INTRODUCTION TO ENVIRONMENT: SCIENCE

Book Four

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Preface

For improving the existing quality of Primary Education in Bangladesh, National Curriculum and Textbook Board (NCTB) in collaboration with PEDP-2 initiated an extensive program for development of curriculum and teaching learning materials in 2002. In the light of this program the curriculum, textbooks and other teaching learning materials of Primary levels have been prepared, revised and evaluated.

The textbook entitled, 'Introduction to Environment: Science' has been prepared on the basis of attainable competencies for the students of Class Four. The subject matter of the textbook is derived from the basic elements of the environment and science around familiar to the children. This will facilitate our young learners to know how they can make best use of the scientific knowledge in their day-to-day life.

The contents of the book are analyzed and explained in such a manner with practical examples, illustrations and system of planned activities, that students are inspired to study the subject with a keen interest.

This book is originally published in Bangla. From this year NCTB is publishing the English version of the textbook. English is the language of choice in today’s globalized world. To facilitate the verbal and written communication skills of our future citizens and suitably prepare them for international competition, we decided to translate the original Bangla textbooks into English. It’s pleasant to note that the number of English medium schools in Bangladesh is increasing very fast. In this context NCTB decided to publish all the textbooks of Primary level in English. This was a big endeavour for us. Despite our all efforts the first edition may not be totally error free. However, in the future editions we shall try to remove all errors and discrepancies.

Finally, I would like to express my heartfelt thanks and gratitude to those who have made their valuable contributions in writing, editing, evaluating and translating this book. I sincerely hope that the book will be useful to those for whom it has been prepared.

Prof. Md. Mostofa Kamaluddin
Chairman
National Curriculum and Textbook Board
Dhaka
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Chapter One
Classification of Plants

There are various types of plants around us. In order to learn about them, we need to know about their classification. Before this, you have to remember the differences between living and non-living things, and the differences between plants and animals. You know that there are many types of animals and plants in our environment. Can you identify different living and non-living things of the environment? Arrange the following living and non-living things into the table given below:

Mango tree, fish, soil, pigeon, air, rose plant, water, fly, grass, wood, sand, mosquito, stone.

<table>
<thead>
<tr>
<th>Non-living things</th>
<th>Living things</th>
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You obviously remember the differences between the living and non-living things. Write down these differences in the following table:
You know that mango trees, grass, pumpkin climbers etc. are living things. Humans, mosquitoes, flies, cows, birds etc. are also living beings. But mango trees, grass and pumpkin climbers are one type of living things, and humans, mosquitoes, flies, cows, birds etc. are of a different type. mango trees, grass and pumpkin climbers are plants. Man, mosquitoes, flies, cows, birds etc. are animals.

**Write down the differences between plants and animals in the following table:**

<table>
<thead>
<tr>
<th>Plants</th>
<th>Animals</th>
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Now let us know about the classifications of plants. There are various types of plant around you. If you observe, you will see that some of them are very large- for example, palm trees and mango trees. These plants are called **trees**. The roots of trees go very deep...
into the soil. Their stems remain above the ground, which are strong, rigid and wide. Branches grow from the stem, and branchlets grow from the branches. The stem bears the branches, branchlets, flowers, leaves and fruits of the plant. We get wood from the stem.

There is another type of plants which are not as big as trees. Rose and china-rose plants are examples of these. Their roots do not go as deep into the soil as those of trees do. The stems, branches and branchlets of these plants are rigid, but much smaller and thinner than those of trees. They are called **shrubs.** Branches grow from all around the stem of a shrub. As a result it looks like a bush. Grass, pumpkin climbers, pepper plants etc. are smaller than shrubs. They have soft stems, branches and branchlets. Their roots do not go deep into the soil. They are called **herbs.**

You have learnt the characteristics of the three types of plants. Now write down the names of the plants in your school compound in the following table according to their characteristics.
Take some seeds of pea or bean. Put it in some water in a saucer. Again, take some seeds of paddy, wheat or maize. Put them in some water in another saucer. Observe the wet seeds everyday. Make sure that the saucers do not become dry. Seedlings will sprout from the seeds in a few days.

<table>
<thead>
<tr>
<th>Herb</th>
<th>Shrub</th>
<th>Tree</th>
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Take a seedling of pea or bean from the first saucer. Carefully peel off the seed-coat from the seed and expose the light-coloured matter inside the cover. The seedling has sprouted from one side of it. Notice that it has two parts.

These two parts will be separated if you press a little. These parts are called **cotyledons**.
Now take one germinated seed of paddy, wheat or maize from the second saucer. Carefully peel off the seed-coat from the seed and observe its interior. Do these seeds have two cotyledons like pea or bean seeds do? You will find that there is only one cotyledon in each of these seeds.

You have seen two cotyledons in pea and bean seeds. These plants are called **dicot** plants. The stems of these plants have branches and branchlets.

Paddy, wheat, and maize seeds have only one cotyledon. These
plants are called **monocots**. Their stems do not have branches.

Now, arrange the following mango, jackfruit, jambu, coconut, palmyra palm, betel-nut. plants into the appropriate columns of the following table:

<table>
<thead>
<tr>
<th>Monocots</th>
<th>Dicots</th>
</tr>
</thead>
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</table>

Observe the following picture. What can you see there? Try to find these plants around your school and house. Your teacher will help you find them. Observe the plants carefully.

![Image of plants](image_url)

*Figure: Non-flowering and flowering plants.*
Do all of these plants bear flowers? Some of these bear flowers while the others do not. Plants which bear flowers are called flowering plants. Most of the plants around us are flowering plants. Mango, jambu, jackfruit, palmyra palm, betel-nut, coconut, paddy, wheat, chilli, bean etc. are flowering plants. Fern, mushroom, algae, moss etc. do not bear flowers. They are called non-flowering plants. Collect a seedling of chilli, eggplant or any other flowering plant. Observe the plant carefully.

Does the plant have roots? Does it have a stem? Does it have branches and branchlets? Does it have leaves?

What do the leaves look like? Does the plant bear flowers and fruits?

Observe the plant and try to find the answers. Draw a diagram of the plant in your notebook and identify its various parts.

The plant you have observed is a flowering plant. It has roots, a stem, leaves, and it bears flowers and fruits.
Now collect some algae and fungi with the help of your teacher. Algae grow in rivers near landing-stages, in ponds, on the walls of water reservoirs, or in stagnant water in humid places. Mushrooms grow on piles of cow-dung or around heaps of garbage. Mosses grow like green carpets on wet or moist walls.

Ferns also grow in such conditions. Collect these plants and observe them carefully. Find which of them have roots, stems, and leaves. Observe the algae under a microscope or a magnifying glass. What is the colour of the algae? Do they have roots, stems, branches or leaves?

Algae are non-flowering plants. They are green in colour. They have fibre-like bodies. They do not have roots, stems, branches or leaves. They do not bear flowers or fruits. Draw a diagram of an alga plant in your notebook and write down its characteristics. Observe a mushroom or any other type of fungus. What is the colour of the fungus? Do fungi have roots, stems or leaves?
Fungi are non-flowering plants. They do not have roots, stems or leaves. They do not bear flowers and fruits. They are not green in colour. Draw a diagram of fungi in your notebook and write down their characteristics.

Mosses are very small plants. They grow in large groups, and because of this, they look like green carpets from a distance. Observe mosses under a magnifying glass.

What is the colour of moss plants? Do they have roots, stems or leaves? Moss is a non-flowering plant. Its colour is green. They have
organs like roots, stems and leaves; but these roots, stems and leaves are not like those of flowering plants. These plants do not bear flowers or fruits. Draw a picture of a moss in your notebook and write down the characteristics of mosses.

Ferns look like flowering plants to some extent. You can collect a fern plant and observe it carefully. What is its colour? Does it have a stem, roots and leaves?

Can you see anything like partical in leaf as shown in Picture? They are called ouras

Ferns are non-flowering plants. They are green in colour. They have organs like roots, stems and leaves. Their roots are not like those of flowering plants. Draw a figure of a fern in your notebook and indicate its various parts.

Take a bean, pea, green mango or a lemon. Cut it or peel it, and find where its seed lies. Notice that the seeds of mango, jambu and jackfruit are covered with a layer of juicy flesh of the fruit. This is why these plants are called covered-seeded plants or **Angiosperms**.
Draw a labelled diagram of the fruit that you have observed. Seeds of many plants are not covered within their fruits. These are called bare-seeded plants or **Gymnosperms**. Gymnosperm plants are very few in number in our country. *Cycas* is an example of a Gymnosperm plant. It is found in Chittagong Hill Tracts.

Study the following diagram carefully. *Cycas* does not bear fruits like Angiosperm plants do. Seeds grow on the sides of seed-bearing leaves. *Pine* and *Aurocaria* are Gymnosperms.
**Interdependence of plants and animals**

You know that there are various types of plants and animals in the environment. Plants and animals are both necessary for our survival.

We obtain food and various other things from plants and animals which are essential for our living. Plants release oxygen into the air and absorb carbon dioxide from it. Because of plants, the amount of carbon dioxide in the air cannot increase. An increase in the amount of carbon dioxide in the air would cause the temperature of the environment to increase. This increase in the temperature of the environment is potentially harmful for us and other animals as well.

![Diagram showing the interdependence of plants and animals](figure.png)

**Figure : Necessity of animals and plants in the environment**

Animal bodies need minerals. Plants absorb minerals from the soil and stores them in their bodies. Animals obtain necessary minerals from plants. When animals die these minerals go back into the soil. Then plants can again gather minerals from the soil. In this manner, animals and plants maintain the equilibrium of the environment.
In order to prevent potential environmental disasters, we must take care of animals and plants. We should not cut down trees unnecessarily. The government observes Tree Plantation Week every year. During this week we must plant more trees all over the country. Cattle must be kept away from growing plants.

In order to preserve the environment, we have to take care of animals and birds. We must stop hunting them. We should take care of the birds which migrate to our country in the winter. We must stop snaring these birds and selling them in the market.

**Exercise**

A. Put a tick (✔) mark beside the correct answer:

1. **What is the characteristic of a Dicot plant?**
   a) bears no flower  b) has large leaves  
   c) has two cotyledons  d) is bare-seeded

2. **Which one of the following is a monocot plant?**
   a) pea  b) paddy  
   c) chick-pea  d) bean

3. **Which one is a non-flowering plant?**
   a) fern  b) sunflower  
   c) paddy  d) chilli
4. Which one is not green in colour?
   a) algae     b) moss
   c) fern      d) fungi

B. Fill in the blanks:
1. The colour of _________ is not green.
2. ________ and ________ do not have roots, stems and leaves.
3. ________ plants have two cotyledons.
4. Algae do not have ________, ________, and ________.
5. Flowering plants have ________, ________, and ________.
6. The roots of ferns are not like those of ________.
7. Seeds of ________ plants sprout from their seed-bearing leaves.

C. Short questions:
1. Write down the characteristics of ferns.
2. Name a Gymnosperm. Write down the characteristics of Gymnosperms.
3. Describe the roles of animals and plants in maintaining the equilibrium of the environment.
Chapter Two
Soil

About one-fourth of the earth is land. The rest of the earth is covered with water. We live on the land. The land consists of soil. Our houses, farmlands, schools etc. are all built on this land. Plants grow on land. We get crops from plants. Plants provide us with food.

Man as well as plant have a close relationship with the soil. Plants grow in soil. We get food, clothing and medicine from plants. Thus soil provides us with food and shelter. That is why soil is compared to mother.

What is soil

According to scientists, the soft surface of the earth which absorbs water and in which plants grow is called soil. The surface of the earth is made of soil.

Long ago, the condition of the soil was not like it is today. The soil has taken millions of years to reach its present state.

Characteristics of soil

Soil is a mixture of clay, sand, stones etc. Various types of plants grow and animals live in the soil. Besides, dried leaves, flowers, fruits, branches, fruit peels etc. decompose and mix with the soil.

The rotten bodies of dead plants and animals mix together to form humus. Humus is a very important ingredient of the soil. Humus is black in colour. It makes the soil fertile. Collect some soil from the garden of your school and test it. Find out what substances are
present in it.

Fill a tall glass with water and add some soil to it. Shake the mixture and leave it to settle down for some hours. After some time, you will find that the soil in the glass has separated into a number of layers.

The sizes of the particles of each layer are different. At the bottom layer there will only be gravels. Gravels are relatively larger in size. The layer above the gravels consists of large sand particles, which are smaller than the gravels. Clay is made of fine particles. The layer above the large sand particles consists of clay. The topmost layer consists of humus.

There are ponds or ditches in most villages. There is clay at the bottom of ponds and ditches. If we go down into the water of these ponds or ditches, our legs sink in the clay up to our knees. This clay is very soft, and it is composed of very small and fine particles. Clay can retain a lot of water, and it takes time to dry. When it dries, it first becomes sticky, and then it becomes hard. This soil is called clayey soil. When water is added to this soil, it becomes mud.
Fields become submerged with water in the rainy season and they are covered with particles of soil mixed with the water. Soil particles consist of particles of sand, clay and water. They are very small particles. These particles are called silt. There may be air and water inside these particles. This soil is called alluvial soil. This type of soil is reduced to powder if pressed. Silt makes the soil fertile.

**Structure and types of soil**

Soil consists mainly of three elements - large sand particles, small silt particles, and fine particles of clay.

