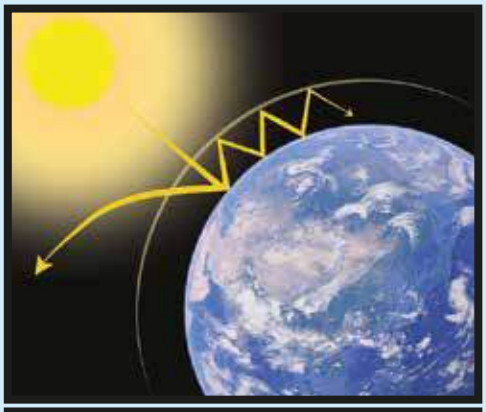
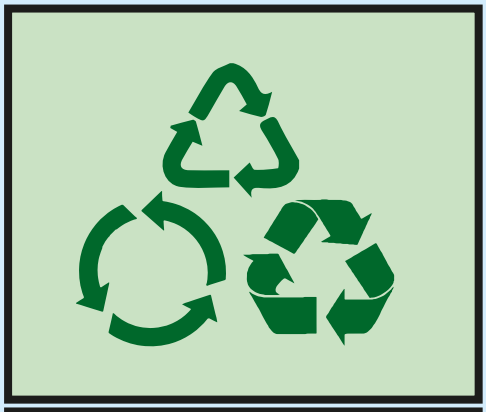
Elementary Science

Class Five



National Curriculum and Textbook Board, Bangladesh

Prescribed by the National Curriculum and Textbook Board, Bangladesh
as a textbook for Class Five from the academic year 2026

Elementary Science

Class Five

[Experimental Edition]



National Curriculum and Textbook Board, Bangladesh

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Preface

Primary education holds paramount importance in national life. To ensure quality education at this level, the Government of Bangladesh has committed to creating equal opportunities for every child, regardless of national identity, socio-economic background, physical or mental limitations, or geographical location. One of the key objectives of primary education is to nurture human values by designing curricula and textbooks rooted in indigenous contexts and resources, while fostering a joyful and supportive learning environment that promotes children's physical, mental, and emotional development. Recognizing its significance, the National Education Policy 2010 has accorded special priority to primary education.

In line with this vision, the National Curriculum and Textbook Board (NCTB) has developed a revised and integrated primary curriculum. To ensure its relevance and effectiveness, comparative studies were conducted on the curricula of neighboring and selected developed countries, while also incorporating the strengths of traditional teaching and learning practices. These efforts have provided a solid foundation for making education more life-oriented, engaging, and practical. Particular emphasis has been placed on children's psychological development. Based on the stakeholder feedback and the evolving national context, the National Curriculum 2021 (Primary Level) has been further revised in 2025. Textbooks for Class One to Three have already been updated accordingly.

Education is the backbone of a nation, and textbooks are its most vital instrument. This *Elementary Science* textbook for Class Five has been carefully prepared and reviewed by subject experts to make learning enjoyable, interactive, and effective. Through creative activities, students will acquire essential scientific skills such as observation, classification, prediction, problem-solving, critical thinking, creativity, and practical application. Teachers are encouraged to adopt participatory teaching methods so that students can develop these competencies in a joyful and engaging environment.

This textbook has been designed with students' prior knowledge, curiosity, and natural inquisitiveness in mind. To stimulate interest and facilitate meaningful learning, various activities, experiments, and examples have been incorporated. Efforts have also been made to include attractive illustrations and colorful designs to enhance appeal and accessibility.

The National Curriculum and Textbook Board, Bangladesh acknowledges with gratitude the valuable contributions of all those involved in preparing these textbooks, subject experts, curriculum developers, teachers, writers, illustrators, designers, and printers. Their dedication and expertise have been instrumental in shaping this resource. It is our sincere hope that this textbook will play a significant role in achieving the goals of Primary Education and in nurturing enlightened, skilled, and patriotic citizens for the future.

September 2025

Professor Robiul Kabir Chowdhury
Chairman (Additional Charge)
National Curriculum and Textbook Board, Bangladesh

Features of the Elementary Science Textbook

1. Student-Teacher Friendly

- The learning content has been arranged keeping in mind the age level of the student.
- Special importance has been given to the student's prior knowledge and real-life experience in the selection of content.
- The content has been described in class-appropriate, simple, and fluent language. Titles, subtitles, and sufficiently colorful pictures or images have been used.
- Abstract topics of science have been presented understandably through appropriate descriptions using colorful pictures or images.
- New scientific terminology related to each chapter has been written in colorful and bold letters.
- A glossary has been attached at the end of the textbook with simple explanations of the new scientific terms used in this textbook.

2. Emphasis on exploratory and active learning

- Each lesson has begun with a question or "Key Question" to emphasize exploratory, problem-solving, and active learning.
- Opportunities have been provided for learning science topics through work.
- Students have been given the opportunity to write their opinions about the various tasks they have completed.
- Necessary content, tasks, and tests have been added to the textbook to develop the students' well-organized and critical thinking skills.
- Assessment opportunities have been provided to verify the students' learning achievements.
- Emphasis has been placed on active learning along with experiential and collaborative learning.
- At the end of each task or test, a summary of the work or test results is presented.
- Sufficient information has been added under the title "Know more" at the end of the summary or results.
- Instructions have been given to use easily available alternative materials related to testing where necessary.

3. Emphasis on the overall development of the student

- Adequate opportunities for hands-on work have been provided to help acquire various processing skills of science, such as observation, testing, comparison, and measurement, etc.
- Opportunities for group and pair discussions have been created to build students' communication skills, ability to express themselves, and foster a positive outlook.

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Characters and Symbols

1. Characters:



Jui Dipu

Jui and Dipu will provide hints or ideas during your science learning. Let's learn science together.

2. Symbols:

Work: Let's observe, explore, and test.

Be Careful: Let's act cautiously to stay safe!

Chapter 1

Habitat of Living Organisms



The living world is composed of a wide variety of organisms, including plants, animals, and many other diversified living being. The living world contains diverse types of plants and animals. Some organisms live on land or in soil, while others live in water or in both land and water. Certain organisms require shady environments, while others thrive in environments with light. In this chapter, we will explore the habitats of different organisms, the types of plants and animals in various habitats, and the strategies they use to survive in their environments.

1. Habitat of Living Organisms

The place where an organism can live comfortably is called its habitat.

What are the habitats of living organisms?

Activity: Finding out where plants and animals live.

What to do: Let us …

1. List the names of plants and animals observed around your school and home, along with the place where they are born or live, in the table below:

Plant's name	Habitat

Animal's name	Habitat

2. Discuss the information in the table with a few classmates to clarify the concept of habitats.

Summary

Different organisms are born and live in various types of habitats. Just as different kinds of plants grow either in water or on land, similarly different animals inhabit a variety of habitats suited to their needs.

