 2: Find out the names, pictures and details of four artificial satellites.

TEAM 3: Make charts on the details of the moon and the voyages to the moon.

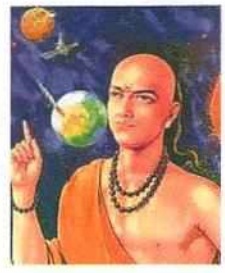
TEAM 4: Collect information on Chandrayaan I and make a chart on it.

Now organize an exhibition on the universe and display your charts and models.

H. Abhay wants to visit the moon. Help him reach the moon.



Let us meet



We know **Aryabhata** was the first satellite India put into orbit.
The man after whom this satellite was named lived over 1500 years ago. He studied and taught astronomy and mathematics at the University of Nalanda. He was the first man to tell us that eclipses occur because of the shadows cast by the earth and the moon, and not because Rahu gobbles up the sun or the moon as was believed earlier! His data on astronomy is still valid and is used in preparing the **Panchang** (calendar).

TEACHER'S NOTES: Organize a visit to the nearest planetarium. Working models of solar and lunar eclipses may be shown in the classroom.

14

Natural Disasters

AIMS

To enable the student to

- identify different types of natural disasters
- know what is seismograph
- know how an earthquake occurs
- know the different types of volcanoes
- know the ill effects of tidal waves and drought

AIDS

- some news clips or movie clips
- picture showing earthquake-affected area, drought-affected area, etc.
- model of a seismograph

When our life is in harmony with nature, things seem to be smooth and pleasant. When living things on earth become victims of nature's fury we say that a natural disaster has happened. Natural disasters may destroy a part of life and property. Some such disasters which might affect our lives are earthquakes, volcanoes, tidal waves and drought.

EARTHQUAKES

An earthquake is a sudden shaking of the ground caused by movements or vibrations deep inside the earth. These vibrations release great energy and can cause the ground to quiver. Earthquakes of high intensity often cause great destruction on the earth's surface.

The earth's upper layer, the **crust**, is made of large and small **plates**. The layers of the earth under the plates are hot and in a molten state because the **core** below is extremely hot. These **layers under the plates** are constantly moving. Usually such movements cause the plates to slide smoothly against each other. However, at

Fig. 14.1 A building collapsed during an earthquake

times the movements between the plates can be sudden giving rise to earthquakes.

When the ground shakes, houses, buildings and bridges shake. When an earthquake lasts for some time, structures shatter, roads crack and communication systems collapse. There is loss of life and property.

Earthquakes are measured on the **Richter Scale**. This scale was invented by Charles Richter in 1935. The Richter Scale starts from magnitude 1 and upward. Earthquakes of magnitudes 1 or 2 can hardly be felt but those of 3 or 4 can be felt. The ones that measure 5 or 6 cause major damage.

Fig. 14.2 Lava flowing out of a volcano

Fig. 14.3 Mount Etna

Earthquakes generate waves that travel all over the earth. They can be detected with an instrument called a **seismograph**. People who study earthquakes are called **seismologists**. They try to predict earthquakes so that the people likely to be affected have time to move to a safer place.

The seismograph consists of a frame, a spring, a stone, a drum, paper and a pen. As the earth trembles the spring moves the pen over the paper wrapped on the drum. This reading or pattern obtained on the paper is called a **seismogram**.

VOLCANOES

The word 'volcano' comes from the name Vulcan, the Roman god of fire. A **volcano** is an opening on the earth's surface, which allows hot, molten rock, ash and gases to escape from below the surface. These burst out of the crust through a vertical tunnel called a **vent**. This hot molten rock is called **lava**. The lava spreads over the land sometimes covering an entire region. When lava is below the earth's surface it is called **magma**. Some volcanoes are formed under the sea. When the lava cools down, the area formed looks like a new island.

Based on the nature of the eruptions, volcanoes can be **active**, **dormant** or **extinct**.

Volcanoes that have erupted in recent years and may erupt again any time are called active volcanoes. Many active volcanoes can be found in the Pacific area. Famous active volcanoes include Mount Vesuvius, Mount Etna, Mount Erebus and Mount Fuji. The Barren Island is the only active volcano in the Indian subcontinent.

Fig. 14.4 Barren island, the only active volcano in India

Fig. 14.5 Destruction caused by tidal waves

It is located in the Andaman and Nicobar islands. Volcanoes that have not erupted in recent years but may erupt in the future are called dormant volcanoes. Volcanoes which have stopped erupting are called extinct volcanoes.