Soil can be classified into three types according to the amounts of sand, clay, silt and humus in it. These are:

1. **Sandy soil:** This type of soil consists mostly of sand. It shines in the sunlight. The soil particles are dry. If you take some sandy soil in your hand and shake it, it falls to the ground in the form of a gritty powder. This soil can retain very little water.

2. **Loamy soil:** This type of soil contains equal amounts of sand, silt and clay. It can retain moderate amount of water. If the amount of sand is high in loamy soil, it is called sandy loam.

3. **Clayey soil:** The amount of clay and silt in this kind of soil is higher than the amount of sand. It can retain a lot of water. Air cannot pass well through this soil.

The water at seashores, mouths of rivers or deltas is saline. This salt becomes mixed with the soil there. This soil is called salty soil.

**Do it yourself: learn about soil**

a. Collect some soil from your surroundings, mix some water with it
and try to roll it into a marble. If you cannot make a marble, the soil is sandy.

b. If you can make a marble, but the marble cracks later, the soil is loamy.

c. If the marble does not crack, the soil is clayey.

Now write down the results of your experiment in the following table:

<table>
<thead>
<tr>
<th>Type of soil</th>
<th>Whether the marble can be made</th>
<th>What happens when the marble dries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sandy soil</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Loamy soil</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clayey soil</td>
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**Soil and crops**

1. **Sandy soil**: If you go to a desert or a sea beach, you will find that the soil particles of those places are large. This type of soil cannot retain much water. This is sandy soil. Peanuts, sweet potatoes, cucumbers, melons etc. grow well in this soil.

2. a) **Loamy soil**: This type of soil is very fertile. It contains a lot of organic substances. Most of the soil of Bangladesh is loamy. This soil is also called the ideal soil. The amounts of sand, silt and clay in loamy soil are almost equal.
Almost all kinds of crops including paddy, jute, wheat, onion, potato, vegetables, maize, pea, mustard etc. grow well in this soil.

2. **b) Sandy loam soil:** This type of soil contains more sand than loamy soil. Raddish, tobacco, chilli etc. grow well in this soil. This soil is also very good for growing winter crops.

3. **Clayey soil:** The amount of sand is very low in this soil. This soil can store a lot of water and the clay particles are very tiny. This soil softens with water. When it is dried it becomes very hard. This soil is not good for all types of crops but paddy grows well in this soil.

**Fertility of soil**

The more fertile the soil is, the more crops grow in it. In other words, production of crops depends upon the fertility of the soil. The soil that contains more nutritious substances can grow more crops. Infertile soil cannot produce high yields of crops.

If you go to a village, you can see that there are lots of crop fields. Some of the fields are green and rich with crops, while some of the fields are barren and barely contain any crops. What is the reason behind this? Some lands are fertile, while some are not. Crops grow well in fertile soil but do not grow well in less fertile soil. In order to increase the fertility of soil, we need to supply water and fertilizers regularly to the fields.

**Necessity of using fertilizers**

You have already learnt that plants collect nutrients from the soil. These nutrients come artificially from fertilizers. If we grow the
same crops again and again for years in the same field, the fertility of the soil decreases, and gradually it become infertile. In order to preserve the fertility of the soil, we need to use fertilizers in the fields. Fertilizers are of two types:

1. Organic fertilizer
2. Inorganic fertilizer or manure

**Organic fertilizers or manures**

Organic fertilizers are produced from the corpses of dead animals and plants. They are formed when the bodies of dead animals and plants decompose and become mixed with the soil. Organic fertilizers, when mixed with the soil, make the soil fertile and provide food to the plants. Cow-dung, green manure, compost, oilcake, bone meal (powdered bone), excrements of domestic fowls etc. are examples of organic fertilizers.

Using organic fertilizers increases the capability of soil to store water and nutrients. Organic fertilizers are the best among ordinary fertilizers. Solid and liquid waste from cattle and various other types of garbage are used to produce this kind of fertilizer.

**1) Cow-dung**

This fertilizer is produced by storing cow dung in a large pit for a long time. The quality of this fertilizer is very high.
Steps of making fertilizer from cow-dung

1. Store the cow-dung in a large pit.
2. Raise the edges of the pit
3. Construct a roof over it so that rainwater cannot collect in it.
4. Leave the pit in this condition for three to four months.

This fertilizer makes the soil light. The soil particles become separated which increases the ability of the soil to retain water. This type of fertilizer makes the soil fertile.

Green manure

It is named so because it is produced by decomposing green plants in soil. *Dhaincha*, flax, and bean plants are cut into pieces when they are green and mixed with the soil. These plants easily rot and mix with the soil, making it fertile. This fertilizer converts sandy soil into loamy soil, which does not harden quickly.
Compost

Various types of organic garbage, such as solid and liquid waste from cattle, peels of fruits and vegetables, hay, farm rubbish, weeds, water hyacinth etc. are gathered in the yard. They are decomposed by bacteria and fungi, and compost is produced in the process. The costs of producing this manure are very low.
For preparation of compost at first the garbage is piled up to a height of 1 foot. Then, two kilograms of bone meal or rotten cow-dung is scattered on the pile. Water is added periodically to the pile in order to help it rot, but care must be taken so that the water does not stagnate in the pile.

**Chemical fertilizer**

Chemical fertilizers are artificially manufactured in factories. It is used to increase the fertility of soil. We use Urea, Triple Super Phosphate (TSP), Muret of Potash (MP) etc. as chemical fertilizers. Nitrogen, Phosphorus and Potassium are used in the manufacture of chemical fertilizer.

**Usefulness**

Nitrogen-rich fertilizers help plants grow fast. Phosphorus-rich fertilizers support normal growth of flowers, fruits and roots of plants. Potassium-rich fertilizers make plants more immune against diseases and pests. It also prevents premature shedding of flowers.

**Harmful effects**

Use of Urea, Triple Super Phosphate (TSP), Muret of Potash (MP) etc. are beneficial for plants, but not for the soil. Besides, excessive use of such fertilizers can cause crop production to decrease. It must be made sure that phosphate fertilizers become completely mixed with the soil. If nitrogen fertilizers are used too much on fruit-yielding plants, the plants will grow but will not bear any fruits.

Excessive use of phosphorus results in early flowering and fruiting of leafy vegetable plants, but production of leaves decrease.
The roots and leaves of plants suffer burns if they come in direct contact with ammonium sulphate fertilizer. Excessive use of this fertilizer can cause plants to die.

**Erosion of soil**

Soil erosion is the gradual removal of the surface soil of land due to storms, rainfall or other causes. The main causes of soil erosion are water, air, water currents and glaciers.

Those of you who live near rivers may have seen river banks breaking down. You may also have seen that during heavy rainfall water currents crack the surface soil of yards and fields. This soil mixes with the water, resulting in soil erosion. Soil erosion at seashores occurs because of tidal bore and waves of the sea. Storms move soil from one place to another. This causes fertile lands to become infertile. Because of duststorms and sandstorms, the valuable surface soil is removed. Soil erosion also depends on the type of soil. For example, since clayey soil has low water-absorbing
capabilities, water stagnates on this type of soil following light showers and causes soil erosion. Excessive rainfall, wind, sloping land, type of soil etc. can cause soil erosion. Besides, excessive grazing by cattle, and ploughing and deforestation by man cause soil erosion.

Growing too much crops causes the humus content of the soil to decrease, resulting in soil erosion. If soil is ploughed again and again, it becomes loose, and exposure to water and wind currents can cause erosion of the soil. Growing crops with small roots also cause soil erosion. Soil erosion makes land infertile and causes siltation of rivers and canals.

Prevention of soil erosion

We can prevent soil erosion by planting more plants and grass. Also, erosion is reduced if the stumps of harvested crops are left in the soil. Grass should not be cut too close to the ground. Soil erosion can be prevented also by building dykes in farmlands.

Soil erosion can also be prevented by using green manures, humus, cow dung, oilcake, compost etc. Fertilizers and humus absorb water. Soil erosion can also be prevented by controlling water currents and wind by planting various types of plants and by constructing good drainage systems.

You have noticed that there are large boulders beside railway tracks and on the banks of rivers under bridges. Both sides of a bridge are made of bricks. This is done to prevent soil erosion due to heavy water currents during the rainy season. Sometimes soil erosion is also prevented by building embankments.
Soil pollution and its causes

We get necessary ingredients for living from the soil. We share a very close relationship with the soil. If soil becomes polluted, it also affects our life seriously. Soil can be polluted in different ways. The natural property of soil is to decompose garbage and waste with the help of microbes and absorb them. But if the amount of garbage and waste in the soil is too much, the soil fails to decompose them. This causes soil pollution. Besides, plastic and polythene never decompose and mix with the soil. These things make the soil infertile. Using chemical fertilizers and pesticides also pollute the soil.

Steps for preventing soil pollution

1. Stop deforestation and preserve forests.
2. Take necessary legal steps to prevent improper disposal of waste from factories.
3. Bury garbage and waste in the ground.
4. Use natural fibres instead of polythene.
5. Restrict the use of chemical fertilizers and pesticides.
6. Use organic fertilizers instead of chemical fertilizers.

Necessity of soil in the conservation of environment

You have already learnt that plants and animals are dependent on soil in a number of ways. Soil is needed for plants to grow. Water
and minerals present in soil particles are essential for plants for preparing food. We depend on plants for the fundamental needs of our life such as food, clothing, accommodation, medical treatment etc. Not only man and other animals and birds, but also other small organisms depend on soil.

Most birds live on fruits. Some animals and birds like foxes, owls etc. live in holes in the trunks of trees. Insects like honey bees, butterflies, grasshoppers etc. live on nectar and juices of leaves of plants. Earthworms live in and collect food from the soil. They are known as 'the ploughs of nature'. Just as farmers plough their lands in order to loosen them up, worms also help to loosen them. Many other tiny organisms also live in the soil, such as fungi and bacteria. When organisms die, these organisms cause their bodies to decompose and mix with the soil and increase the fertility of the soil. The process increases the water retaining capabilities of the soil. Rainwater, water of rivers, streams, canals and marshes seep through the soil and remain stored deep in the ground. You may ask, where does the rainwater go? The rainwater flows to rivers, streams, canals and marshes. However, some water is absorbed into the ground, causing it to be wet. Plants use the water and mineral salts present in the soil for making their food. Plants release some water through pores on the underside of their leaves in the form of vapour. This helps the environment remain cool and causes rainfall to occur. Some of you have seen hills. There are hills of many different sizes in various districts of our country, such as Chittagong, Rangamati, Bandarban, Khagrachhari and Comilla. These hills are made of soil. However, generally the proportions of rocks, limestone and sand are much greater in the soil of hills. Plants of various sizes grow in hills,
from which we obtain many types of flowers, fruits and wood. Animals such as monkeys, elephants, langurs and snakes are usually found in the hill forests. Many different species of birds are also found in these forests, notably mynah and munia birds. You have obviously heard of a kind of snakes known as pythons. These snakes also live in hill forests. Hills and mountains also aid in causing rainfall. Besides, we obtain many different types of minerals from mines located deep under the surface of the earth.

Ways to conserve soil

Soil is a very important element of the environment. You have learnt how useful soil is to us. So, it is very important for us to conserve soil. In order to conserve soil, we must do the following things:

1. Avoid deforestation unless absolutely necessary.
2. Plant more trees.
3. Plant grass instead of leaving lands barren.
Exercise

A. Put a tick (✔) mark beside the correct answer:

1. Which soil has the highest capability of storing water?
   a) sandy soil  b) clayey soil
   c) loamy soil  d) silt

2. Which soil contains large particles?
   a) clayey soil  b) silt
   c) sandy soil   d) loamy soil

3. Which type of soil retains nearly equal amount of silt, sand, and clay?
   a) sandy soil  b) clayey soil
   c) silt       d) loamy soil

4. Which fertilizer helps to grow the plants faster?
   a) Nitrogen   b) Phosphorus
   c) Potassium  d) Compost

5. What does clayey soil become when wet?
   a) sandy soil  b) mud
   c) loamy soil  d) silt
6. **Which one is not an organic fertilizer?**
   a) green fertilizer    b) cow dung
   c) compost            d) urea

7. **Which one is a chemical fertilizer?**
   a) TSP                   b) green fertilizer
   c) compost              d) cow dung

8. **What is the reason of soil erosion?**
   a) plantation of more trees   b) decrease in population
   c) cultivation of farmlands  d) water currents

9. **How can soil erosion be prevented?**
   a) by deforestation         b) by cutting grass
   c) by planting trees        d) by rooting out crops

10. **Which one is an organic fertilizer?**
    a) Urea                   b) cow dung
    b) Triple Super Phosphate d) Muret of Potash

11. **The fertilizer which can convert sandy soil into loamy soil is:**
    a) green fertilizer        b) compost fertilizer
    c) chemical fertilizer     d) cow-dung
B. Fill in the blanks:

1. Soil is a valuable ________ of the environment.
2. Destruction of plants causes soil ________.
3. Silt makes the land ________.
4. Soil gives us ________ and ________.
5. Soil contain mixture of clay, sand and ________.
6. Decomposed bodies of animals and plants make ________.
7. Most of the soil of Bangladesh is ________.
8. Plants collect ________ from soil.
9. Too much cultivation causes the ________ of soil to decrease.
10. Overuse of ________ fertilizers reduces the fertility of soil.
11. Clayey soil and mud have low water-_______ capabilities.
12. Fertilizers and ________ absorb the water like blotting paper.
13. Almost all the plants need ________ to grow.
14. The earthworm is known as 'the plough of ________'.