Let us learn more about the plants and animals in different habitats...

There are various environments for organisms to live in, such as terrestrial, aquatic, and polar environments. There is also diversity among animals living in these environments. Just as different habitats have distinct characteristics, the animals living in these habitats exhibit diversity and variations.



Plants in Different Environments

Terrestrial habitat

The environment of soil or land is called a terrestrial habitat. A large portion of plants and animals live in terrestrial environments. Terrestrial plants include mango, blackberry, jackfruit, coconut, banana, neem, koroi, mahogany, etc. Shaded areas under these large plants serve as habitats for smaller plants, such as various types of grasses or herbaceous plants. Mosses and ferns grow in damp, wet and cool places. Some plants, like orchids and various kinds of ferns, survive by attaching themselves to larger plants. Among animals, humans, cows,

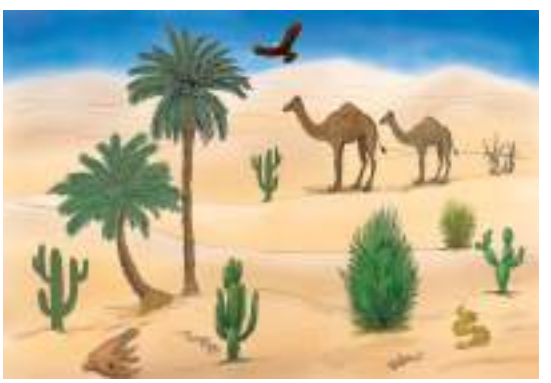
goats, elephants, tigers, foxes, ducks, chickens, various birds, rats, earthworms, ants, etc. also grow in terrestrial habitats. Terrestrial habitats also exhibit huge diversity, such as forests, deserts and grasslands.

Forest habitat: When a large number of diverse plants grow naturally in an area, a forest is formed, such as the Shal forests or The Sundarbans in our country. Common forest plants include shal or gajari, mahogany, sundari, gewa and garjan, as well as shrubs, grasses, mosses and ferns. Many animals also live in forest environments. For example, the Sundarbans is home to tigers, deer, monkeys, crocodiles, and various birds. Amphibians like frogs live in water during their early (tadpole) stage and on both land and water after being adults. Snakes, rats and crabs live in burrows in the soil. In our country, elephants inhabit the forests of Chattogram and the Hill Tracts. Our national animal, the Royal Bengal Tiger, resides exclusively in the Sundarbans.



Plants and Animals in Forest Environments

Grassland: In some terrestrial environments, vast areas are dominated by grasses, known as grasslands. Plants in grasslands include jute, reeds, herbs and shrubs. Animals found here are deer, dogs, rabbits, foxes, hawks, owls, hyenas, etc.



Plants and Animals in Desert Environments

Desert habitat: The desert is a type of terrestrial environment with special characteristics. High temperature, low rainfall, significant diurnal temperature fluctuation, and dry weather are the salient features of the desert environment. Plants in deserts include date palms, prickly pear (Fonimonsha) and cacti, and various shrubs. Animals in desert environments include, camels chameleons, lizards, snakes and various insects.

Polar habitat: Some parts of the earth, such as polar regions, are covered with ice. Very few plants grow in this environment. Among them are arctic willow, cotton grass, and lichens are common. Besides, certain unique animals, such as polar bears, seals, penguins, etc. live here.



Animals in Polar Regions

Aquatic Habitat

Habitats that remain submerged all the year-round are called aquatic habitats. These include oceans, rivers, ponds, canals, and wetlands. These habitats also vary in their characteristics. One type is the freshwater aquatic environment, such as rivers, ponds, canals, and wetlands. Plants in these environments include water lilies, lotuses, water hyacinths, small aquatic plants, various algae, etc.



Animals and Plants in Aquatic Environments

Animals in freshwater environments include fish like rohi, katla, mrigal and pangas, as well as crocodiles, turtles, crabs, snails, mussels, shrimp, etc.

Marine habitat: Although marine habitats are aquatic, the water in oceans is distinct from that in rivers, ponds, canals, or beels. The water of the sea is saline. Plants and animals living in saline water differ from those in freshwater habitats. Marine plants include various types of seaweed and seagrasses. The major plants



Animals and Plants in Marine Environments

in the marine habitat are different types of algae, such as Laminaria, Sargassam, etc. Moreover, there are marine grasses, such as Zostera, Halodule etc. Marine animals include whales, dolphins, octopuses, sharks, red crabs, starfish, jellyfish and numerous fish species. Common marine fish include Pomfret, Loitta, Laksha, Coral, Salmon, Tuna and Hilsa.

Wetlands: Some low-lying areas remain submerged in water for most of the year and dry out for the rest. These are called wetlands. In Bangladesh, haors and baors are examples of wetlands. Wetlands can be freshwater, such as Ratargul or Hakaluki Haor, or saline, like the Sundarbans. The biodiversity in wetlands varies with water depth. Notable plants in wetlands include kolmi, helencha, hijal, koroch, barun, etc. Animals in wetlands include fish, snakes, frogs and various waterfowls.

2. Adaptation of Living Organisms

The process by which organisms adjust to survive in a specific habitat or environment is called adaptation. Different plants exhibit specific characteristics to adapt to their environments. Animals also show various external and internal structural changes to adapt.

How do organisms adapt to different environments?

Activity: Investigating adaptation strategies of organisms

Materials Needed:

1. Water hyacinth
2. Pictures of chicken and duck feet

What to do:

1. Water hyacinth is an aquatic plant that floats on water. Let us observe it closely.
2. We must have noticed that the stems of water hyacinth contain many hollow parts. Why do these hollow parts exist? Let us write our views about the purpose of these hollow parts in the space below.

Let us-

1. Observe the differences between the toes of chickens and ducks, either in reality or in pictures. Write the reason for these differences in the space below.
2. Form small groups to discuss the above two tasks.
3. Present the findings of each group in the class. Revise your work based on feedback from classmates and the teacher, if necessary.

Summary

The hollow parts in water hyacinth, called air chambers, help it float in aquatic environments. These air chambers are an adaptation for aquatic plants. Chicken feet are strong, long and equipped with sharp claws allowing them to dig in the soil for insects. Duck feet have webbed toes enabling them to swim easily in water.



Water Hyacinth



Duck Feet



Chicken Feet

Let us know more about adaptation...

Organisms modify their structure and physiological functions to survive effectively in their specific environments. This is called adaptation. These changes primarily occur for inhabitation, self-defence, reproduction, or species survival.

Terrestrial environment

The main terrestrial environment is the forest environment. A large number of tree-like plants grow here in the forest. Their stems are strong and thick, and have extensive branches. Their roots are also thick, strong, and widespread with extensive branches. As a result, the plant stems anchor firmly to the soil. In winter, when the air is dry, plants lose more water through their leaves than usual, which can lead to dehydration and death. To avoid this, some plants shed their leaves in winter.