IT'S A FACT!

The eruptions of the Eyjafjallajökull volcano of Iceland in 2010 threw out fine, glass-rich ash into the atmosphere. It thereby disrupted air traffic across western and northern Europe and caused inconvenience to air travel.

TIDAL WAVES

Tidal or storm waves are also known as **tsunamis** (pronounced su-nami). A tsunami is caused by an undersea earthquake or by a severe hurricane or cyclone. Storm waves from the sea come rolling towards the shore. They cause destruction on the seashore within seconds.

Tidal waves as high as 15 metres have been recorded. If there is already a high tide then storm waves hit the land. They can cause severe damage. These giant waves travel at a speed of 800 km/h. This results in destruction of life and property in the area.

On 26 December 2004, an earthquake measuring 9.0 on the Richter Scale hit off the coast of Indonesia. It triggered a massive tsunami that resulted in widespread death and destruction across South Asia. There were over 1,50,000 dead across 11 countries with Indonesia, Sri Lanka, India and Thailand being among the hardest hit. Over 5 million people became homeless.

Oral Questions

Choose the correct answer.

1. The crust or the upper layer of the earth is made of plates / stones / volcanoes.
2. Based on the nature of eruptions, volcanoes / tsunami can be active, dormant or extinct.
3. The magnitude of tsunami / tidal wave / earthquake is measured on Richter Scale.
4. The liquid that comes out of a volcano is called lava / magma / core.

Fig. 14.6 Water is scarce in drought-affected areas.

DROUGHT

If a particular area receives no rain or less rain than normal for a long period, it is said to be affected by **drought**. However, it is not only the lack of rainfall that causes drought. Hot dry winds, very high temperature and evaporation of moisture from the ground can result in conditions of drought.

Drought-affected areas

People have to wait for help to come in the form of food, water and medicines from neighbouring places or international agencies.

India has faced three major droughts in the twentieth century—1904–05, 1965–66 and 1986–87. The 1987 drought was known as the drought of the century and had a major impact on one-third of the country.

Let us say it again

- Natural disasters make life miserable for those affected.
- Earthquakes cause loss of life and property.
- Seismologists use seismographs to measure earthquakes on the Richter Scale.
- Volcanoes occur when lava from deep within the earth rushes out through weak spots in the crust. Volcanoes can be active, dormant or extinct.
- Tidal waves are rolling waves which rush towards the seashore. These are called tsunamis.
- Drought is caused by dry conditions. In drought-affected areas people often face famine.

Let us answer

A. Tick (✓) the correct answer.

1. Structures shatter, buildings shake, roads crack and communication fails during
   a. spring. b. winter. c. earthquakes. d. summer.
2. Those who study earthquakes are called
   a. geologists. b. seismologists. c. astronomers. d. astrologers.
3. The drought of the century in the history of India was in
   a. 1904–1905. b. 1962–1963. c. 1986–1987. d. 2008–2009.

4. _____ is a famous volcano.

a. Mt Vesuvius b. Kutch c. Bhuj d. Latur

B. Write T for True or F for False.

1. The layers of the earth under the plates are stationary.
2. A seismograph consists of a frame, a spring, a stone, a drum, paper and a pen.
3. When magma is below the earth's surface it is called lava.
4. Tidal or storm waves are also called tsunamis.
5. Drought is caused by moisture in the air.

C. Write short answers.

1. What are earthquakes?
2. What is magma?
3. What is a tsunami?
4. Name three active volcanoes.

D. Answer these questions.

1. What is a seismogram?
2. How do earthquakes affect the earth and its people?
3. How do volcanoes erupt? Name three types of volcanoes.
4. How does a tsunami affect human life?
5. What is drought? Name the conditions that can cause a drought.
6. How do people suffer in drought-affected areas?

HOTS questions

E. Think and answer.

1. We generally hear about epidemics after any natural disaster. Why?
2. Sometimes earthquakes cause fires. How?

Let us do

ENRICHMENT ACTIVITIES

F. Amazing volcano

Make a cone with thick chart paper. Make a hole on the top of the cone with some strips falling around. Keep a glass with orange-coloured water and sodium bicarbonate on a table. Cover it with the cone. Drop some vinegar into the glass. See what happens. What you see is the eruption of a 'volcano'.

G. There are some words from the lesson in this wordsearch. Circle them.

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

H. Write a report.

Collect information on safety measures which can be taken during an earthquake. You can take help from your library, newspapers, magazines or the internet. Write a report in 200 words. Paste pictures below your report.