C. Answer briefly:

1. What are the characteristics of clayey soil?
2. What is humus?
3. State the differences between sand and loamy soil.
4. Why do we use fertilizers?
5. How many types of fertilizer are there and what are they?
6. What are the problems caused by soil erosion?
7. How can soil erosion be prevented?
8. What do you understand by soil pollution?
9. Mention 6 ways to prevent soil pollution?
10. What are the roles of earthworms in conservation of environment?

D. Answer in detail:

1. How are green and organic fertilizers prepared?
2. Describe which types of crop grow well in different types of soil.
3. What are the main reasons behind soil erosion?
4. What are the steps that can be taken to increase fertility of soil?
5. Describe the reasons of soil pollution.
6. Describe harmful effects of using chemical fertilizer.
7. You are given three types of soil. How will you decide which is loamy soil?
Chapter Three

Water

No organism can survive without water. Therefore, water is another name for life. About 70% of our total body mass consists of water.

Sources of water

Almost three-fourths of the surface of the earth consists of water. Water can be obtained from many different sources. We obtain water from ponds, rivers, seas, canals, springs, wells, tube-wells, beels, haors, baors etc. Rain is also a source of water.
What sources of water are available in your locality? Make a list of them.

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Which sources of water are man-made? People dig ponds, sink tube-wells and dig wells because of their own needs. They create artificial fountains and lakes at various places for beautification. They are manmade sources of water. Other sources, such as rivers, seas, natural springs, rain etc. cannot be created by man at will. They are natural sources of water.
Uses of water

We drink water when we are thirsty. Plants and other organisms also take water. Water is used for washing our hands and faces, performing religious cleansing, bathing, washing clothes, washing dishes and other hygiene-related purposes. Potters mix water with clayey soil in order to make a type of mud (called clay) in order to make pots, pitchers, tubs, vases, dolls, pretty toys, models of fruits etc.

Lots of water is also used in factories, brick fields, and for agricultural purposes. Agriculture, industries and fisheries all involve the use of large amounts of water.
You will be surprised to know that large rivers can be dammed in order to block a sufficient amount of water which can be later released in order to create powerful current. The power of this current can be used to generate electricity. In our country, the strong current of the river Karnaphuli in Kaptai is utilized to generate electricity.

Now you know what purposes water is used for. Make a list of all the purposes for which water is used in your locality.

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**Fresh water and salt water**

How does the water you use at home taste? Do you like its taste? Dissolve some salt in a glass of water and drink it. How does the water taste? Salty, right? This type of water does not taste good to human beings. Seawater is salty. Water which tastes salty is called salt water. Water which is not salty is called fresh water.

**Polluted water**

Water is indispensable for the existence of life. Water which contains dust particles and microbes of diseases is called polluted water. If garbage is dumped in water, it becomes polluted. The greater the amount of dirt, garbage and algae present in a sample of
water, the more polluted it is.

Man is mainly responsible for the pollution of water. Often, it can be seen in villages that cattle are bathed and clothing of the diseased are washed in the same pond from which water is collected for drinking and cooking. This causes microbes of diseases to spread into the water of the pond and the water to become polluted. Also, if utensils are washed with soap in ponds, it causes the water to become polluted. Excretion of bodily waste should not be performed in the vicinity of ponds or other water bodies, because the wastes may pollute the water. Often industrial waste and toxic chemicals mix with water and cause it to become polluted. If excessive amounts of chemical fertilizers and insecticides are used in farmlands, they are washed by floods and rainwater into rivers and other water bodies, causing their water to become polluted. Sometimes, fuel leaking from launches and steamers pollute water.
Plastic, polythene, sewage and decomposed bodies of animals mix with water and make it polluted. Besides, jute, bamboo etc. left to rot in water also pollute it.

**Harmful effects of polluted water**

Another name for water is life. The lives of all types of plants and animals depend on water. Harmful effects of polluted water include:

1. Household trash, bodily wastes of the diseased and industrial waste pollute water and spread diseases such as diarrhoea, cholera, dysentery and jaundice.

2. Too much decaying of garbage in water makes the oxygen content of the water to decrease, and as a result aquatic organisms living in the water die.

3. If excessive amounts of chemical fertilizers and insecticides are used in farmlands, the chemicals are washed into nearby water bodies by rainwater, and more algae and other aquatic plants grow in the water. They decay and cause the water to become tasteless and bad-smelling. As a result of this, the oxygen in water decreases and aquatic organisms die.

4. Bathing in polluted water can cause many types of skin diseases.

**Steps to stop water pollution**

Polluted water is harmful for our living. So, the following steps must be taken in order to prevent water pollution:

1. Garbage must not be dumped in water

2. Excretion of bodily wastes must not be done near water bodies.
3. Care must be taken so that decomposed bodies of dead organisms do not mix with water.

4. Clay or cement walls must be raised around wells.

5. Industrial waste pollutes water. So, industrial waste must be decontaminated before releasing it into water. Also, care must be taken so that none of these harmful substances can mix with the water.

6. Excessive use of insecticides and chemical fertilizers must be stopped. Organic fertilizers should be used instead of chemical ones.

7. Precautions must be taken so that oil does not leak from tanks of vessels into the water of seas and rivers.

8. Plants like water hyacinths can capture particles of metal in their roots, and thus help to prevent water pollution. So, water hyacinth plants should be cultured in polluted water bodies.

9. Bleaching powder, alum etc. can be added to water tanks/reservoirs or polluted water bodies in order to purify them.

**Necessity of safe water in the conservation of environment**

Clean water containing no microbes is called safe water. In this chapter, you have learnt about various reasons as to why water becomes polluted. You have also learnt about the harmful effects of using polluted water which contains microbes. You have learnt how water in your locality can become polluted. However, besides microbes, water can also be contaminated by arsenic where the level of arsenic in water are dangerously high.
To date, arsenic has been found in the waters of tube-wells at many places in Bangladesh. Water containing arsenic is poisonous, and it is not safe to drink. If this water is drunk regularly, arsenic poisoning may occur within a few years. In its initial stage black spots occur on various parts of the patient’s body including his palms and feet. In the next stage, a burning feeling of pain gradually develops in the throat and stomach. Nausea and frequent discharge of the bowels occur. A burning pain is felt in the anus. The muscles of the arms and legs stiffen up, body temperature lowers, and the eyes become sunk. The victim of the poisoning then becomes feverish and finds it hard to breathe. The efficiency of the kidneys gradually decreases, and the patient often vomits blood. He or she also suffers from jaundice and headache. Finally, the victim’s body starts to rot like someone infected with leprosy, and ultimately becomes afflicted with cancer. The patient slowly moves toward death. However, if clean water can be provided to the patient at the early stage of the poisoning, the contamination will not spread further. At this stage, water must be disinfected by boiling prior to drinking. But past this stage, it is hard to stop the disease.

Figure: Hands and feet of an arsenic-contaminated patient
Preservation of water

Water is indispensable for our survival. In order to live healthily and maintain the balance of the environment, we must conserve water carefully. Water must not be wasted. Water must not be polluted. We must drink and use pure and safe water. The ways in which water becomes polluted, poisoned or infected by microbes in our localities must be stopped. The people of the community must be made aware of the harmful effects of drinking and using polluted and poisonous water. If required, help of the adults should be sought.

Now, with the help of your teacher, make a list of the ways in which community members can be made aware of the proper use of safe water. Use the table given below to make a list of water pollution cases in your locality. Beside them, write down the ways in which these cases of pollution can be prevented. Ask your elders for help if needed.

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<th>Reasons of water pollution</th>
<th>Steps to stop pollution</th>
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Exercise

A. Put a tick (✓) mark beside the correct answer:

1. Which one is a natural source of water?
   a) pond       b) well
   c) tube-well   d) spring

2. Which one is a source of salt water?
   a) pond       b) canal
   c) well       d) sea

3. Which toxic element has been found in the waters of the tube-wells in Bangladesh?
   a) carbonate   b) iron
   c) chlorine    d) arsenic

4. What is the first symptom of arsenic contamination?
   a) cancer      b) spots on the skin
   c) jaundice    d) vomiting blood

5. Which one is a waterborne disease?
   a) cholera     b) headache
   c) asthma      d) night-blindness
6. Why do fish die if chemical fertilizers are mixed with water?

   a) water becomes polluted       b) fish grow fast
   c) oxygen deficiency occurs     d) production of algae increases

B. Answer briefly:

1. Name five sources of water.
2. Name five uses of water.
3. Name three water-borne diseases.

C. Answer in detail:

1. Describe uses of water in household and other works.
2. What do you understand by fresh water and salt water? Give examples.
3. What do you understand by polluted and safe water?
4. Mention six reasons of water pollution.
5. How does toxic and polluted water do harm to man and other animals and plants?
6. Write down the ways to stop water pollution.
7. What are the symptoms of an arsenic contaminated patient?
8. What steps can be taken to make people aware of using pure water?
Chapter Four

Air

Don't you feel very comfortable when a cool breeze blows on an extremely hot day? The wind cannot be touched or seen, but only its touch can be felt. There is air all around us. A layer of air surrounds our planet as well. This layer of air is called the atmosphere. The higher we go above the surface of the earth, the thinner the atmosphere becomes. There is no air in outer space.

Existence of air

Observe the picture below. Based on this picture, write down at least five examples of the existence of air in your work book.

Figure: Existence of air
Wind causes tree leaves to move, allows clouds to float, lets sailboats travel, makes kites and clothing fly among many other things. Have you ever seen a northwester? Wind flows very fast during such storms. In extreme cases houses may collapse, tin roofs are blown away and plants are uprooted.

**Necessity of air**

We cannot survive without air for a single moment. Actually, no organism can live without air. Organisms acquire oxygen from the air through the process of respiration. Aquatic plants and animals also get their necessary oxygen from water for respiration. Energy is generated in the bodies of all organisms through respiration.

Plants use air not only for respiration, but also to make food in their bodies. During the day, plants absorb carbon dioxide from air and water and nutrients from the soil in order to make food in the presence of sunlight in their green leaves. Nitrogen in the air is a highly essential substance for plants. Some plants absorb nitrogen directly from the air. You have learnt in Class III that air helps fire to burn. The element of air which allows fire to burn is called oxygen.

**Experiment**

Here is an experiment which demonstrates that oxygen helps fire to burn. However, perform it only under supervision of your teacher or adults so that no accidents occur. Place a candle in a bowl as shown in the picture. Pour some water into the bowl, and light the candle. Now cover the candle with a glass as shown in the picture.
What do you see? The candle goes out and the water level inside the glass rises. Why did the water rise? Because the air inside the glass contained oxygen. As the burning candle was covered with the glass, the candle became extinguished after sometime because of this Oxygen. The water inside the glass rose in order to fill up the vacuum created inside the glass by the lack of oxygen when all the oxygen inside the glass was used up.

Now use a scale to measure the height by which the water has risen inside the glass. You will observe that it has risen by almost 1/5th of the total height of the glass.

So, from this experiment, it can be inferred that:

1. Oxygen helps fire to burn.
2. About 1/5th of the air of a place consists of oxygen.
Elements of air

Air is a compound substance. The elements of air are oxygen, nitrogen, carbon dioxide, water vapour, inert gases such as argon, neon and helium, and dust particles. These elements of air can be separated and used for various purposes.

Use of oxygen

Other than respiration, people use the oxygen in the air for various other purposes as well. Asthma patients often use oxygen cylinders for breathing. Oxygen is stored in the cylinders in liquid state. We cannot breathe under water. So, when divers stay underwater for long periods of time in search of something, they take oxygen cylinders with them. Mountaineers climbing high mountains also need oxygen cylinders. This is because the higher we rise above the surface of the earth, the less is the density of oxygen in the air. For this reason, mountaineers, pilots and high-altitude travellers often require extra oxygen.
Use of nitrogen

Chemical fertilizers, such as urea, are sometimes used to increase the fertility of soil. Urea is also called nitrogen fertilizer. This type of fertilizer is essential for proper growth of plants. Nitrogen from the air is used in the manufacture of urea. Now a days different types of tinned and packed foods are available in our country, such as fish, meat, fruits and chips. Nitrogen is used to prevent these food items from decaying.

Use of carbon dioxide

You must have seen a device like the one shown in the diagram in large buildings, cinemas, factories and vehicles. This apparatus is called a fire extinguisher. It contains some chemical substances. The handle on top of the device as shown in the diagram can be pressed down to make the chemicals mix together to form a foam of carbon dioxide.
Carbon dioxide helps to extinguish flames. This gas is heavier than air. When a fire occurs somewhere, if a layer of carbon dioxide foam is made to form around it by spraying, the fire cannot come in contact with the oxygen in the air, and it thus becomes extinguished.

You sometimes drink soft drinks such as Fanta, Pepsi, 7-Up or RC Cola. When you open the bottle or can before drinking, what do you see? Gas bubbles rise upward, right? These are bubbles of carbon dioxide gas. Carbon dioxide gas under high pressure is added to these soft drinks during the manufacturing process.
Air pollution

You have learnt that air contains different gases at certain proportions. If the densities of these gases change or the amount of dust particles in the air increases, air becomes polluted. Also, smoke from industries and black smoke from vehicles pollute the air. Even tobacco smoke from cigarettes and bidis pollute air.