Adaptation of Predatory Animals (Sharp Beaks, Claws, and Teeth)

Animals in forest environments have strong lungs for respiration. Their legs are powerful for fast and long-distance movement. Predatory animals have sharp claws and teeth for hunting and tearing flesh. Birds, a key group in forest environments, are primarily aerial. They have wings and lightweight bodies due to minimal bone marrow. There are also air sacs in the body, which help in flying. Predatory birds, such as eagles, have sharp vision, hooked beaks, clawed feet and strong wings for hunting. Some forest animals, like chameleons and butterflies, adapt by camouflaging with the colours of their environment for self-defence.

In **desert habitats**, low rainfall and dry conditions result in small, shrub-like plants. To store water, these plants have thick, fleshy leaves and stems. For protection, leaves of some plants transform into spines, such as in cacti and date palms. Desert animals, like camels, can store water and food in their bodies. Smaller animals live in burrows to escape the heat of the Sun.



Desert Plants



Desert Animals

The **polar region** of the terrestrial environment is covered with ice. Few plants grow in this kind of place. These types of plants can tolerate sever cold. Some animals live here with unique characteristics. To stay warm in the extreme cold, these animals have a thick layer of fat under their skin. Most of them have white fur, like the snow, for camouflage during hunting or self-defence. Their long, curved and strong legs are adapted for walking on ice.

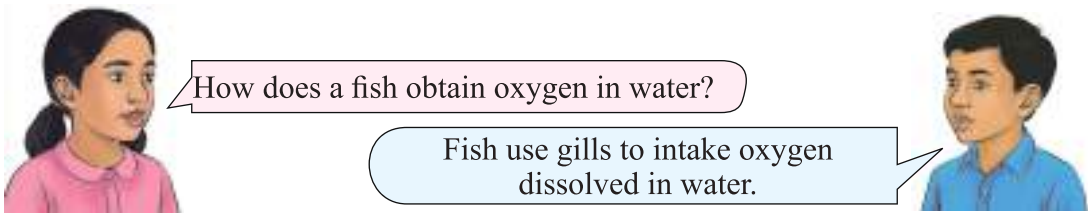


Polar Animals

Aquatic environments:

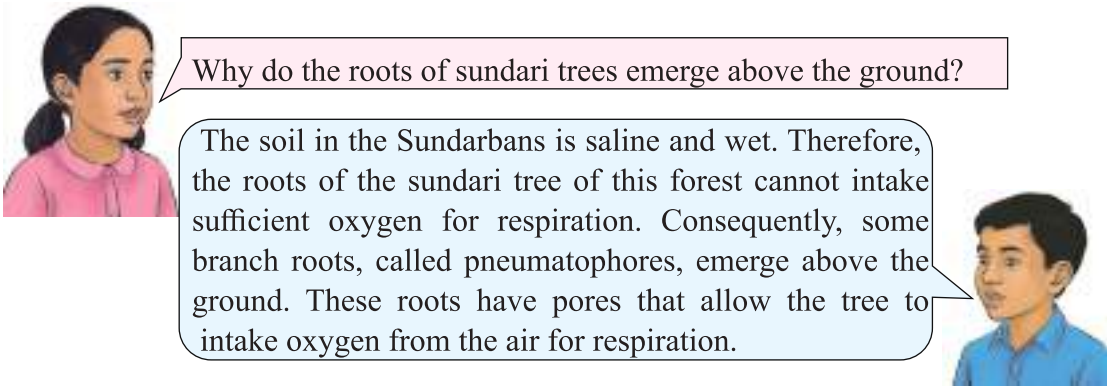
In aquatic environments, the plant body becomes soft and the roots short to adapt to the water wave. They have numerous air chambers to float. Mostly reproduce vegetatively.

Fish have flattened midsections and tapered heads and tails to adapt to the waves of the water. Air bladders help them float and move. Fins and tails aid in swimming. Fish breathe using gills to extract oxygen from water.



In aquatic environments, the **marine environment** is the most widespread region. This environment requires organisms to adapt to water salinity and high water pressure. Different types of floating algae are the dominant plants of this environment. Marine fish also have tapered heads and tails with wider midsections, and their fins and tails aid in swimming. Marine vertebrates have lungs that store air for long periods. For hunting and defence, they can use light, colour, or toxic substances.

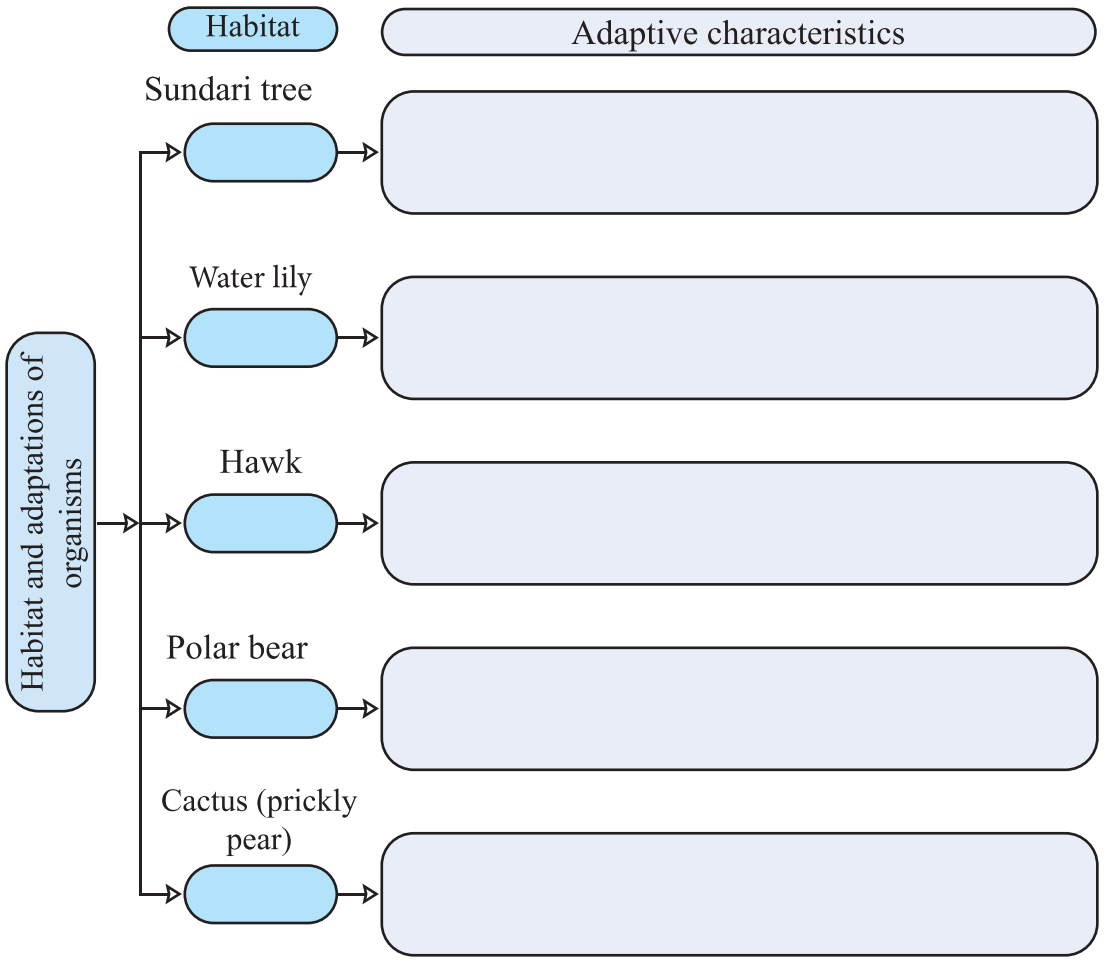
In **wetland environments**, plants and animals exhibit characteristics of both terrestrial and aquatic habitats. Plants have thin, broad leaves and stronger roots than aquatic plants. Pneumatophores emerge to facilitate respiration when submerged. When wetlands are full of water, aquatic plants and animals dominate. As water levels drop, some animals hide in shallow water or mud for protection.