A subject link

(ENGLISH)

I. Read an extract from a real incident which occurred on 26 December 2004 when huge tsunami waves hit India's coast. Circle the adjectives.

"Run away!" her husband screamed from a rooftop. He had just spotted the colossal tsunami waves rushing towards the shore. The giant waves that would crush or wash away at least 1,23,000 lives on the shores of the Indian Ocean.

Sangeeta grabbed her youngest two children and ran. She thought the oldest, seven-year-old Dinakaran, would be able to outrun the tsunami churning toward their home. Dinakaran headed for the safest place he knew.

TEACHER'S NOTES: Talk to the children about the calamities we have faced in the last two decades. Guide the children to make the model of a volcano.

15

Changes in Our Environment

AIMS

To enable the student to

- understand the concept of greenhouse effect
- know the concept of global warming
- know the various ill effects of global warming
- know the various steps to reduce global warming
- know about pollution and how to control and prevent it

AIDS

- a model of a glasshouse
- CDs, pictures and posters on global warming
- charts on controlling pollution
- information about environmentalists like Sunderlal Bahuguna
- a DVD of Al Gore's film name

Our environment consists of living and non-living things like air, water, land, plants and animals. These interact with each other. However, human beings change the environment to suit their needs. Your great grandparents lived in a different environment. The houses were well-ventilated, there was greenery all around, there were few electric gadgets, less vehicles on the road and fresh air. Gradually human beings have changed the grasslands around them into farmlands. Parts of forests have been cut down to build colonies and factories. Wildlife habitats have been reduced or destroyed.

Human activities have made some changes in the atmosphere too. Factories are set up every day to meet increasing demands. The number of vehicles on the road is increasing day by day. The amount of smoke produced also keeps

Fig. 15.1 A greenhouse is a glasshouse where we grow plants, especially in winter.

increasing. Thus, air, water, and land are getting more and more polluted.

A **greenhouse** is a glasshouse where we grow plants, especially during winter. In a greenhouse the climate is controlled. The sun's rays pass through the glass and warm up the inside of the house.

Plants grow well in the warm and moist air of a greenhouse. What makes it warm? The ultraviolet and infrared rays from the sun bring in heat and light energy. The glass walls of a greenhouse do not allow the heat to escape.

GREENHOUSE GASES

The earth's atmosphere is a blanket of gases. Some of these gases like carbon dioxide, nitrous oxide, methane and water vapour have the property of trapping energy from the sun.

These gases do not allow the heat to escape back into space. They warm up the earth. These gases are called **greenhouse gases** and this effect is known as the **greenhouse effect**. This effect means an increase in the concentration of greenhouse gases in the atmosphere which leads to an increase in the amount of infrared radiation close to the surface of the earth.

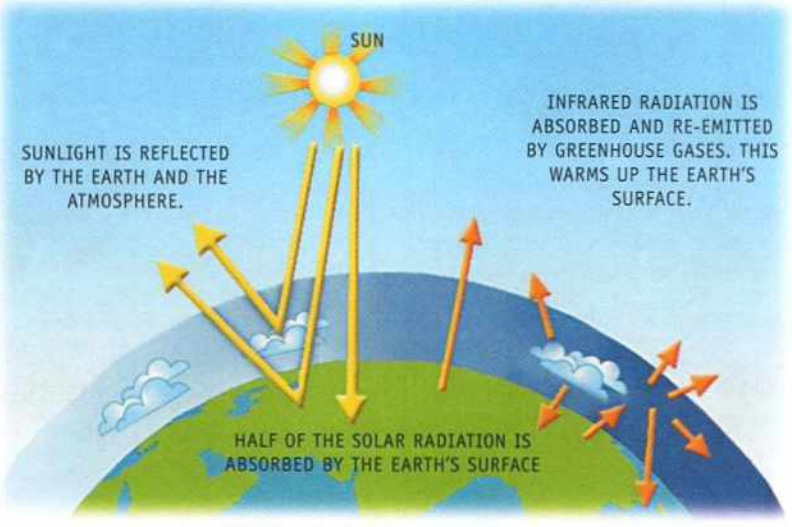


Fig. 15.2 Greenhouse effect

Carbon dioxide

The amount of carbon dioxide in the atmosphere has been increasing gradually over the last hundred years. The main reasons are the burning of fossil fuels and the destruction of rainforests. If carbon dioxide keeps on increasing at the present rate, more heat will be trapped in the atmosphere and the temperature of the earth could increase.