Air containing polluted gases, disease-bearing microbes and dust particles is called polluted air. Fresh air contains proper amounts of oxygen, nitrogen, carbon dioxide, argon, helium and water vapour. It does not contain dust particles, smoke, any types of polluted gases, disease-bearing microbes or other substances.

Causes of air pollution

If we spit, cough, or excrete here and there, germs can be mixed with the air and pollute it.

If garbage and bodies of dead animals are discarded here and there,
they rot, produce foul smells and pollute the air in the process. Brick fields, leather factories etc. generate smoke which pollutes air. Smoke from kitchens and burning of tyres of motor vehicles also pollute the air.

Smoke emitted from factories and vehicles contain carbon dioxide, sulphur dioxide, oxides of nitrogen etc. These gases become mixed with water vapour present in the air and form acids which pollute the air. These acids come down to the surface of the earth with rain.

Some fuels used by vehicles contain lead. Mixed with black smoke, lead particles go up in the air and pollute it. Volcanic eruptions, dust etc. also pollute the air.

**Harmful effects of air pollution**

1. If the density of carbon dioxide in the air increases, the temperature of the environment also increases which upsets the balance of the environment.

2. Bronchitis, asthma, cancer etc. may be caused if smoke from factories, vehicles etc. are inhaled along with air.

3. Gases present in the fumes emitted by factories and vehicles cause acid rain. Acid rain damages buildings. It erodes marble. It also causes severe harm to plants and animals.

4. Carbon monoxide gas, emitted from factories and vehicles, mixes with human blood and reduces its oxygen content, causing harm to health.
5. Smoke which contains lead is very harmful to children and pregnant women. Increases in the amount of lead in blood causes loss of appetite, and eventually leads to anemia. It also injures the neural system and the kidneys. It causes blood pressure to rise and impedes intellectual development of children.

**Steps to stop air pollution**

We cannot live without air. To live we need food, and to live a healthy life we need pure air. So we should try to keep the air fresh and free from pollution. We must not spit or excrete here and there. Garbage and bodies of dead animals must be buried in the ground. More trees must be planted in order to maintain the balance of oxygen and carbon dioxide in the air. We need to start using Compressed Natural Gas instead of petrol. We must not use defective vehicles. We must not create smoke by burning things unnecessarily. Factories that cause air pollution must be built far away from the city and high chimney should be used. We must not use excessive amounts of chemical fertilizers and pesticides. We should be aware of air pollution and we should obey the rules and regulation of preventing air pollution.
Exercise

A. Put a tick (√) mark beside the correct answer:

1. What type of matter is air?
   a) heavy  b) solid
   c) mixed  d) liquid

2. Which element of the air is used by the plants to prepare their food?
   a) oxygen  b) nitrogen
   c) water vapour  d) carbon dioxide

3. Which element helps in combustion?
   a) nitrogen  b) argon
   c) carbon dioxide  d) oxygen

4. Which can cause breathing problems?
   a) water pollution  b) sound pollution
   c) soil pollution  d) air pollution

5. Which element do we use for breathing?
   a) nitrogen  b) oxygen
   c) helium  d) argon
6. Which one is an air-borne disease?
   a) tuberculosis  b) malaria
   c) dysentery  d) diarrhoea

7. What happens if garbage is burnt?
   a) water pollution  b) soil pollution
   c) air pollution  d) sound pollution

B. Fill in the blanks:

1. Chemical fertilizers have ________.

2. Tinned food is preserved using ________.

3. Helium is an ________ gas.

4. The air that contains polluted gas, dust particles, and ________ is called polluted air.

5. Fuels of vehicles contain ________.

6. If the amount of carbon dioxide in the atmosphere ________, the temperature increases.

C. Answer briefly:

1. Give 5 examples of the existence of air.

2. Name the elements present in the air.

3. Which element of the air is used for breathing of animals?

4. Why is air called a compound substance?
D. Answer in detail:

1. Describe how you would prove that oxygen helps fire to burn.
2. What purposes do we use oxygen for?
3. What purposes do we use nitrogen for?
4. How does a fire extinguisher work?
5. Explain why divers, mountaineers and patients having breathing problems need to use oxygen cylinders.
6. What are the causes of air pollution?
7. Describe the harmful effects of air pollution.
8. What steps can be taken to stop air pollution?
9. What would you do yourself to prevent air pollution?
Chapter Five

Electrical Energy

What is energy

We have books, notebooks, tables, chairs, bricks, stones, water, soil, air and many other things around us. They have shape, volume and mass. They occupy space. They are called matter. We also have light, heat, sound, electricity etc. around us. They do not have shape, volume and mass like matter does. They do not occupy space. So they cannot be called matter. But we can see light, feel heat and hear sound. We cannot see electricity but we can do a lot of things using it. Like electricity, we also use heat, light and sound for many purposes. So light, heat, sound and electricity have the ability to make things work. Energy means the ability to work. Because of this, light, heat, sound and electricity are classified as energy. We also work. We need energy to work. Where does this energy come from? The food that we eat provides us with energy. Chemical energy is produced in our body through the metabolism of food. Heat is produced from this chemical energy. Touch your skin with your hand. Can you feel some heat? Our bodies produce this heat from chemical energy.

Energy can be converted from one form to another. The various forms of energy that we get from machines are converted into many other forms. For example, in a flashlight the chemical energy of a battery is converted into electrical energy. Light is produced from
this electrical energy. The light enables us to see in dark places. Light traps are used to eradicate pests in farmlands. Light is also used for taking photographs. Heat is produced from an electric bulb, the kinetic energy of an engine is produced from heat, sound is produced from the electrical energy of radios and televisions, and heat is produced from the electrical energy of the electric heater and iron. So, as we can see, energy changes from one form to another, it is never destroyed. Now we will try to learn about various forms of electrical energy and their uses.

**Uses of electrical energy**

Various types of machines run by electrical energy nowadays. If we press switches, lights are turned on, fans begin to rotate, televisions are turned on etc. Apart from listenning to music and news, we can instantly get various types of information from radios and televisions. When a game takes place anywhere in the world, it can be seen and heard from your own room instantaneously. We use telephones, fax machines and computers for communication.

Figure: Light is on, fan is moving, a game is being broadcast on the television, and a computer is running
Electric machines are used to husk paddy, grind wheat and powder spices. You have seen electric pumps being used for irrigation.

![Electric pump is used for irrigation](image)

We sew clothes using electric sewing machines.

![Electric burner, iron, refrigerator and sewing machine](image)

Electric burners are used for cooking by many of us. We press clothes using electric irons. We preserve fish, meat and other food items using refrigerators. Musical instruments like electric guitars,
keyboards etc. are powered by electricity. Electricity-powered cranes are used to lift heavy things.

Figure: Electric guitars, keyboards and other instruments

Figure: Cranes are used to lift heavy things
Electricity is used in large buildings to power lifts. You can give many other examples of electricity-driven machines. If you observe closely, you will find that different electrical devices produce different forms of energy. We have already learnt that light bulbs, tube-lights etc. produce light.
We can hear different types of sound from radios, televisions, electric guitars, keyboards, tape-recorders, alarms etc. In such cases, electrical energy is converted into sound.

In recent times, we have seen the advent of mobile phones. The batteries of these phones are charged with electricity.

Irons, electric burners, heaters etc. produce heat. This heat is used for pressing clothes, cooking, heating rooms etc. Electricity is also used to cool rooms. The appliance used for this is called an air-cooler (AC).

At present, motorized engines are used to propel boats. Heat generated in an engine is converted into kinetic energy. Many of us have washing machines in our houses. Drill machines are used to make holes in walls. These machines convert electrical energy into mechanical and kinetic energy.
Works that were done using muscle power in the past are now done using electrical devices much more easily, requiring much less effort and time than before.
The advantages of using electricity are the facts that we can control this energy easily and use it to improve our standard of living to a great extent.

So far you have learnt the names of many electric machines and their uses. Now make a list of the electrical devices that you have seen in your house or in your locality, on television, in newspapers, or heard about on the radio. You can also ask the elders to tell you about some other machines.

**Mention what these machines do and fill up the following table:**

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<th>Name of the electrical device</th>
<th>Its application</th>
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Now you certainly understand how electricity has made our life easier and better. We can do many things faster, more easily and more comfortably with the help of electricity. We must be careful so that these devices and machines do not fail because of our carelessness. Besides, if we do not handle these devices and machines with care, there is a possibility of receiving electric shock. It may cause danger.

Figure: A girl receiving an electric shock

**Conservation of electricity**

We often leave our lights, fans, televisions, radios etc. turned on unnecessarily. Sometimes we forget to switch off the iron after pressing clothes. These result in wastage of electricity. Electric irons, heaters etc. consume lots of electricity. We should not use these appliances during night unless absolutely necessary.
Load-shedding

The production of electricity in our country is very inadequate with respect to the demand of our population. That is why it is not possible to supply sufficient amounts of electricity to all areas. To distribute electricity according to the needs of all areas, electric supply is temporarily shut off for certain period of time in different areas at different times. This is called load-shedding. Load-shedding decreases if wastage of electricity is reduced. People often take illegal electrical connections for their shops, houses and factories both in rural and urban areas. Because of these illegal connections, shortage of electricity occurs. It often poses a serious threat. Load-shedding results in our misery and financial loss. So we must be careful so that no wastage of electricity occurs in our surroundings. It will greatly benefit us if we can prevent the wastage of electricity. Electricity can be stored, and we can use this electricity later according to our needs. The load-shedding problem can be eliminated if we can check the wastage of electricity.
Exercise

A. Put a tick (✓) mark beside the correct answer:

1. Which one has improved our standard of living?
   a) muscle power   b) heat
   c) electrical energy   d) light

2. Which one is the most advantageous form of energy?
   a) sound    b) heat
   c) light     d) electricity

3. Which one has no use of electricity?
   a) motor car    b) rickshaw
   c) computer    d) mobile phone

4. Why is load-shedding caused?
   a) if there is much electricity
   b) if there is insufficient electricity
   c) if electric wires are old
   d) if there is a wastage of electricity

B. Fill in the blanks:

1. Electricity can be ________.
2. ________ is necessary to compensate for the shortage of electricity.

3. Electricity is a kind of ________.

4. We get ________, ________, ________ etc. from electricity.

5. The ability to do work is called ________.

C. Answer briefly:

1. What is energy?
2. What is electricity?
3. What is load-shedding?

D. Answer in detail:

1. In what ways do we use electricity? Mention ten uses of electricity.

2. Energy is never destroyed - explain with examples.

3. Describe what should be done in order to check the misuse of electricity.

4. What do you understand by load-shedding? How can we benefit from checking the wastage of electricity?

5. Give 3 examples of each of the cases of conversion of electrical energy into light, sound, heat and kinetic energy.
Chapter Six

Heat

Touch your throat with the outer side of your hand. Can you feel the body temperature? Stand for a few minutes in the sun and then touch your throat again. What do you feel? It definitely feels warmer, doesn’t it? Now do an experiment. You will need three bowls, some hot water, some cold water and some normal water for this experiment. Take a bowl of hot water, a bowl of normal water and a bowl of cold water. Put these bowls on a table.

Figure : Different temperatures are felt by immersing hands in water

Now immerse your left hand in the cold water and right hand in the hot water. Keep your hands in this position for two minutes. You can certainly tell which water is hot and which one is cold. Now take your left hand out of the cold water and put it in normal water.
Does the water feel cold? Does the water which felt warm with your left hand feel cold when you submerge your right hand into it? What would you call this normal water - hot or cold? Can you find the reason behind feeling the same water to be hot and cold?

First you immersed your left hand in cold water. The temperature of the water was less than that of your hand. Cold water has absorbed some heat from your hand. Because of this, the temperature of your hand has decreased. That is why the normal water felt warmer in your hand. Again, you submerged your right hand in hot water first. Your hand absorbed some heat from the hot water and its temperature rose. As you immersed your warm right hand in the normal water, it felt cold. Do you now understand why heat can make us feel hot and cold? Matters absorb heat to become hot and give out heat to become cold.

**Effect of heat**

If you keep some water in a plate in the sun, it evaporates. Water changes into vapour due to the heat of the sun. You have learnt

![Figure: Experiment to show that water is evaporated by heat](image)
the water cycle in Class III. You have learnt that water is evaporated by heat.

Now, let us perform an experiment. Take four pieces of fine cloth made of the same fibre. Two of the pieces should be white, and the two other should be black or coloured. Soak the pieces of cloth in water. Now spread one piece of black or coloured cloth and one piece of white cloth in open air under the sun, and the other two pieces of black or coloured and white cloth in the shadows. Which cloth will dry first? You shall find that the pieces of cloth which are kept in the sun and in the open air will dry first. The pieces that are kept in the shadows will dry later. Wet clothes kept in the sun and in open air dry faster. The wind quickly blows water vapour away from the clothes. It helps the water in the wet clothes to evaporate quickly into the air.

![Figure: Roles of temperature and winds in drying of white and coloured clothes](image)

Which one of the pieces of cloth that have been kept in the sun dries first? Which one of the pieces that have been kept in the shadows dries first? In both cases, you will find that the black or coloured
Heat pieces of cloth kept in the sun and in the shadows dry before the white pieces. Do you know the reason? Black or Coloured clothes have greater heat-absorption capacity than the white clothes. That is why black or coloured clothes kept in the open under the sun or in the shadows dry up before white clothes. But heat absorption capacity of black cloths is more than all other coloured cloth.