Activity: Finding out habitate and adaptive features.

The table below lists some plants and animals. Let us write the environments they live in and the characteristics that help them survive in those environments.

Let us compare the table with a few classmates and discuss it, and if necessary, seek the teacher's assistance.



Exercises

1. Put a tick mark (√) on the correct answer.

a) What is a unique characteristic of aquatic plants?

☐ Thick leaves ☐ Air chambers ☐ Flowers ☐ Spiny

b) What is the main characteristic of carnivorous animals?

☐ Fast movement ☐ Large size ☐ Sharp teeth ☐ Fat layer

c) Which plant has pneumatophores?

☐ Hijal ☐ Sundari ☐ Pakur ☐ Water hyacinth

2. Fill in the blanks.

Fill in the blanks with the correct words from the list.

[air sac, fat layer, fern, air chamber, fish]

a) _____ helps aquatic plants float in water.

b) _____ keeps animals warm in extreme cold.

c) _____ is a plant found in shaded areas.

3. Answer the following questions in brief.

a) What is meant by the habitat of living organisms?

b) What types of plants and animals are found in freshwater environments?

c) What types of adaptations occur in aquatic animals?

4. Answer the following questions in detail.

a) What are the characteristics of terrestrial plants and animals?

b) Describe the characteristics of plants and animals in aquatic environments.

c) Explain the adaptive characteristics of marine animals with examples.

Chapter 2

Interdependence of Living Organisms and the Environment

We have already learned that the components of the environment can be divided into two categories: living organisms (biotic) and non-living components. Humans, animals, birds, plants, etc. are living organisms. Soil, water, air, sun, vehicles, chairs, tables, toys, etc. are non-living components. Among these, soil, water, air, and sun are the basic non-living components of the environment. Living organisms and non-living components are interconnected.

1. Dependence of Living Organisms on Non-Living Components

Our environment consists of living organisms and non-living components. In the environment, by non-living components, we mean soil, water, air, and so on. Every living organism depends on these non-living components in some way or other to survive.

How are living organisms dependent on non-living components?



Activity: Investigate the dependence of living organisms on non-living components.



What to do:

1. The names of the non-living things in the environment that we depend on for survival are given in the table below. Let us find out what these non-living components are used for and fill in the table below. As an example, the use of one non-living component has been provided.

Non-living component	How they are used
Water	Drinking, bathing, agriculture, industries …..
Air	
Sun	
Soil	

2. Let us discuss the information written in the table with classmates and note any new insights, if any. Seek the teacher's assistance.

Summary

We are always dependent on non-living components. Air is essential for respiration. Life is impossible without water. We obtain food crops from the soil. Additionally, we use non-living components to make houses, furniture, clothing, and equipment, among other things. Thus, we constantly rely on non-living components for various purposes.

Humans depend on non-living components for survival, reproduction, and thriving in nature.

Let us learn more about the dependence of living organisms on non-living components...



Our environment

Dependence of animals

Like humans, all other animals depend on non-living components such as air, soil, water, etc. for survival. Soil and water serve as habitats for many animals. Insects, earthworms, rats, and others live in soil, while fish, crocodiles, and turtles live in water. Animals use oxygen from the air for respiration.



Animals living under the soil

Dependence of plants

Like animals, plants also rely on non-living components to survive. Plants need oxygen from the air for respiration, just like animals do. In the presence of sunlight, plants use carbon dioxide from the air and water to produce their own food through photosynthesis. Most green plants contain 70 - 90% water in their body. Nutrients in the soil are transported to different parts of the plant through water. The habitat of plants like water lilies, water hyacinths, duckweeds, etc. is water.

2. Interdependence of Plants and Animals

In nature, plants and animals depend on each other for survival. This interdependence maintains the balance and beauty of nature.



Dependence of animals on plants

How are plants and animals interdependent?

Activity: Investigate the interdependence of plants and animals.

What to do: Let us…

1. Carefully observe the picture above.
2. In the table below, write your observations about how plants depend on animals and how animals depend on plants.

Dependence of animals on plants	Dependence of plants on animals

Summary

Neither plants nor animals are self-sufficient. To meet their needs for survival and living in the environment, they depend on each other.

Let us learn more about the interdependence of plants and animals …

In the environment, plants and animals are complementary to each other. Plants use the carbon dioxide released by animals during respiration for photosynthesis to produce food. Animals consume this food to survive. Animals use the oxygen produced by plants during photosynthesis for respiration.