Methane

Methane is a natural gas. When grass-eating animals digest their food, their systems release a large quantity of methane into the atmosphere. The waste from animals called manure, is used as fertilizers. This releases more methane into the atmosphere. This gas warms up our planet.

Water vapour

Water vapour accounts for 35–75 per cent of the greenhouse effect.

Ozone

Ozone is found in the stratosphere.

CFC

CFC (chlorofluorocarbon) is a chemical widely used in refrigerators, air conditioners and in many other industrial processes. It too warms up the atmosphere.

Oral Questions

Choose the correct answer.

1. A greenhouse is a glasshouse / concrete house where we grow plants.
2. Water vapour / Methane / Ozone causes 35%–75% of greenhouse effect.
3. CFC is widely used in refrigerators / car engines.

THINK GREEN!

Trees help to maintain the balance in nature. A single tree can absorb approximately one ton of carbon dioxide during its lifetime. So, plant trees whenever and wherever possible.

GLOBAL WARMING

Greenhouse gases in the atmosphere trap the heat of the sun and there is a rise in temperature on the earth. This is called **global warming.**

In the last hundred years the average temperature of the earth has risen by 1°F and in the next century it may rise about 2°–6°F. This will change the climate for the worse.

The effects of climate change are visible—melting polar ice caps, rise in water levels of oceans and flooding of places near the sea.

Efforts need to be made to reduce the warming-up process. Each country, especially the ones which release more greenhouse gases, should reduce them. That is the only way to prevent a major disaster.

Fig. 15.3 Melting of polar ice due to global warming

Each one of us can do our bit by using electricity carefully, reducing the use of fuel, using mass transport systems like the bus or the metro, growing more trees and using recycled products.

Many countries have signed agreements aimed at reducing greenhouse gases. One such agreement is the Kyoto Protocol.

POLLUTION

Pollution is the spoiling of land, air and water. Smoke from vehicles, factories and houses fouls the air. Garbage from houses thrown in the open pollutes land and air, and causes diseases.

Spilling of oil or petroleum and dumping of chemical wastes from factories into rivers and seas harm water plants and animals. When nuclear power stations produce electricity, harmful poisonous waste mixes with the air.

STEPS TO CONTROL POLLUTION

We must restrict the use of vehicles and electricity.

Local bodies like Panchayats, Municipalities and Corporations must make people realize that pollution can be reduced if

- factories are located in areas away from places where people live;

Fig. 15.4 Pollution spoils the beauty of nature and causes health problems.

- tall chimneys fitted with filters are used in factories to let out smoke and gases.
- waste is treated and made harmless before being dumped into water bodies.
- garbage (wet or dry) from houses is thrown at proper dumping places.
- the use of plastic bags is reduced.

The white marble of the Taj Mahal in Agra is turning yellow because of the chemicals given out by factories around it. To save the monument, many factories have been closed down or relocated.

Trees help to keep the air clean. So, trees have been planted around the Taj Mahal. Monuments like the Red Fort are periodically renovated by the Archaeological Survey of India.

Reuse and Recycle

This is done to reduce the accumulation of waste like metals, paper, clothes, rubber and plastic in landfills. These materials can be reused directly or recycled and then reused.

RUBBER: Used tyres can be cut into shapes of swing seats, climbing frames and rubber slippers or chappals. Rubber tubes are also used to make jewellery items like beads, rings and bracelets.

Old truck tyres are recycled to make playground surfaces, pencil pouches and diary covers.

METAL: Metal objects thrown away by people can be reused. People buy pipes, rods and gates from scrap dealers for reuse as they are cheaper. Have you seen left over metal sheets with holes used to make racks and cages?

Craftsmen buy and melt pieces of scrap to make frames, decoration pieces and jewellery.

Every new car has some recycled part of an old car. Empty aluminium cans are cleaned, shredded, melted and reshaped into new cans for reuse.

THINK GREEN!

Deforestation and unnecessary killing of animals threaten the life of both. We need to grow more trees. Vanamahotsava every year is one way of doing so. The Chipko Movement in Garhwal and the Appiko Movement in Karnataka are some efforts of nature lovers to protect trees. Similarly, we should protect our wildlife.

Let us say it again 

- Human beings change the environment not only on land but in the atmosphere too.
- A greenhouse is a glasshouse which is kept warm by sunlight so that plants get enough warmth.
- A few gases go up in the air, form a covering in the atmosphere and do not allow the heat to escape. These are called greenhouse gases.
- The heating up of the earth is called global warming. The gases that do this are mainly carbon dioxide, water vapour, nitrous oxide, ozone and methane.
- The results of global warming are seen in many parts of the earth.
- In an effort to reduce greenhouse gases, nations have signed agreements. Let us hope this helps to prevent disasters.
- Pollution means the spoiling of land, air and water.
- Many old objects can be reused or recycled.