There are differences of temperatures in the summer, in the rainy season, and in the winter in our country. Temperature levels remain very high in the summer. The humidity also remains high in the summer. `Humidity' means amount of water particles or water vapour in the air. The temperature and humidity levels remain low in the winter. On rainy days level of humidity goes up. This means that more water vapour is present in the air on a rainy day. Besides, the temperature of the air remains rather low. Also, in the absence of wind, it takes time for water vapour to move away from the wet clothes. That is why clothes do not dry fast on rainy days. Sunny and windy days are more suitable for washing clothes. Clothes dry faster in winter than in the rainy season. Because during winter humidity of air remains low, and therefore heat and wind can transform the water particles in clothes into vapour faster.

Look at the following list. What information is given there? Study the information and decide where clothes will dry faster. Why would clothes dry faster there?

<table>
<thead>
<tr>
<th>Place</th>
<th>Temperature</th>
<th>Humidity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dinajpur</td>
<td>18 C</td>
<td>30%</td>
</tr>
<tr>
<td>Dhaka</td>
<td>33 C</td>
<td>75%</td>
</tr>
<tr>
<td>Rajshahi</td>
<td>40 C</td>
<td>30%</td>
</tr>
<tr>
<td>Srimangal</td>
<td>21 C</td>
<td>35%</td>
</tr>
</tbody>
</table>

Temperature remains low in the winter and high in the summer. In order to stay warm in the winter, what colour would you like your
dress to be? Why would that be possible? Will you feel comfortable in a coloured dress in the summer? Answer the questions based on what you have learnt from the previous experiment. If you cannot find the answers by yourself, discuss with your friends or seniors to find out the reasons. You have learnt that dark-coloured clothes have greater heat-absorption abilities than white or lightly coloured clothes. That is why we feel comfortable in coloured dress in winter and white or lightly coloured dress in summer.

**Effect of heat on matter**

Do you know heat causes all types of matter to expand? Take a piece of wire with a length of one meter. Secure both ends of the wire according to the following figure so that the wire is stretched tightly between the two stands.

Now heat the wire using three or four candles under the supervision of your teachers or elders. Place the candles on plates or pieces of paper. You will see that in a few minutes the tightly stretched wire becomes a bit loose. What do we understand from this? Heat causes solid matter to expand. When the wire cools down, it comes back to its original state.
Solid matter may expand very little because of heat, but it is nevertheless very important. If this expansion of solid matters is ignored, it may cause a lot of accidents.

Many of you have seen railway tracks. Railway tracks are made of steel plates. Trains run on these tracks. A small gap is always maintained between two adjoining track segments. Can you explain the reason behind this? When trains run on the lines, heat is produced as a result of the friction occurring between the wheels of the trains and the tracks. Besides, the temperature also increases because of hot weather. It causes segments of the railway tracks to expand. If no gaps are kept between two segments of the tracks, the plates would bend. It may result in serious accidents.

Figure: A little gap is kept between two adjoining segments of railway tracks

If you notice the wheels of a cart, you will find that there is an iron girdle around each of the wheels. The circumference of the girdle is
to be slightly less than that of the wheel. Then how can the girdle be fitted around the wheel? Yes, it is possible because solid substances expand when they are heated. First, the iron girdle is heated to a very high temperature. Heat expands the length of the girdle, allowing it to fit easily around the wheel. The girdle contracts as it cools, and fits tightly around the wheel.

![Figure: Fitting a girdle around the wheel of a cart](image)

You can use expansion of solid matters for many other purposes. The cork of a bottle or the cap of a pen cannot be removed if they are stuck tightly. But if you heat up the bottle or the pen slightly, you will see that the cork or the cap comes off rather easily. Heat does not expand all matters equally. For example, aluminum expands twice as much as iron. Glass expands much less than other solids. If the cap of a bottle is made of aluminum and the bottle itself is made of glass, the aluminum cap expands more than glass when
heated, and the cap of the bottle becomes loose.

**Heat increases the volume of liquids**

You have seen a thermometer which is used to measure body temperature. It is essentially a glass tube with a bulb at one end that contains a glittering liquid. The liquid is called mercury. When we have fever, we place the thermometer under our tongues, and the mercury level inside the instrument rises according to our body temperature. This shows that liquids expand when they are heated. The glass tube of the thermometer is marked with standard units of temperature which we use for measuring the body temperature. The normal temperature of human body is 34 °Celsius or 98.4°Fahrenheit.

![Figure: Using a thermometer to measure body temperature](image)

When we have a fever, our body temperature rises above the normal level. You can measure your own body temperature by placing the bulb of a thermometer in your armpit or under your tongue. So, you
have now learnt through an experiment that liquids expand upon heating.

Now conduct an experiment in the presence of your teacher or an elder. Take a bottle of water and mix some ink with it. Now close the mouth of the bottle using a cork with a hole in it.

Insert a narrow glass tube through the cork as shown in the picture. Some water will rise through the tube. Mark the level of water inside the tube. Seal the openings in the cork around the tube with paraffin. Heat carefully using a spirit lamp or a candle.

After a while you will find that the water level inside the tube has risen even further. Now remove the spirit lamp or candle. As the water cools, you will find that its level inside the tube has come down.
Heat increases the volume of gaseous substances

Inflate a balloon. Take some warm water in a bowl and put the balloon in it. What happens? The balloon grows bigger. Now take a bowl of cold water and put the balloon in it. The balloon will get smaller again. Why did it so happen? The air inside the balloon expands when it is heated and contracts when it gets cold.

Figure: An enlarged balloon in a bowl of warm water and a shrunk balloon in a bowl of cold water

Now do another experiment. Attach a slightly inflated balloon to the mouth of a bottle so that the air inside it cannot escape. Keep the bottle in a trough of hot water or keep it in the sun. After some time you will see that the balloon has grown bigger in size. It shows that the air inside the balloon has expanded due to heat.
**Use of heat**

We use heat to press our clothes. Heat is used in factories in order to dry different things. Powdered spices such as chilli, coriander, turmeric etc. are available in the market. At the factories these are washed, dried up by heating, and powdered. Heaters are used during winter to keep rooms warm, and air-conditioners are used during summer to keep rooms cool. Meat and fish are dried up in order to preserve them.

We use the expansion of matter due to heat in many ways. For example, we utilize the expansion of solid, liquid, and gaseous substances to make sure that trains run safely on railway tracks, to measure body temperature with thermometer, to run steam and petrol engines etc. Find out other examples like these. Make a list of such uses and fill in the following table.

<table>
<thead>
<tr>
<th>Serial No.</th>
<th>Use of heat</th>
<th>Expansion of solid/liquid/gaseous substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
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<td>2.</td>
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<tr>
<td>3.</td>
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<tr>
<td>4.</td>
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<td>5.</td>
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<td>6.</td>
<td></td>
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<tr>
<td>7.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Exercise

A. Put a tick (✓) mark beside the correct answer:

1. What do we need to convert ice into vapour?
   a) air       b) pressure
   c) heat      d) light

2. What is needed to expand matter?
   a) heat      b) light
   c) electricity d) sound

3. Which one of the following expands most due to heat?
   a) water     b) iron
   c) glass     d) air

B. Fill in the blanks:

1. Heat causes the ________ of matters to expand.

2. Wet clothes dry ________ if there is a wind.

3. Wet clothes take more time to dry if there is more ________ in the air.

4. Heat is a kind of ________.

5. Coloured clothes absorb heat ________ than white clothes do.

C. Answer briefly:

1. Why is a little gap kept between two adjoining segments of a
railway track?

2. Why does the girdle of a wheel of a cart need to be heated before it is fitted?

3. Think and then answer
   a) What would the electric wires in the streets look like in summer and in winter, and why?
   b) What happens if we fill a bottle of glass or plastic with water and keep it in the refrigerator, and why?

4. Why do coloured clothes dry faster than white clothes?

5. Dresses of which colour feel comfortable in the summer and why?

6. Why do clothes dry faster in summer and winter than in the rainy season?

D. **Answer in detail:**

1. Narrate the experiment of expansion of solids due to heat with a diagram.

2. Describe the experiment of expansion of liquids due to heat.

3. Describe the experiment of expansion of gaseous substance due to heat.

4. How can the expansion of solid, liquid and gaseous substances be used for different purposes? Give two examples of each.
Chapter Seven

Sound

We wake up in the morning hearing the chirping of birds. Sounds of azan flow in from the mosques. Gradually we hear many other sounds, including news from radio and television, music, mother's voice, noises from kitchen, noises of rickshaws, buses, trucks etc., sound of thunder, barking of dogs at night, murmurs of leaves, noises of insects, ticking of clocks and so on. It is almost as if we live in a world of sounds.

What will you answer if someone asks you what sound is? Probably you will say sound is what we hear. Sound gives our ears the feeling of hearing. Did you ever think about how sound is produced and how it reaches our ears? Conduct a few experiments to find this out.

Touch your throat lightly with your fingers. Now sing in a low voice or make the "aaah" sound continuously. What do you feel? Is anything vibrating inside your throat?

Figure : Vibration of vocal cord
Figure : Vocal cord being tested

There are vocal cords inside our throats. They are used to generate sound.
Now take a rubber band. Hold one end of it in your teeth, hold the other end between your fingers, and stretch it taut. Now pull the band aside with the fingers of your other hand and release it. Is the rubber band vibrating? You will also hear a sound.

Many of you have seen drums being played in band music. If you keep pieces of foam or cork on the drum, you will find that they jump up or vibrate when the drum is beaten with sticks. The pieces of foam or cork will jump as strongly as the drum is beaten. They may even fly off from the surface of the drum as a result of this.

You can conduct another test. It can also be demonstrated by your teacher. A
tuning fork is needed for this experiment. Strike a table or the floor with one end of the tuning fork. Now bring the fork close to your ear. Can you hear something? Now grasp both the prongs of the fork with your palm. What happens? The sound stops. Now take a mug full of water. Hit a table or the floor again with one end of the tuning fork. Quickly dip both the prongs of the tuning fork in the water. What happens? The water ripples and spills over the edges of the mug. Try to play on guitars, violins, drums, ektaras, sitar or whatever you can get. You will find that they all produce vibrations.
If you take a bowl made of steel or any other metal, fill it with water and then hit it with a spoon, you will see that the water is vibrating. If you touch the bowl with your hand, the vibration will stop. From these experiments, you can understand that sound is created through vibrations.

The vibration of a body creates waves in the particles of the air. These waves spread all around. They strike our ears. The membranes inside our ears are very thin. The waves in the air cause the membranes to vibrate. This vibration passes on to the soft bone behind the membrane, causing it to vibrate as well. In this way, vibration reaches our brain through the ears, and we can hear the sound. Now take a long, thin bamboo stick. Move it in the air speedily and swiftly. Can you hear anything? Why does it produce a sound? Now take a shorter and thinner stick and move it in the air in the same manner. Next take a longer and thicker stick and move it as the previous ones. Can you realize the differences among the sounds produced by the three sticks? The pitch of the sound depends upon the length and thickness of the stick.

Now do another experiment. Take some bowls or glasses of the
same size. Take a little water in the first glass, then some more water in the second glass, a bit more in the third glass and so on. In this way, increase the amount of water in the glasses one after another - the last glass should be almost full. Hit the glasses or bowls one by one with a stick. Can you hear any difference among the sounds? You can see that the pitch of the sound changes with the amount of water in the glasses.

![Figure: Musical notes can be created using glasses of water](image)

**Sound produced by musical instruments**

You have seen different kinds of musical instruments like flute, *piano, ektara, dotara, dhol, tabla*, drums etc. The flute is played by blowing. There are holes in the body of the flute. The notes produced by the flute can be changed by covering or uncovering these holes with fingers. Strings are used to create vibrations in cases of instruments like *ektara, dotara*, sitar, piano etc. In these instruments, the thicker and longer the string is, the heavier is the sound produced by it. If the string is thin and short, the sound produced by it will be sharp and high-pitched. The fingers or palms...
of the hands, or sticks are used to play the *tabla, dhol, drum* etc. The sounds produced from these instruments are heavy. The sound of the flute is sharp. Have you seen flutes made from the fronds of coconut or palm trees?

Make flutes like these with the help of your elders or teachers. When you play a flute, the air that cannot pass through the holes causes vibrations, producing sound. The notes produced by a flute varies depending on the amount of air trapped inside it and how the trapped air is controlled.

**Sound is a kind of energy**

You have seen ringing bells in schools. In order to ring a bell, it must be struck. The bell creates vibrations because of the force exerted on it. Sound is created because of these vibrations. Sometimes houses vibrate when heavy trucks pass by. The window-panes of the nearby houses rattle. If you stand on a bridge at that time, you will find that it also vibrates. So you clearly understand that sound is a type of energy. Many things can be done using
sound. Musical instruments can produce sounds because of this energy. Window-panes are sometimes shattered by the tremendously loud sound emitted by jet planes or cannons. The membranes inside the ears can be injured, ears may bleed, and it may result in deafness.

**Use of sound**

Use of sound has improved our standard of living. We talk by making sound and communicate with each other. We use telephones to communicate with people over long distances. We create music by producing sounds with the help of musical instruments. We use radio to listen to news, music, dramas broadcast from distant places. While watching television, we also listen to the sounds that accompany the picture. Sound is used for other purposes as well. We use alarm clocks to help us wake up in time. To request entry into houses, we use doorbells. Sirens are blown during the holy month of Ramadan to wake people up before dawn.