Photosynthesis

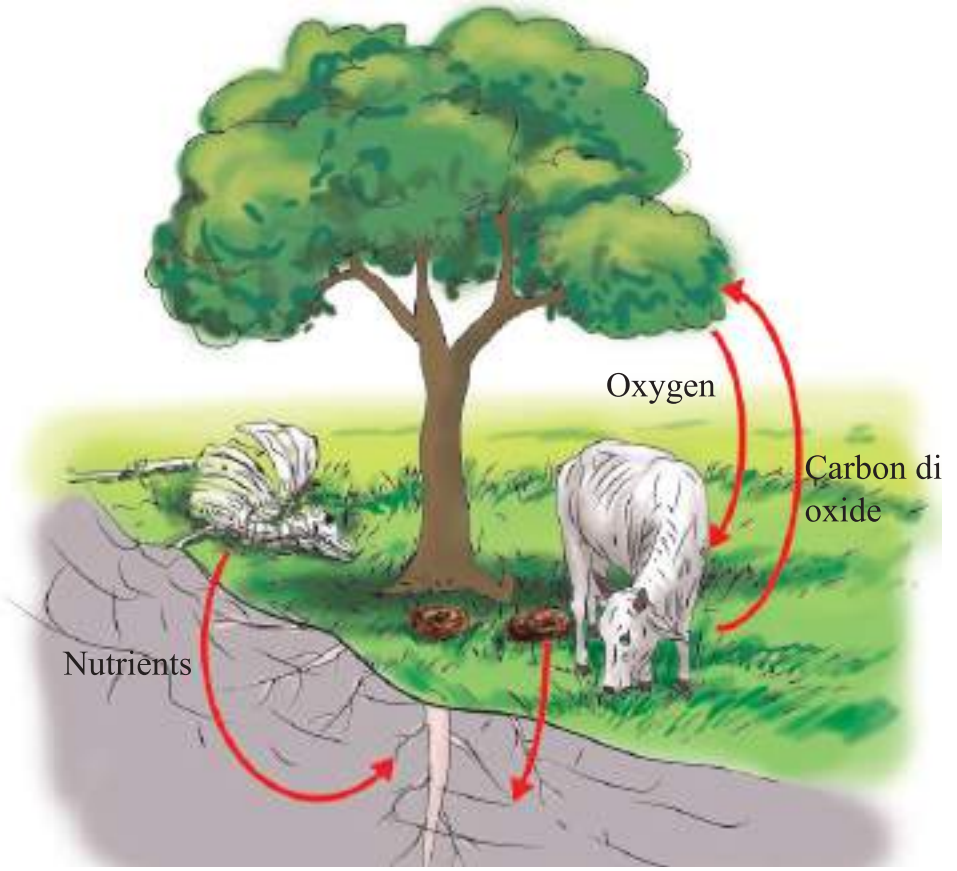


Pollination in a flower

Plants serve as habitats for many animals. For example, birds, monkeys, bees, ants, etc. live on branches of trees. Plants depend on animals for pollination and seed dispersal. Bees, birds, butterflies, and other animals collect nectar while moving from flower to flower, transferring pollen and facilitating pollination. Without pollination, reproduction in most plants is impossible.

Birds eat fruits. When they eat fruits, seeds are dispersed in nature. In this way, the seed dispersal process takes place. Some plant seeds do not germinate directly. After being consumed by birds and excreted, these seeds return to the soil. After that, it germinates into new plants. Such as banyan and fig trees.

The dead bodies of different plants and animals get decomposed and turn into non-living components in nature. Green plants absorb these as nutrients. Through this interdependence, dynamism and balance of the environment are maintained.



Interdependence of plants and animals

3. Interdependence of Plants, Animals and Humans

We have learned how plants and animals depend on each other. Now, we will explore how humans depend on plants and animals.

How are plants, animals and humans interdependent?

Activity: Investigate the interdependence of plants, animals, and humans.

What to do: Let us…

Fill in the blanks in the concept map below with the interdependence in nature among humans, plants, and animals.

Dependence of humans on plants	Dependence of humans on animals	Dependence of plants and animals on humans

Summary

Humans depend directly and indirectly on plants and animals for survival. In some cases, plants and animals also depend on humans for reproduction and survival.

Let us learn more about the interdependence of plants, animals, and humans…

Dependence of Humans on Plants

Most of the food we consume daily comes from plants, such as rice, flour, pulses, fruits, vegetables, seeds, etc. Humans and other animals use the oxygen produced by plants during photosynthesis for survival. Many medicines are derived from plants. Wood from plants is used to build houses and furniture.

Dependence of Humans on Animals

Our daily diet includes fish, meat, milk, and eggs, which come from animals. Our everyday items, such as clothing, bags, shoes, and combs, are made from

animal hides, wool, and bones. Animal bone meal is used to produce fertilizer. Humans use this fertilizer to grow crops. Additionally, we raise cows, goats, ducks, chickens, etc. at home. From these, we get both food and economic benefits.

Dependence of plants and animals on humans

Humans depend on plants and animals in various ways. Again, plants and animals also rely on humans in many cases. For example, when humans raise animals, they provide food and shelter for reproduction and safety. They ensure a healthy environment and medical care.



Materials obtained from plants and animals

Through cultivation, humans create suitable conditions for plant growth and reproduction, provide nutrients through fertilization and protect plants from diseases, weeds, and adverse weather. Humans also ensure the survival and multiplication of plant species through all forestation

4. Food Chain and Food Web

All living organisms require food to survive. Plants and animals depend on each other for food. Some animals survive by eating grass, leaves, fruits etc. Some animals consume other animals as food. Animals that eat plants or other animals are called consumers. The substances they consume to sustain life are called food.

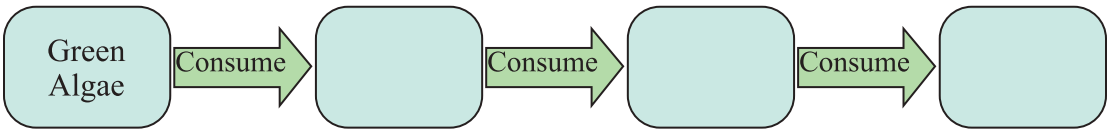
How are animals and plants intreconnected intrems of food habit?

Activity: Identifying consumers and food

What to do:



Let us discuss the relationship between food and consumers for the organisms in the above picture. After the discussion, fill in the boxes of the flowchart.



Summary

A food chain is formed based on the sequential relationship between food and consumers. The flowchart above shows that organisms in the environment are interconnected through food consumption. One consumer may serve as food for another. This relationship is known as a food chain. A food chain is formed based on the sequential relationship between food and consumers. The flowchart above shows that organisms in the environment are interconnected through food consumption. One consumer may serve as food for another. This relationship is known as food chain.

Let us know more about food chains and food webs...

Food chain

Living organisms require energy to survive. Humans and other animals obtain this energy from food. Energy is transferred between organisms through the food chain. Based on the relationship between food and consumers, organisms are classified as producers or consumers.