Let us answer 

A. Tick (✓) the correct answer.

1. The increase in the number of factories and vehicles has resulted in the increase of
   a. oxygen. b. methane. c. carbon dioxide. d. water vapour.
2. The earth's atmosphere is a blanket of
   a. wool. b. gases. c. water vapour. d. dust particles.
3. Which of the following gases is not a greenhouse gas?
   a. carbon dioxide b. oxygen c. methane d. CFC
4. The change in climate is leading to the
   a. melting of ice at the poles. b. rise in water levels of oceans.
   c. frequent flooding of places. d. all the above
5. Trees help to clean the
   a. water. b. air. c. monuments. d. land.

B. Match the columns.

1. spilling of oil into the sea	a. global warming
2. melting of polar ice caps	b. refrigerator
3. animals give out this gas	c. carbon dioxide
4. CFC	d. harmful for water animals and plants
5. the process of earth getting heated	e. effect of global warming

C. Write short answers.

1. What is a greenhouse?
2. What are greenhouse gases?
3. How are certain monuments getting affected because of pollution?
4. What is global warming?

D. Answer these questions.

1. What do you mean by pollution? How can we prevent pollution of air and water?
2. What should the government do to prevent pollution?
3. How can rubber be recycled?
4. How can metal be recycled?

HOTS questions

E. Think and answer.

1. Destruction of rainforests lead to global warming. How?
2. Man is partly responsible for global warming. Give reasons.
3. If a factory is located near a river, how does it affect the people living close by?

Let us do 

ENRICHMENT ACTIVITIES

F. Which of the following can lead to global warming? Circle them.

burning of fuels air conditioner thick growth of plants
cutting down of trees volcano clouds refrigerator
a herd of cattle in a farm books on a table

G. Say 'NO' to chemicals. Make your own natural colours for Holi.

1. *Haldi* (turmeric) gives a beautiful yellow colour. Mix it with *besan* to be used as dry colour. Boil it with water and leave overnight for using it as wet colour.
2. Beetroot makes a lovely pink colour when boiled in water.
3. *Tesu* flowers, when boiled in water and left overnight give a nice yellow colour.

H. Visit any garden in your city.

TO VISIT

Enjoy the greenery and learn about the lovely flowers, and the colourful butterflies and singing birds.

A life skill 

I. How green are you? Discuss with your partner and tick (✔) the things your family and you do.

1. Do you use a car pool? ☐
2. Do you and your family sometimes use public transport? ☐
3. Do you use natural colours for Holi? ☐
4. Do you tell people not to burn leaves in the park? ☐
5. Do you walk or use a bicycle for going to nearby places? ☐
6. Do you tell your parents not to use plastic bags? ☐
7. Do you reuse paper bags that you get from the market? ☐
8. Do you sell old newspapers, to be recycled? ☐
9. Do you ever buy greeting cards and envelopes that have been printed on recycled paper? ☐
10. Do you throw garbage at the proper dumping place? ☐

A subject link 

(MATHEMATICS)

J. Ramu's father has a rectangular field near a sea shore. Due to global warming and increase in the level of sea water, the length of the field got reduced from 35 m to 30 m.
The width of the field is 20 m. Find the area of the field lost by Ramu's father due to global warming.

TEACHER'S NOTES: Encourage children to reuse old things in their own imaginative way. Discuss and find out ways to reduce pollution.

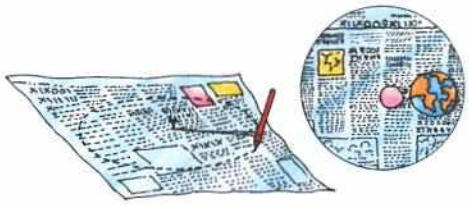
Check Your Understanding

Enrichment Activities

A. I see an egg a-floating.

Usually, an egg sinks in water. Make one float. Add plenty of salt to a glass jar filled with water. Stir with a spoon till it dissolves. Add more salt. Stir again. Go on adding salt till no more can dissolve. Now, gently put an egg in the salty water and watch. Wonder, of wonders, the egg floats. Discuss the reason with your partner.