![Figure : Uses of sound](image)

Police cars, fire trucks and ambulances also use sounds as signals.
Car horns and rickshaw bells alert us when we are out in the street. We also use sounds for safety purposes. For example, many cars and houses have alarms which are activated if burglars try to break into them. Smoke detectors alert us using an audible alarm if a fire starts in the house. Serious accidents can be avoided if we immediately open the doors and windows of the house. Sound also has its uses in the medical sector for diagnosis of diseases. Stethoscopes and other apparatuses use sound energy in order to determine diseases or measure blood pressure.

Blind and deaf people can move around with the help of a sound device. The presence of submarines or icebergs under the sea can be determined using sound waves.

**Echo**

Have you noticed what happens when you shout in an empty room or in front of mountains, hills or high walls? Can you hear your own voice again? What is it called? If someone shouts in a large open field or on the bank of a river, the sound waves bounce back if they are
blocked by mountains or walls. Thus the sound is heard again after a short interval. This is called an echo.

Figure : Echo

If you make a sound while standing beside a well or on the bank of a river, the sound will return to your ears as an echo.

Using echoes, we can measure the depths of wells or seas. In medical practice, echoes are used to determine diseases. We also use echoes to detect different things under the sea.

**Sound pollution**

We cannot do without sound. But loud and high-pitched sounds irritate us and have harmful effects on our bodies. This effect is
called sound pollution.

Horns of vehicles on the roads, noises from factories, noisy construction of buildings in the urban areas, using loudspeakers etc. cause sound pollution. You have noticed that noises made by loudspeakers hamper study and other activities. Sound pollution may cause headaches, mental agitation, hearing impairment, high blood pressure, heart diseases etc. Band music played at very loud volumes may even cause heart attacks in some cases. People who work in very noisy environments may eventually become deaf.

We must be careful to keep our environment free of sound pollution. Every country has its regulations that determine the permissible levels of sound for different areas. We all should know about these regulations and abide by them. It is a serious crime to make loud noises in or around hospitals, educational institutions and residential areas.
Exercise

A. Put a tick (✓) mark beside the correct answer:

1. What is needed to produce a sound?
   a) vibration
   b) long string
   c) flute
   d) tune

2. Which musical instrument uses a membrane to generate sound?
   a) guitar
   b) sitar
   b) flute
   d) tabla

3. Which musical instrument uses strings to make sound?
   a) flute
   b) tabla
   b) dhol
   d) piano

4. Which one uses echoes?
   a) ambulance
   b) television
   c) watch
   d) ultrasonography

B. Fill in the blanks:

1. Sound is a kind of ________.

2. ________ of matter is needed to produce sound.

3. Sound produces many kinds of ________.

4. Tabla, dhol, drum etc. use ________ for making sound.
5. The production of heavy sharp notes by ektara depends upon the ________ of the string.

C. Answer briefly:

1. What is sound?

2. What do we need to do to produce sound?

3. What energy is used in musical instruments to make sound?

4. Why do our throats vibrate when we speak?

D. Answer in detail:

1. Why is sound called an energy? Explain with two examples.

2. Describe uses of sound energy in medical science.

3. Describe uses of sound energy.

4. What is an echo?

5. What do you understand by sound pollution? Describe the harmful effects of sound pollution.

6. How does sound pollution occur?

7. Describe an experiment showing how sound is produced using ripples of water.

8. Explain how sound is produced by musical instruments.
Health is the state of being healthy. Health means sound body and sound mind. Health is wealth. In order to safeguard this wealth we need to consume balanced diets, sleep properly and take rest. Since birth an infant is fed only on milk. When a baby is five to six months old, it is given soft rice, eggs, bananas, fruit juice etc. Babies who are two to three years of age can eat almost all kinds of food including fish, meat, egg, rice, bread, fruits, vegetables. Notice that babies learn to eat many more types of food as they grow up. So, from this you can easily understand that our bodies require various types of food in order to be built and to grow.

**Importance of food in maintenance of health**

Food is what we eat and what compensates for decay, helps the body to grow and enables the body to fight diseases. There are many types of food in the world. All of them do not possess the same food value. Carbohydrate, protein, and fat are the three main elements of food. We also consume water, vitamins and minerals. To digest carbohydrate, protein and fat, we need enzymes. To keep our body sound and healthy we need all these elements. All kinds of pulse, bean seed, green pea, fish, dried fish, egg, milk, liver, meat etc. are protein food. We need protein for building up, compensating for decay and growth of our bodies.
Rice, wheat, maize, sugar, potato, and all products of rice including chira, muri, khai etc. are starchy food. This type of food gives us energy to work.

Butter, ghee, and various types of oils are fatty foods. Fat gives us energy.

**Need of vitamins to maintain health**

There are plenty of vitamins and minerals in vegetables and fruits. Vitamins protect our body. Vitamin deficiency may cause various diseases. It may even cause death. Vitamins are of many kinds. Many of us suffer from different diseases because of vitamin deficiencies. You must have heard about a disease called 'night-blindness'. Deficiency of vitamin A causes this disease. If this deficiency is not compensated for in time, it may lead to permanent blindness. All kinds of coloured fruits and green vegetables contain vitamin A. *Mala* and *dhela* fish also contain plenty of vitamin A. Sores on lips and tongue are caused because of deficiencies of vitamin B. Rice husked using husking pedal (*dhenki*), peas, liver, vegetables etc. contain vitamin B. Fruits such as hog-plum, guava,
tomato, lemon, myrobalan etc. contain plenty of vitamin C. Vitamin C increases our ability to fight diseases. Deficiency of vitamin C causes a disease called scurvy. This disease causes swelling, soreness and bleeding of gums. Vitamin C keeps our skin healthy and protect us from catching cold.

Vitamin C is spoilt by heat. Therefore, the fruits which contain vitamin C should be eaten raw. Our body cannot store this vitamin, so we should take food containing vitamin C everyday.

**Need of minerals to maintain health**

Minerals are essential elements for our bodies. Minerals strengthen our teeth and bones. The fish, meat and vegetables which we eat contain various kinds of minerals. Deficiency of minerals causes many kinds of diseases. For example - deficiency of iron causes anemia. Generally children and women suffer from this disease.

Molasses, eggs, red amaranths, arum leaves, liver, plantain etc. contain plenty of iron. Many of you have heard about a disease called goitre. This disease is caused by iodine deficiencies. There is
iodine in sea fish. Iodine deficiency can be compensated for if we take iodized salt. Bones do not grow properly if there is deficiency of calcium in the body. This deficiency also causes children's legs to bend and teeth to decay. Milk, curd, arum leaves, small fish, red amaranths etc. contain calcium.

Need of water to maintain health

Like other food elements, water is also an essential element for our body. The food we eat cannot be digested without water. To put it simply, no living being can live without water. About 70 to 80 percent of our body mass consists of water. The food we eat everyday contains a lot of water. Still, we need to drink five to six glasses of water everyday.

Healthy habits

You already know that cleanliness is a part of hygiene. Cleanliness
consists of many of our regular habits like taking bath, brushing teeth, cleaning eyes, washing hands and face, clipping nails, combing hair, wearing clean clothes, washing hands with soap before taking meals and after using the toilet etc. We must also practise a number of other healthy habits to keep ourselves strong and healthy. These are - doing physical work, getting adequate rest, sleeping, taking food regularly, playing, exercising etc.

**Necessity of physical activities to maintain health**

Do you know why we eat food? What is food? Why is food necessary for our health? Eating large quantities of nutritious food is not enough to maintain a good health. If we do not do any physical work, we will suffer from ill health, lack of interest in doing our work, and lethargy. It will gradually decrease our ability to work. We will become physically incapable. Also we will start suffering from various diseases. So we need to do physical work to keep ourselves physically strong and active. Children should play regularly. It takes away lethargy and increases hunger and appetite. It helps to keep them cheerful. It also helps to develop interest in studying and doing other things.

*Figure: Playing and exercising*
How do you feel when your school is closed and you have to spend the whole day at home without getting a chance to play? Do you feel good?

It is good for your health to do some light exercise regularly. For example - walking briskly, running, swimming etc. Exercises enhance the blood circulation in the body and make us feel fresh.

**Resting and sleeping to maintain good health**

We play, work, study etc. all day long. It makes our body tired, after which we do not feel like doing anything else, and we want to rest. Why do we feel like this? This happens because working expends a lot of energy. Rest means a break between periods of activity. We regain our energy through rest. We cannot work continuously without resting. Resting keeps both our body and mind fresh. A man need to sleep for six to eight hours everyday. A sound and pleasant sleep drives away physical and mental fatigue. It is a healthy habit to go to bed and get up regularly at a proper time. It is good to get up early in the morning. Morning air is very good for health.

Health is the key to all happiness. People who are not healthy are the most miserable people in the world. Health is represented by a disease-free body and a healthy mind. If we can develop a habit of cleanliness from childhood along with other good habits, we can be healthy physically and mentally throughout our lives.

You have already learnt that it is very much necessary to take proper care of health and practise cleanliness in order to be free from diseases. You have also learnt that we need to keep our environment clean as well. Notice how your houses, roads, yards, surroundings
etc. get dirty. Now fill in the following table and show it to your teacher.

<table>
<thead>
<tr>
<th>Ways the environment gets dirty</th>
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<tr>
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<td>5.</td>
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<td>6.</td>
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</tbody>
</table>

Many of you must have mentioned garbage and excreta among the things you have written down in the above table. So we understand that it is very much necessary to dispose of garbage and excreta properly to keep the environment clean.

**What is garbage?**

The dirty and useless stuff we throw away is garbage. Garbage and waste can be of three kinds. They are: (1) dry garbage, (2) moist garbage, and (3) liquid waste.

(1) **Dry garbage:** dirt, leaves, pieces of bricks and stones, shreds of clothes, pieces of tin etc.
(2) **Moist garbage:** vegetable and fruit peelings, rotten or stale food, fish scales, corpses of animals and birds etc.

(3) **Liquid waste:** water from bathrooms, water that has been used to wash vegetables, fish or meat etc.

**How garbage harms us**

If hygienic disposal of garbage and excreta is not done, they can create a lot of problems. For example -

1. Garbage and excreta spread bad smell when they decompose. It causes air pollution.

2. Flies lay their eggs in rotten garbage and thus they breed and spread diseases.

3. If garbage is thrown in wells or ponds or near tube-wells, they rot. This rotten garbage is washed into the waters of ponds or wells. This results in water pollution.

4. Garbage and excreta are ideal dwelling places for insects. This often invites pests such as flies, cockroaches and rats.

**Disposal of garbage**

The garbage disposal facilities in urban and rural areas are not the same. In urban areas, garbage must be disposed of in dustbins close to your houses. It is not at all right to throw away garbage beside dustbins. Garbage vans owned by the municipalities collect this garbage everyday. This garbage is used to fill up ditches or low lands. If there is no proper drainage system, rainwater, water from bathrooms and other types of liquid waste stagnate and make our
We need to have proper drainage systems in order to keep our houses healthy. There are brick-built drainage systems in towns for disposing of liquid waste. Many of us throw other types of garbage besides liquid waste into these systems. But this is not right at all. Rural areas do not have brick-built drainage systems. There people must construct their own earthen drains. We must be careful so that the drains do not clog up. Drain water can be released into agricultural fields. Earthen drains must be cleaned everyday.

Garbage and waste do not always create problems for us. In rural areas rotten garbage is used as fertilizer. To make fertilizer, a hole is dug 8 to 10 meters away from houses. This hole is filled daily with excreta of ducks and chickens, cow dung, fallen leaves and other types of household garbage. Once the hole is completely filled with garbage, it is covered with soil. Within a few days the garbage decomposes and is converted into a very good fertilizer. Garbage is also burnt and buried underground to fill up pits, ditches etc.
Exercise

A. Put a tick (✓) mark beside the correct answer:

1. Which one is an example of starch-type food?
   a) fish  b) meat  
   c) egg  d) maize

2. What type of food is necessary for proper build up and growth of the body?
   a) starch  b) protein  
   b) fat  d) minerals

3. Which one helps to remove fatigue?
   a) food  b) gossiping  
   b) playing  d) sleeping

4. Which disease may be caused because of vitamin A deficiency?
   a) scurvy  b) sores on the lips  
   c) anemia  d) night-blindness

5. Which one is not a type of garbage?
   a) dirt  b) fish scales  
   c) rain water  d) vegetable peelings
6. **Where is garbage disposed of in towns?**
   a) in holes       b) in drains
   c) in dustbins    d) in ditches

7. **What can be obtained from decomposed garbage?**
   a) soil           b) organic fertilizer
   c) fish food      d) green fertilizer

**B. Fill in the blanks:**

1. A healthy body has a healthy ________.
2. Our bodies cannot function without ________.
3. ________ is caused because of vitamin C deficiency.
4. Sores on the lips are caused because of vitamin _____ deficiency.
5. There is plenty of ________ in sea fish.
6. ________ and ________ are ideal dwelling places for insects.
7. Garbage and excreta spread ________.
8. ________ should be cleaned daily.
9. There are brick-built drainage systems in the towns to remove _____.
10. Garbage decomposes and turns into good ________.
C. Match the words on the right with the ones on the left:

<table>
<thead>
<tr>
<th>Left</th>
<th>Right</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. dirt, dry leaves are</td>
<td>1. in rotten garbage</td>
</tr>
<tr>
<td>2. peelings of fruits and fish scales are</td>
<td>2. moist garbage</td>
</tr>
<tr>
<td>3. water in which fish have been</td>
<td>3. dry garbage</td>
</tr>
<tr>
<td>washed and water from bathrooms is</td>
<td>4. spreads bad smell</td>
</tr>
<tr>
<td>4. rotten garbage</td>
<td>5. liquid waste</td>
</tr>
<tr>
<td>5. flies lay egg</td>
<td></td>
</tr>
</tbody>
</table>

D. Answer briefly:
1. What do you understand by garbage?
2. What good does garbage do for us?
3. How are we benefited from garbage?
4. Why do we need drains?
5. Why is food important for proper maintenance of health?
6. What diseases may be caused due to deficiency of minerals?