Producers

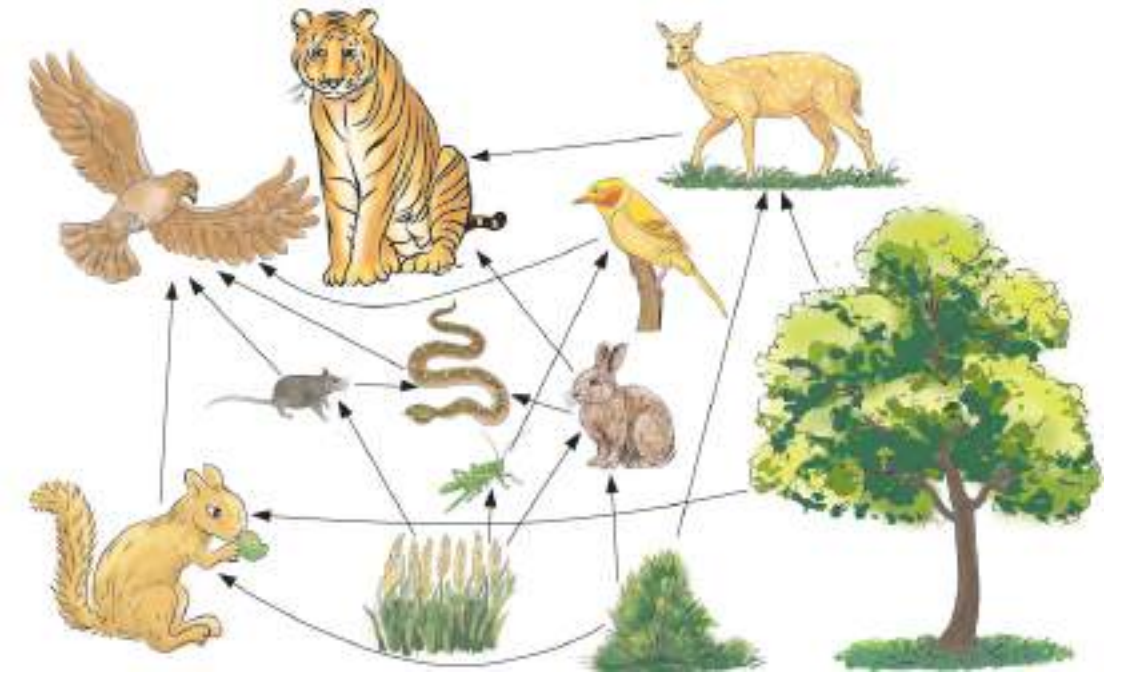
Green plants, using sunlight, produce their own food through photosynthesis. These green plants are called producers.

Consumers

Animals cannot produce their own food. Animals depend on green plants and the food produced by green plants. For this reason, animals are called consumers. Animals that directly consume plants are primary consumers, such as grasshoppers, cows, goats, deer etc. Animals that eat herbivorous animals are secondary consumers, such as frogs, foxes etc. Animals that consume secondary consumers are called tertiary consumers, such as snakes, eagles, tigers, etc. Most tertiary consumers are carnivorous. Each level of a food chain is called a trophic level.

Food Web

In an ecosystem, multiple food chains are interconnected based on food-consumer relationships. The complex network formed by these interconnected food chains is called a food web.



Food web

Food chains and food webs maintain the balance of energy and food among different organisms in the same environment.

5. Energy Flow

The Sun is the only source of energy. Solar energy is transferred to various organisms. We will explore how this energy is transferred from one organism to another.



Where do living organisms get energy from?

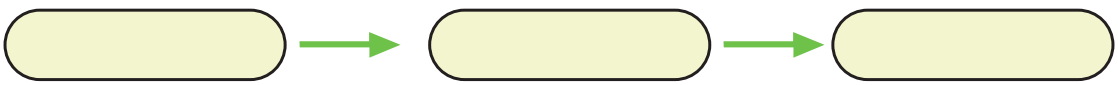
Activity: Finding out how energy flows.

Need to do: Let us…

1. Carefully observe the picture above.

2. Determine how energy from the Sun is transferred to different organisms.

3. Write in the blank boxes of the flowchart below which organism first receives energy from the Sun and how it is subsequently transferred to other organisms.

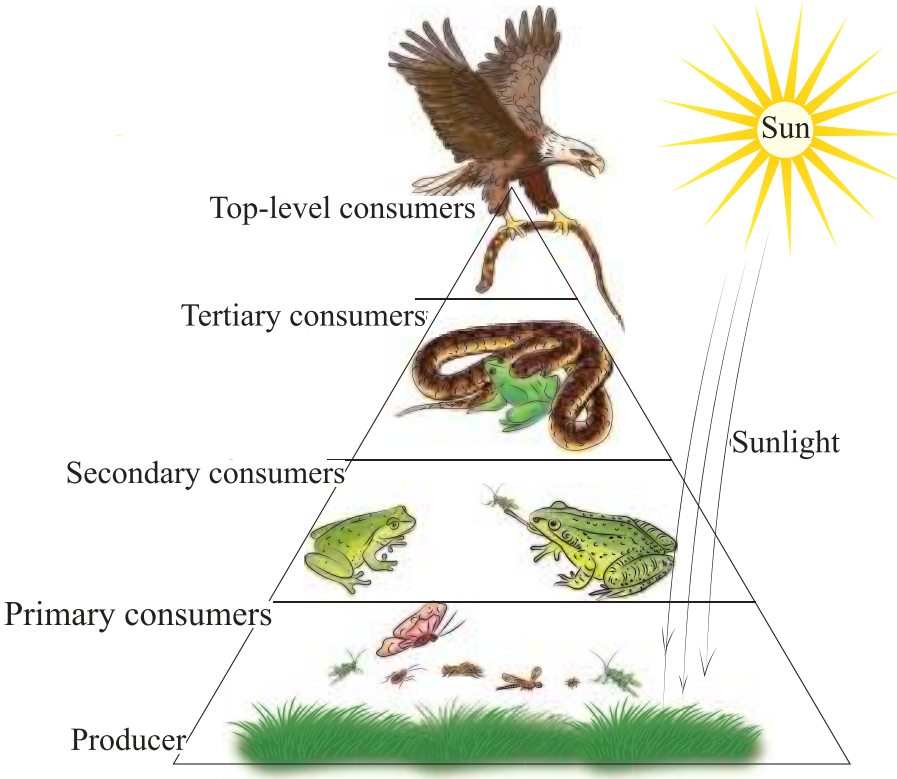


Summary

Plants obtain energy directly from the Sun and animals obtain it indirectly to survive.

Let us learn more about energy flow...

The Sun is the source of all energy on the earth. This is called solar energy. This solar energy is stored as chemical energy in green plants or producers through photosynthesis. This energy is stored in green plants as food. Primary consumers consume green plants. As a result, energy in plants is transferred to the primary consumers. The energy then flows sequentially from primary consumers to secondary and tertiary consumers. Thus the flow of energy continues. This process is called energy flow in an ecosystem. Organisms at different trophic levels use this energy for movement and other activities. This energy flow is unidirectional.