B. Spacetalk



On a sheet of newspaper, draw a circle as big as you can. Use a drawing pin and a pencil to draw the circle. Cut the circle with a pair of scissors. Now, draw a circle of 25.5 cm radius on this big circle and colour it blue. Near it, draw another circle of 7 cm radius and colour it yellow. The blue circle represents the earth and the yellow circle represents the moon. Compare their sizes by displaying this circular sheet with the 'earth' and the 'moon' on a bulletin board. The actual measurements of the radius of the earth and the moon are: earth — 6378 km, moon — 1738 km.

C. A solar eclipse

Things required: You need a tennis ball and a marble.

Method:

- Hold the ball at arm's length in your left hand in front of your face.
- With your right hand hold the marble in front of the ball.
- Close your left eye and slowly move the marble towards your open right eye.

As the marble nears your face, less and less of the ball will be visible until finally you can no longer see the ball. This is how a solar eclipse takes place. Write about your observation in hundred words.

D. Class project

Divide the class into four groups. Make charts on the different topics given below.

Team 1 finds out about greenhouse gases and their effects. Team 2 finds out about pollution and their effects, Team 3 about global warming and Team 4 about reuse and recycle things.

Organize a class exhibition. Each team can then talk about what they have found. Be ready to answer questions and to write or draw on the blackboard to explain facts.

Annual Test Paper

(based on Lessons 8 to 15)

A. Tick (✓) the correct answer.

1. Insects breathe through
   a. spiracles. b. lungs. c. gills. d. body surfaces.
2. The backbone is made up of _____ small bones, called vertebrae.
   a. 23 b. 13 c. 33 d. 10
3. This looks like a black spot, through which light enters the lens.
   a. pupil b. iris c. cornea d. eyeball
4. It is the vibration transmitted through a solid, liquid or gas.
   a. sound b. electricity c. light d. wind
5. In this process, impure water is heated till it starts boiling.
   a. distillation b. sedimentation c. chlorination d. filtration

B. Fill in the blanks.

1. The mass movement of animals from one place to another is known as _____
2. _____, the powerful thigh bone bears the weight of the whole body.
3. _____ force slows down a moving object.
4. The _____ is our earth's closest neighbour in space.
5. _____ are caused by an undersea earthquake or by a severe hurricane or cyclone.

C. Write short answers.

1. Name one animal that has four paddle-like limbs.
2. Name two migratory birds.
3. Which joint allows movement at the wrist and ankle?
4. Which is the most important gas for the survival of living beings?
5. Name any two active volcanoes.

D. Answer these questions.

1. Describe the three types of levers?
2. What are the different layers of atmosphere? Write a short note on stratosphere.
3. Describe the surface of the moon.
4. What is a Richter Scale? Who invented it?
5. How is the Taj Mahal affected by pollution?

Yoga and You

Try yoga to help relax your entire body. You will not feel pressurized by competitions and exams. You will work better and achieve more.

With yoga you learn to breathe naturally and smoothly. It helps you to be calm, confident and a happier person with a healthy and flexible body. Exercise has a definite role to play in keeping you physically fit. But, Yoga gives relaxation and peace to mind as well. Your internal organs also receive much needed exercise. Yoga teaches us self-control and self-discipline. It keeps one in perfect health.

Salute the Sun
Surya Namaskar

All sessions of Yoga should begin with surya namaskar. It helps the body to become flexible, regulates breathing and focuses the mind.

Fig. 1

POSITION 1: **Inhale** — Stand erect and inhale as in Figure 1 with hands joined close to the chest, feet together and toes touching each other.

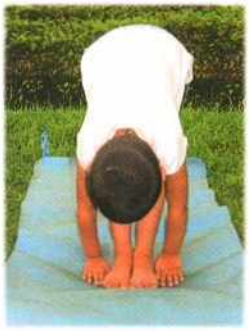


Fig. 2

POSITION 2: **Exhale** — Exhale and bend down till palms touch the ground in line with the toes. Don't bend the knees. At first you may find it difficult to do so but try to bend as much as possible without bending the knees.

Fig. 3

POSITION 3: **Inhale** — Inhale and push back the left leg with toes on the floor. Press the waist downwards. Raise the neck, push the chest forward and push the shoulders back. Keep the right leg and both the arms in the same position (See Fig. 3).

Fig. 4

POSITION 4: **Hold your breath** — Hold your breath and raise the knee of the left leg. Take the right leg backwards and keep it close to the left leg. Straighten both the legs and both the arms. Take care that the neck, the spine, the thighs and the feet are in a straight line.