E. Answer in detail:
1. Describe the importance of food for maintaining health.
2. Discuss the importance of vitamins in the context of proper maintenance of health.
3. Why minerals are necessary for health? Give three examples of minerals.
4. Discuss the importance of sleep and rest in the context of proper maintenance of health.
5. What steps can be taken to keep our houses clean?
6. Describe how organic fertilizers can be prepared from garbage.
7. What are the rules you should obey to develop healthy habits?
Chapter Nine

Insects as Vectors of Diseases

Mosquitoes, flies, ants, silkworms, bees, cockroaches etc. are insects. We get silk from the cocoons of silkworms. We collect honey from beehives. These are useful insects. Insects like mosquitoes, flies and cockroaches spread diseases. These are harmful insects. These insects breed in unhealthy and dirty environments. They cannot survive in clean environments. Now let us know about the breeding grounds of these harmful insects. It will help us to prevent them from breeding.

Mosquitoes

The mosquito is a very common harmful insect. There are many marshlands and swamps in Bangladesh. That is why we are disturbed by mosquitoes so much. The buzzing sound of their wings makes us aware of their presence at night. Mosquitoes stick their needle-like probosces into our bodies and suck our blood. This is what we call mosquito bites.

There are three types of mosquitoes in our country. They are:

1) Anopheles 2) Culex 3) Aedis

Male anopheles mosquitoes cannot bear germs of malaria. They cannot even suck human blood. They live on the juices of leaves and fruits. Female anopheles mosquitoes are the vectors of malarial germs. When these vector female anopheles mosquitoes bite, the malarial germs are transferred to human body and they begin to breed. When the number of germs becomes sufficiently high, then the symptom of malaria is reveabl.
The symptoms are:

* The body of the patient begins to shiver with cold, and a high fever occurs.
* Severe aches occur in the head and all over the body.
* Fever occurs intermittently.
* After five to six hours, the patient breaks out in a sweat, and his body temperature comes back to normal by itself.

Figure: Anopheles mosquito

Culex mosquitoes spread germs of elephantiasis. Elephantiasis causes swelling in various parts of the body, but the legs are affected the most. In our country there had not been any violent outbreaks of dengue until recent years. Female aedis mosquitoes are vectors of dengue. Aedis mosquitoes have white dots on their bodies. These mosquitoes can be identified at close proximity. Dengue is mainly of two types: common dengue and hemorrhagic dengue. Hemorrhagic dengue is more dangerous than common dengue. Dengue causes body temperature to rise severely. Bleeding occurs from eyes, tongue, gums and other parts of the body. This disease
reduces the number of platelets in bloodstream. If the platelet count becomes too low, the patient must go for medical treatment according to a doctor’s advice.

![Figure: Aedis mosquito](image1.png) ![Figure: A patient suffering from dengue](image2.png)

**Habitats of mosquitoes**

You have learnt earlier that in order to keep ourselves safe from the diseases spread by the mosquitoes, we need to know about their breeding places. Identify the breeding grounds of mosquitoes in your surroundings. In which season do mosquitoes pester the most? When are they less prevalent? Mosquitoes hide themselves away in the corners of rooms, in the bushes or in dark places. They lay eggs in stagnant water. All types of mosquitoes lay their eggs in the water accumulated in broken pots, pitchers, tubs, bottles, coconut shells etc. However, aedis mosquitoes lay their eggs in such water only if it is clear. Mosquito larvae hatch from the eggs. Take a close look, and you will find the larvae swimming in the water. If you cannot identify these mosquitoes, ask your teachers or elders for help.

Now try to find mosquito-larva in springs, rivers or in the clear
water of ponds. Can you find any larvae there? What is the reason behind this? You know that mosquitoes lay their eggs in stagnant and dirty water. They do not lay eggs in flowing or clean water.

**Prevention of the spreading of mosquitoes**

To prevent the breeding of any animal, we need to destroy its breeding grounds. So we must first make sure that there is no stagnant water in our surroundings. If we still find mosquito larvae in stagnant water somewhere, we must spray insecticides or kerosene into that water. But be careful, and never do this by yourselves. This should be carefully done only by adults. Do not let water accumulate in broken pots, pitchers, tubs, bottles, coconut shells etc. Always destroy them or keep them upside down. Drains of houses must be kept clean. Mosquitoes hide in the bushes during daytime. So we need to clear bushes from the immediate vicinity of our houses. We must practise sleeping under mosquito nets in order to be protected from mosquitoes.
Flies

Flies are one of the most harmful insects. In summer flies are seen flying around rotten and stale food, garbage and ripe fruits. Every year thousands of people die in our country from diarrhoea, cholera, dysentery etc. Flies are vectors of these diseases. They carry germs on their wings and legs. Flies are great enemies to us. They also carry germs of tuberculosis and typhoid. They are found flying around mostly during the day. Flies generally live on human excrement, vomit, faeces of animals, rotten and decomposed garbage etc. They vomit and defecate repeatedly while they feed on.

Habitats of flies

You have learnt that flies are vectors of a lot of diseases. You have also learnt that they live in rotten garbage, decomposed corpses of animals, piles of cow dung etc. and lay their eggs there. Newly-born flies hatch from those eggs and grow up. They do not have wings or legs. They move like worms and remain within shells. They finally turn into adult flies. Adult flies have wings and legs, and they can fly.

In the table below, write down the differences between mosquitoes and flies and show it to your teacher.

<table>
<thead>
<tr>
<th>Mosquito</th>
<th>Fly</th>
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<tbody>
<tr>
<td>1.</td>
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<td>2.</td>
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<td>3.</td>
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<td>4.</td>
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</tbody>
</table>
Prevention of breeding of flies

If we can destroy habitats of flies, we can prevent them from breeding. In order to do this, we need to keep our houses clean. We must not throw away rotten or stale food, garbage, excreta etc. in open places. In urban areas we must dispose of garbage in dustbins. In villages, we must bury them underground by digging holes away from our houses and cover them well with soil. This will prevent the stench of the decomposed garbage from spreading, and the air will not be polluted. Besides, it will prevent flies from laying eggs in the garbage. We need to spray phenyl or insecticides on the breeding grounds of flies.

So now we know how to destroy the habitats and breeding grounds of flies. Let us also learn about the steps that can save us from the disturbances of flies and diseases which are spread by the flies.

* We must keep our houses and the surroundings clean.

* We must keep the drains clean and regularly spray phenyl or DDT into the drains.

* We must not defecate or urinate in open places.

* We must not eat rotten or stale food.

Other insects

There are many other insects besides mosquitoes and flies that are harmful to man and plants. For example - cockroaches, bedbugs,
lice, caterpillers, rice hispars etc. Rice hispars harm our paddy and
caterpillers harm our jute. Cockroaches, bedbugs, lice etc. spread
diseases. The main way to be safe from these insects is to keep
ourselves and our surroundings clean.

**Exercise**

**A. Put a tick (✓) mark beside the correct answer:**

1. **Which mosquito causes dengue?**
   a) Anopheles  b) Culex  
   c) Aedis  d) female anopheles

2. **Female anopheles mosquitoes are the vectors of:**
   a) malaria  b) dengue  
   c) elephantiasis  d) tuberculosis

**B. Fill in the blanks:**

1. Flies are great ________ to us.

2. ________ carry germs of dysentery and diarrhoea.

3. Swelling of the arms and legs occurs because of the disease
called ________.

4. Elephantiasis is spread by ________ mosquito.
C. Match the words on the right with the ones on the left:

<table>
<thead>
<tr>
<th>Left</th>
<th>Right</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. fever with shivering</td>
<td>1. culex</td>
</tr>
<tr>
<td>2. fly</td>
<td>2. kerosene, insecticides</td>
</tr>
<tr>
<td>3. in stagnant water</td>
<td>3. number of platelets decreases</td>
</tr>
<tr>
<td>4. dengue</td>
<td>4. have no wings</td>
</tr>
<tr>
<td>5. destroy mosquitoes and flies</td>
<td>5. malaria</td>
</tr>
<tr>
<td>6. elephantiasis</td>
<td>6. mosquitoes lay eggs</td>
</tr>
<tr>
<td>7. mosquito larvae</td>
<td></td>
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</tbody>
</table>

D. Answer briefly:

1. What are the habitats of mosquitoes?
2. What do flies eat?
3. What diseases are spread by flies?
4. What diseases are spread by mosquitoes?
5. What are the habitats of flies?
6. How can Aedis mosquitoes be identified?

E. Answer in detail:

1. Write down the steps of exterminating mosquitoes.
2. How can the breeding of flies be prevented?
3. Write down the symptoms of malaria.
4. Write down the symptoms of a dengue patient.
Chapter Ten

First Aid

What are accidents and first aid

Suppose one of your friends fell from rickshaw on his way to the school and injured his knees. Another friend cut his finger while he was cutting a green mango. Another friend went to swim in the pond and nearly drowned. His elder brother was also swimming then. He saved his life. Anyone who does not know how to swim can drown like this. Getting injured while travelling, getting cut in the hands or legs someway, drowning in water because of not knowing how to swim etc. are all examples of accidents. Accidents can make a healthy person ill in a moment. It is necessary to take quick measures whenever an accident occurs. We should first take certain immediate measures for saving the lives of accident victims before consulting a doctor. The simple medical treatment that is given immediately to an accident victim is called first aid. First aid for all types of accidents are not the same. The kind of first aid would depend on the kind of accident that has occurred.

Make a list of different kinds of accidents using the following table:

<table>
<thead>
<tr>
<th>Accidents</th>
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</table>
What to do if someone cut his hand or leg

Robin cut his leg while running in the school playground. What should you do in such a case? At first you need to know how badly he has been injured. If the cut is not a deep or severe one, first wash the wound using Detol or Savlon. If Detol or Savlon is not available, use some cold boiled water. Now spread some antiseptic cream on to a piece of cotton or light cloth and apply it to the wound.

Figure: The wound is washed using clean water

Figure: A piece of cloth is used to stop bleeding

If the cut is deep and blood spurts from it, the wound should be pressed with a piece of cotton or clean used cloth immediately to stop the bleeding. If the wound is in the arm or leg, then the limb should be held up, and the injured person should be taken to a doctor as soon as possible. We should not apply any other things to the wound to stop the bleeding.
**Burns**

What steps should be taken if a part of your body or someone else's body sustains burns in an accident? First you need to determine which part of the body is injured and how severe the burn is. It would then be possible to determine what kind of treatment should be given to the patient.

When an entire arm, a leg, the head, or more than half of the back is burnt, the burn is considered a severe one. If the burn covers a smaller area, it can be considered as relatively minor burn.

If only a small part of the skin is burnt and no blisters appear, we call it scorching. In such cases, the burnt area should be kept immersed in water. This will lessen the pain and minimize damage to the scorched area. No medical treatment will be necessary. If a part of the body is severely scorched, water to be poured out there and the person should be taken to the doctor immediately.

If there are blisters only, the burnt skin should be washed with soap and water carefully. Then it should be dried using a soft piece of cloth. We must never try to burst the blisters. If they burst automatically, the area should be washed gently with cold boiled water and soap. The burnt skin must be kept exposed. We must make sure that no flies come in contact with the wound.

If the blisters burst and the wound contains pus, we need to wash the burnt area very carefully with water mixed with potassium permanganate with the help of a piece of soft cloth. If the medicine
is not available, mix one teaspoonful of salt with one liter cold boiled water and use it to wash the burnt skin. If there is excessive pain, pus, bad odours, or fever, a doctor must be consulted.

**Drowning in water**

Sometimes you learn from newspapers about the deaths of people when a launch or boat sinks. These are deaths by drowning. Drowning people can be saved if immediate treatment is given to them. Therefore it is very important to give first aid to a drowning patient. Two things should be considered before starting the treatment. First, we should see whether the patient is conscious or breathing. If it seems that the patient is not breathing, you should tilt up the head of the patient and blow air from your mouth into his or her mouth once every half a minute. It is necessary to give the patient a chance to breath from time to time. The patient should be taken to the doctor as soon as possible.

If the patient is conscious, he must be taken out of the water at once and his clothes should be loosened. After drying his mouth and nose with a piece of cloth he should be laid down on his stomach on the ground. The head of the patient should be placed on one of his hands and his face should be turned sideways.

The mouth of the patient must be kept open by inserting a hard object between his teeth. The mouth and the throat of the patient should be cleaned with a soft clean cloth.
Figure: Water comes out of the patient's stomach as pressure is applied on his back.