Energy flow in plants and animals

6. The Necessity to Maintain Balance Among all Environmental Components

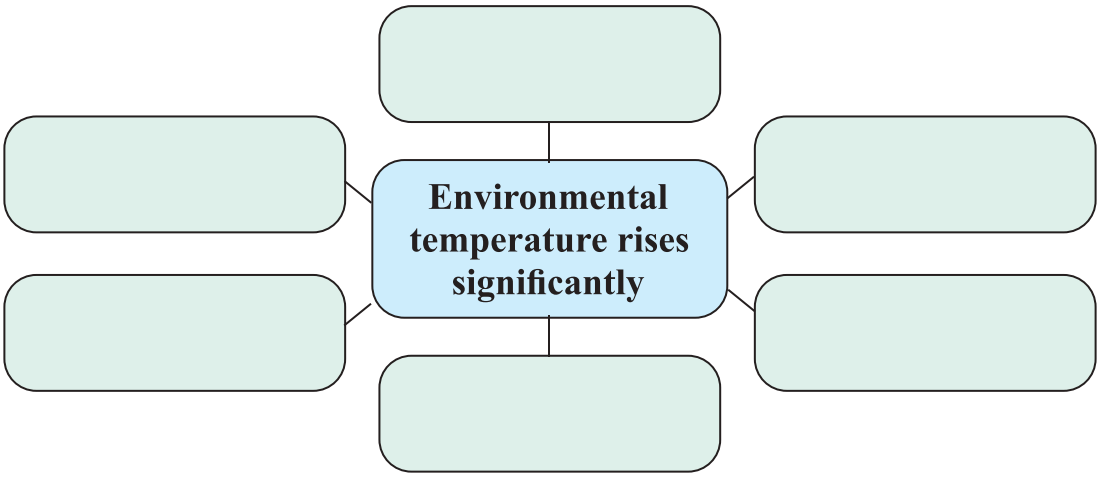
Environmental components are soil, water, air, light, heat, plants, and animals. These components provide food and shelter for living organisms. If one or more components are lost, reduced, or increased, the balance of the environment is disrupted. Maintaining the balance between non-living and living components is essential for preserving the natural environment.

? Why is it necessary to maintain the balance of environmental components?

Activity: Investigating the importance of environmental components.

What to do: Let us…

Suppose the average temperature in our country rises drastically. Write in the blank boxes of the concept map below the potential problems that could arise.



Summary

Light, air, soil, water, plants, animals etc. are essential for sustaining life. We obtain these components from the environment. If any component is absent, polluted, or altered, the environmental balance is disrupted.

Let us learn more about the need to maintain balance among environmental components...

We have already learned that there is a close relationship between living organisms and non-living components in the environment. The balance of the environment is maintained through the interactions between these components. If the balance of any component is disrupted, it can lead to climate change, drought, crop failure, or destruction of food webs. This could make the earth uninhabitable and threaten the existence of the entire living world. Therefore, maintaining the balance of environmental components is crucial for the survival of humans and the living world. Light, air, soil, water, plants, animals etc. are essential for sustaining life. We obtain these components from the environment. If any component is absent, polluted, or altered, the environmental balance is disrupted.

Exercises

1. Put a tick mark (√) on the correct answer.

a) What is the source of all energy in the living world?

☐ Sun ☐ Green plants ☐ Food ☐ Air

b) Which component do plants depend on animals for?

☐ Oxygen ☐ Carbon dioxide ☐ Water ☐ Reproduction

c) Which one is the producer in a food chain?

☐ Fungi ☐ Green plants ☐ Animal farms ☐ Factories

2. Fill in the blanks.

Fill in the blanks with the correct words from the list.

[birds, producer, herbivore, fish, bees]

a) In a food chain, green plants are called _____.

b) _____ animals are first-level consumers.

c) _____ help in seed dispersal of plants.

3. Answer the following questions in brief.

a) How are plants dependent on non-living components?

b) How do plants depend on animals for reproduction?

c) Create a flowchart of a food chain observed in your adjacent environment.

4. Answer the following questions in detail.

a) How are humans and other animals dependent on plants?

b) Why is it necessary to maintain the balance of environmental components?

c) Describe the flow of energy in the living world in light of the interdependence of plants and animals.

Chapter 3

Food

Food provides energy, supports growth, repairs our body, and builds immunity to fight diseases. Are all the foods we eat nutritious? To maintain good health, it is necessary to consume food based on an individual's age, physical needs, and type of work. The food we consume must contain adequate amounts of carbohydrates, proteins, fats, vitamins, minerals, and water. Additionally, we preserve food to keep its quality, freshness, and nutrients intact so that it can be used throughout the year.

1. Balanced Diet

The diet that contains the right amount of carbohydrates, protein, fat, vitamins, minerals and water is called balanced diet. A daily diet includes carbohydrate-rich foods like rice and bread, protein-rich foods like fish, meat, eggs, milk, and fat-rich foods like oil and nuts. Additionally, vegetables and fruits should be included as sources of vitamins and minerals.



Different types of food

Do we eat a balanced diet?

Activity: Creating a balanced diet list

What to do:

Let us-

1. Observe the pictures provided in previous page.
2. List the foods that can be included in a balanced diet, categorized by food groups.
3. Identify which of these foods we consume daily.

Food group	Name of food	What I eat
Carbohydrates		
Proteins		
Fats		
Vitamins and Minerals		

4. Review the list, then think and find out whether our diet is balanced or not. If it is not balanced, identify which foods should be added to make it balanced.

Summary

For proper physical growth, repair, and immunity, our daily diet must include carbohydrates, proteins, fats, vitamins, and minerals. Therefore, we must consciously choose foods to ensure that our daily diet becomes balanced.

Let us learn more about a balanced diet...

We have learned about balanced diets, food groups, and how foods in these groups benefit our bodies in class three.

The nutritional needs of children, pregnant women, and elderly people vary. Children grow gradually. Their developing bodies require foods that support growth, provide energy, and protect the bodies from diseases. Therefore, their diet must include more protein-rich foods like egg, fish, meat, milk, and dairy products.

A sample list of a balanced diet for children (6 to 12 years), with suggested amounts, is as follows:

Food Group	Food source	Quantity	
Carbohydrates	Bread/Paratha/Bread	1–2 pieces	150 g
	Rice/Potato/Noodles	1 cup	50 g
Proteins	Meat/Fish	1–3 pieces	60 g
	Egg	1 piece	
	Lentils	1–3 cup	
Dairy Products	Milk/Yogurt	1 glass	
	Cheese	1 piece	
Vitamins, Minerals	Cooked vegetables or raw vegetables	½ cup	100 g
	Seasonal fruits (mango, banana, apple, orange, etc.)	1 piece	100 g
Fats & Oils	Ghee/Butter/Cooking Oil	1 tablespoon	15–20 g

Pregnant women require extra nutrition because another life is growing inside them. They need foods that build the body, provide energy and enhance immunity. In contrast, as people grow old facilitates their energy levels decrease, so elderly people need easily digestible and nutritious foods. They need foods that promote digestion, strengthen bones and teeth, and prevent disease. Keeping all these things in mind, a balanced food list has to be made.