Now place a pillow under the belly of the patient. You have to kneel down on the ground as shown in the picture, keeping the legs of the patient between your legs. Then, place your hands on either side of the patient's back and start pressing hard with short intervals. After a while water will start to come out of the mouth of the patient and he will start breathing. The patient should then be taken to a doctor as soon as possible.

Such accidents may happen any moment in our lives. So we need to be aware of the first aid procedures for these accidents. Split your class into a number of groups. Each team will consist of five or six students. The groups will then demonstrate through acting how to give first aid in case of the accidents discussed above.
Exercise

A. Put a tick (✓) mark beside the correct answer:

1. What should you do when there is an accidental cut?
   a) apply antibiotic ointment
   b) break an egg and apply it
   c) apply cloth and kerosene
   d) apply cow dung and kerosene

2. What should you do with a severe burn?
   a) pour water in the wound and to take the doctor
   b) wash the wound with Savlon or Detol
   c) apply antibiotic ointment
   d) apply juice of marigold

3. What should you first do if there is a severe cut and blood spurts from it?
   a) apply juice of Doop grass
   b) apply egg white
   c) press the wound with cloth or cotton
   d) apply antibiotic ointment
4. **What should we first do in order to save the life of a drowning patient?**
   a) check if he is vomiting
   b) check if there is water in the patient’s stomach
   c) check if he is breathing
   d) check if his limbs are broken

B. **Fill in the blanks:**

1. A scorched area should be kept immersed in ________.
2. ________ should be poured to severely burnt skin.
3. In case of a drowning patient, we should first check if he is ________ or not.
4. Accidents may make a healthy man ________ in a moment.
5. The ________ that should be instantly carried out to save the life of an accident victim is called ________.

C. **Answer briefly:**

1. What do you understand by first aid?
2. What should you do if you suffer a cut on any part of your body?
3. What should you do if you suffer a severe cut on your hand or leg?
4. What is the necessity of knowing how to swim?

D. **Answer in detail:**

1. How first aid would be given to a drowning patient?
2. What should be done with a severe burn on any part of the body?
Chapter Eleven

Information Communication Technology

Information

Those of you who have seen a mother hen wandering around with her little chicks may have noticed one thing. The mother hen, whenever she finds some food, makes a particular sound from her throat. Hearing that sound, the little chicks come running to their mother for feeding. Again, if the mother hen sees a kite in the sky, she makes a different kind of sound with her throat. Hearing that sound, the chicks quickly hide themselves in safe places. By now you must have understood that the mother hen, by making a particular sound sends the message to her chicks that she has found food, and by making another particular sound sends the message of warning that she has seen a kite. In other words, the mother hen is communicating some information to her chicks by making some sounds from her throat.

Like the cocks and the hens, other animals and birds also send information to each other in different ways. You may be surprised to know that even insects send information to each other. When a bee finds a flower garden, it immediately goes back to its hive. It then starts flying in the shape of the number 8, and from that movement the other bees can get the information about where to go.

You can see that animals, birds or insects do not have much intelligence, but they don't need to know much either. Therefore, their information is also of very general kind and they send this information to each other in quite simple ways. Compared to animals, birds and insects, men are much more developed
and so their information is also much more developed. Not only that, the ways in which men communicate information to each other are also much developed. When animals, birds or insects communicate a certain piece of information to each other, they always do it in the same way. They cannot think of new ways of communicating information. But it is different with men. Men are constantly trying to find newer ways to communicate information. You will be surprised to learn about all these means of information communication.

You must have understood by now what is meant by information. News or knowledge about anything is information. To live we constantly need to learn new information. A farmer needs to know how to drain water into his land. A factory worker has to know how to run the machines in the factory. A student is all the time getting new information from his or her books. A doctor needs to have new information about illnesses, patients and treatment to be a good doctor. Again, a businessman needs to have the information about at what price to buy his goods and at what price to sell those. Thus you see, everyone according to his or her needs in life has to have information about things in life. And this information is scattered all around us in various ways. We look for and find the information as we need it. You should also remember that men not only gather information scattered around them, they also give birth to new information. Many people across the world are giving rise to a lot of new information through their experiences and research works. When a new disease breaks out, doctors need to know what it actually is and what medicines to give. Scientists do research work on it and find the medicine for its treatment. And a new piece of information is born in the world. Thus, new information is constantly being born around us every minute, there's no end to it.

**Information Communication**

Suppose, the people in the Weather Department one day come to know that a cyclone has formed in the Bay of Bengal and also that the cyclone is moving
towards the coast. If they keep this information to themselves and don't communicate this to the people, what will happen? Thousands of people will perhaps then die in the cyclone. However, if the people in the Weather Department give the news of the cyclone on radio and television and inform the people about it, the lives of thousands of people can be saved. The people can move away to safer places or go to the shelter centres. So, you see that information can save the lives of thousands of people. But, it is important to communicate the information for that. That is, as information itself is very important, so is contacting the people for communicating the information.

We can see many examples of information communication around us. When a farmer notices an insect in his crop or farm land, he needs to contact the Agriculture department to get the information about how to get rid of the bugs. A factory worker, when a machine breaks down, needs to communicate with the engineering department for information about it. When a student needs a book and cannot find it in local bookstores, he or she has to communicate with the bigger bookstores or libraries in the nearby city. A labourer living in a foreign country communicates with his or her family members in Bangladesh to get news about their well-being.

In the modern world, information communication is a very important subject. Earlier we didn't have so many different ways of communicating information as we have now. Before, a man or a woman had to carry information in person from one place to another. The information would reach others as fast as the person could go to them.
Besides this, people sometimes used to communicate information through blowing a trumpet or playing the drums. American Indians used to send messages to far away places by rising or lowering the smoke of fire. You can understand that in this way only one or two simple messages could be sent. No complicated messages could be sent in these ways. Sometimes, messages were written on a piece of paper and then it was tied to the feet of a pigeon.
The pigeon would then fly back to its home and the people there would get the message. Thus, complicated messages could be sent on papers, but that could be done to one definite place only. There were no ways to send information to many people at the same time. And therefore, for a long time, people used to ride horses to carry messages as fast as possible from one place to another.

Later on, when boats, then ships, then motor vehicles were invented, people started using these to send information quickly to others. After the plane was invented, people could send information much faster than before.

**Information Communication and Technology**

In 1837, a significant change happened in the field of information communication. A scientist called Samuel Morse invented a technique of sending information by using electronic signals through wires. This technique is known as Telegraph. People started to send information through telegraph. Because electronic signals could travel a long way in an instant, people started to send messages to people thousands of miles away through telegraph. For the first time, men started to use technology instead of a human being to send information from one place to another.

Technology is the use of science. Science is knowledge and
knowledge can never be bad. But technology can be good or bad. A lot of harm has been done to mankind as well as to environment by bad technology. However, man has for the most part used technology for the good of man. Information technology is a good example of that.

At first, only one word at a time could be sent through telegraph. Thus, one word, then the next word, and then the next, in this way a message was sent. When telephone was invented, people could send information directly by talking into the phone and sending the speech through wire. People physically separated by hundreds of miles in between them started to talk to each other using telephone.

Figure: Use of technology for exchange of information
Telephone wire is needed to be installed to make the telephone work. So, the scientists started experiments to find out if information could be sent without wires. In 1901, the Italian scientist Marconi and the Bengali scientist Sir Jagadish Chandra Basu invented the new technology of sending information without wire. This technology is known as wireless. Because no wire is needed in this technology to send information, wireless has been a milestone in the field of information technology.

Gradually a lot of improvements have been made in this technology. Using this technology, we have found the television. Now almost all of us use mobile phones - this is also a contribution of the wireless technology. It is a matter of pride for us that one of the inventors of this wonderful technology is a Bengali scientist.

Figure: Devices which use radio technology
The machine which has made a revolution in the field of information technology is the computer. Although the computer was first created for keeping accounts, now it is being used for various kinds of works. We can use computer to write, to draw pictures, to listen to music, and even to solve complicated problems of mathematic.

Scientists and technologists have started to link one computer with another. In a short span of time, millions of computers in the world have been connected with each other. This is called 'computer network'. People across the world can now exchange information with each other through computer network. This is known as 'internet'. Internet is considered as the most significant technology of the new world.

If you want, you can now get a particular piece of information from any part of the world through internet, or send information to any part of the world you want. And because it is so easy now to get information through internet, people all over the world are becoming more and more dependent on the internet.

This new form of information technology is changing our world in new ways everyday. Have you taken part in this new change? Do you want to take part?
Exercises

A. Tick the correct answer.

1. Which one of the following is **not** correct?
   a. Birds and animals also exchange information among themselves.
   b. Man has created new methods for communicating information.
   c. It is not possible to create new information.
   d. We need to know new information in order to live.

2. Which living being was used earlier to carry information?
   a. Hare  b. Cat
   c. Eagle  d. Pigeon

3. Wireless technology is used in which of the following?
   a. Cassette player  b. Sewing machine
   c. Radio  d. Telegraph
4. Which of the following is not correct?
   a. Letters or alphabet is sent by telegraph.
   b. Speech is sent through telephone.
   c. Pictures are sent through radio.
   d. Speech and pictures are sent through television.

5. Fill in the blanks:
   a. Wireless was invented by Marconi and ___________.
   b. The technology that communicates information across the world through computer network is called ___________.

6. Answer in brief.
   a. Why is information important in our life?
   b. Give examples of two good technologies and two bad technologies.
   c. How can we save people's lives by communicating information?
You have learnt that the population of Bangladesh is very large and it is increasing day by day. You have also learnt that over population creates various problems for a country. It suffers food shortages. Over population causes harm to and pollutes the environment. Air and water become polluted. People start facing unemployment. You have learnt about environment pollution in earlier classes. In this chapter we shall learn more about the pollution of the environment due to over population.

Before we discuss the effect of over population on the environment, let us learn some theories and information about population. We shall learn what population is, how the population of a country is counted, what population density is and how it is determined, what per capita income is and how it is measured, and how per capita land is measured.

According to Census Report 2001 the population of Bangladesh is, about 130.03 million. This means that the total number of males, females, youths, old people and children who live in Bangladesh is the total population of Bangladesh. So we can say that the total number of males and females of a country including children and adults is the population of that country.

The process of counting the people of a country for determining its population is called census.
A census is conducted every 10 years. Censuses not only give us information about the total population of a country. It also provides us with information about the numbers of males and females, children and adults, and literate and illiterate people of a country. Besides, we can learn about other types of useful information like the number of people engaged in various professions, socio-economic conditions, birth and mortality rates, density of population, rates and nature of increase and decrease in population etc.

You know that the population of the world is increasing day by day. To provide food for this increasing population, forests are destroyed in order to create fields for cultivation. As a result, trees and forests are diminishing day by day, and the amount of carbon dioxide in the air is simultaneously increasing. Because of the increase in population, the numbers of vehicles and factories are also increasing. The smoke emitted from these vehicles and factories are also causing the amount of carbon dioxide in the air to increase.

The temperature of the earth increases as the amount of carbon dioxide in the air increases. That is why summer feels hotter nowadays. On the other hand, it feels less cold in winter. If the forests and trees diminish, the amount of rain also decreases. This may result in a change of climate.

So you can now understand how over population can affect the climate and weather.
You have learnt that the number of factories increases as the population increases. Wastes produced by factories may get mixed with the waters of rivers or canals in a number of ways and pollute it.

![Figure: Soil, water and air pollution because of wastes produced by factories](image)

Many plants grow in the soil and cover it. If there is a layer of plants over the surface of the soil, rainwater, water currents, floods etc. cannot cause much erosion of soil. If the trees and forests in an area diminish due to the increase in population, soil erosion may easily occur there. This causes the land to become infertile. Crops cannot be cultivated there. Besides, factory wastes can also become mixed with the soil and cause soil pollution.

You have learnt about the effects of over population on the environment. The effects of over population are also visible in various areas of our life. Even the school you study at is not free of these effects. This can be explained using an example.

Number of children increases as the population increases. This
results in huge rush for admission at schools. Many of these children cannot get admitted to the institutions of their choice. The schools sometimes are forced to accept too many students. If there are too many students in a school, it may face various problems. Classrooms cannot accommodate the children properly. To make room, students have to sit in a rather congested manner. They can hardly keep all their books and notebooks on their desks, and they find it difficult to write.

Teachers also have problems while teaching the students if there are too many children in a class. They cannot take care of all the students equally well. This hampers the learning process of the students.

If there are too many students in a school, the school compound becomes dirty because of the garbage produced by the students. It becomes very hard to keep the school clean in such cases.
Exercise

A. Put a tick (✓) mark beside the correct answer:

1. How often are censuses conducted?
   a) every five years        b) every ten years
   c) every fifteen years     d) every twenty years

2. What happens if the forests and trees diminish?
   a) amount of rainfall increases  b) winters feel colder
   c) temperature increases       d) amount of oxygen increases

B. Fill in the blanks:

1. If population increases, the forests ________.
2. The ratio of carbon dioxide to oxygen in the air is balanced by ________.
3. Smoke emitted from factories pollute ________ .
4. Waste products from factories pollute ________ and ________.

C. Answer briefly:

1. What is the population of Bangladesh?
2. What is population cencus?
3. What happens if the trees and forests diminish?
4. How is the ratio of carbon dioxide to oxygen in the air balanced?
5. How is water polluted if the population increases?
6. What problems may arise if there are too many students in a school?