2. Necessity of Consuming a Balanced Diet

Consuming a balanced diet is essential to keep the body healthy, strong, and functional. A balanced diet helps a child's proper physical and mental development, and also supports maintains brain health. Consuming a balanced diet only can meet the nutritional needs of the body properly.

Why do we need to consume a balanced diet?

Activity: identify the importance of consuming a balanced diet

What to do:

Based on previous lessons and personal experiences, let us write the reasons why consuming a balanced diet is necessary.

Sl No.	Importance of consuming a balanced diet
a)	
b)	
c)	

Summary

There is no alternative to consuming a balanced diet for maintaing good health. The right amount of nutrients is essential to stay healthy and functional. The need for a balanced diet varies depending on age, gender, and type of work.

Let us learn more about the importance of a balanced diet...

Once we were small. Now we are gradually growing. Every day, we get engaged in various activities, move around, play, and study. If we get minor cuts or scrapes while playing, they heal quickly without medicine. The main reason behind this is a balanced diet.



A child growing up

The functions that food components do in our body include-

- Promoting growth, recovery and protection of the body
- Providing energy and heat for work
- Supporting physiological functions
- Building immunity in the body against diseases

If we do not consume a balanced diet in adequate amounts daily, the nutritional balance in the body is disrupted. A deficiency in one nutrient can prevent the absorption or proper functioning of another nutrient. Which results in malnutrition, even if sufficient nutritious food is consumed. On the other hand, consuming excessive amounts of a nutrient can cause issues like obesity and other physical problems. If a balanced diet is not consumed every day, the body

will becomes weak and its immunity will be reduced. As a result, diseases can easily attack the body. If a balanced diet is not consumed daily, the normal growth of children will be affected. Consuming the right proportion of food at the right time promotes better sleep and reduces mental stress. Selecting food depending on age, gender, and physical activity helps maintain good health.

3. The Importance of Taking Food on Time

Consuming balanced and nutrious food is not enough staying healthy. To stay healthy, it is not enough to consume balanced and nutritious food. When, how often, and how many times we intake food are also important. Many of us do not follow a regular food-taking schedule. We take food whenever we like it or at different times on different days. Sometimes, we pass long time without taking any food.

What are the benefits of taking food on time?



Activity: Identifying the importance of taking food on time.



What to do:

Let us discuss the importance of timely food intake with classmates and write the points in the table below.

Sl No.	Importance of taking food on time
a)	
b)	
c)	
d)	
e)	

Summary

In addition to consuming balanced and nutritious food, taking food at the right time is crucial for good health. Just as schools have a fixed schedule, we should have a specific schedule for eating. Following a regular schedule for taking food keeps the body healthy.

Let us learn more about the importance of taking food on time...

Various components work in our body to digest food. Research has shown that irregular and haphazard eating habits increase various health risks. If food is not eaten on time, problems like stomach ulcers, indigestion, weight loss, or gain can occur. In addition, immunity of the body decreases and the body becomes weak. If food is eaten at the right time-

- Keeps the body healthy and functional
- Enhances brain performance
- Supports proper physical and mental development in children

It is good to have breakfast every day by 8 a.m. The right time for lunch is between 12:30 and 1:00 p.m. If breakfast is a square meal, lunch should be moderate.

It is good to finish dinner by 7:00 p.m. Eating dinner late increases the risk of being overweight or having stomach problems. If it is not possible to eat by this time, dinner should be taken at least three hours before sleeping. It is better to eat easily digestible food at night.

It usually takes 3–4 hours to digest food. Therefore, there should be at least a 4-hour gap between each meal. This helps digestion, keeps the digestive system healthy and active, and reduces the chances of becoming overweight.

Effects of regular and irregular food intake



Activity: Comparative analysis of regular and irregular food intake



What to do:

Let us-

1. Discuss the effects of regular and irregular food intake with a classmate.
2. After discussion, complete a comparative analysis and fill in the table below:

Effects of regular food intake	Effects of irregular food intake
Keeps the body healthy and functional	Reduces performance of the body

4. Food Preservation

All types of foods are available throughout the year or at all times. Some foods are available in winter, some in summer and some are available throughout the year. As food is perishable, it gets spoiled easily. Therefore, food preservation is necessary to ensure its availability throughout the year. Food preservation involves preventing microbial contamination and spoilage while keeping the taste and nutritional quality of food intact.

What are the methods of food preservation?

Activity: Identifing methods of preserving different foods

What to do:

Do we preserve any type of food at our home? If we do, let us write down the methods used for preservation in the table below.

Name of food	Preservation method
Rice, Wheat	Preserved by drying

Summary

Food can be preserved in various ways while maintaining its quality and standards, such as drying, storing in a refrigerator, using salt, etc. This keeps the food safe, free from contamination and usable for a long time. As we preserve crops like rice, mustard, wheat, corn, pulses, fruits, etc. in warehouses or cold storage, we also preserve food at home using different methods.

Let us learn more about food preservation methods …



Preservation of various food grains

Preservation by drying

Drying food in the Sun or using a dryer is a common method of preservation. To preserve food items for a long time, we dry and preserve many types of food, such as rice, mustard,

wheat, corn, pulses, fish, etc. Besides, various spices, bean seeds, green mangoes and plums can be dried in the Sun for preservation. In this process, after drying the seeds, they are cooled at room temperature and stored. Airtight and dry containers are used. The mouth of the container is sealed with cloth or mud.

Refrigeration or cold storage

At normal temperature and in a normal environment, fish, meat, vegetables, fruits, and similar items get spoiled very quickly. These foods can easily be preserved by storing them in a refrigerator or cold storage. At home, food is usually preserved in a refrigerator at temperatures from 4°C to –18°C. At these temperatures, the microbes that cause food to spoil become inactive. As a result, the food doesn't spoil easily and can be preserved for several months. Commercially, potatoes, carrots, peas, and various types of fish are stored in cold storage throughout the year.



Refrigerator

Curing



Salted Hilsa

The process of preserving any food using salt or its solution is called curing. When there were no refrigerators, curing was a very popular method for preserving food. Once upon a time, there were plenty of hilsa fish available in the country. At that time, hilsa fish were preserved with salt and eaten throughout the year. By using this method, meat, different fruits, and vegetables can be preserved.

Prickle and jams-jellies



Jelly Pickles

When any food (fruits and vegetables) is preserved using salt or sugar, mustard oil, vinegar, and spices, the processed food is called a pickle. For example, mango, olive, hog plum, garlic, wood apple, tamarind and lemon pickles are especially noteworthy. In making pickles, salt, sugar, vinegar, and oil are used as food preservatives. Different fruits or fruit juices are mixed with sugar and preserved as jam or jelly.

5. Importance of Food Preservation

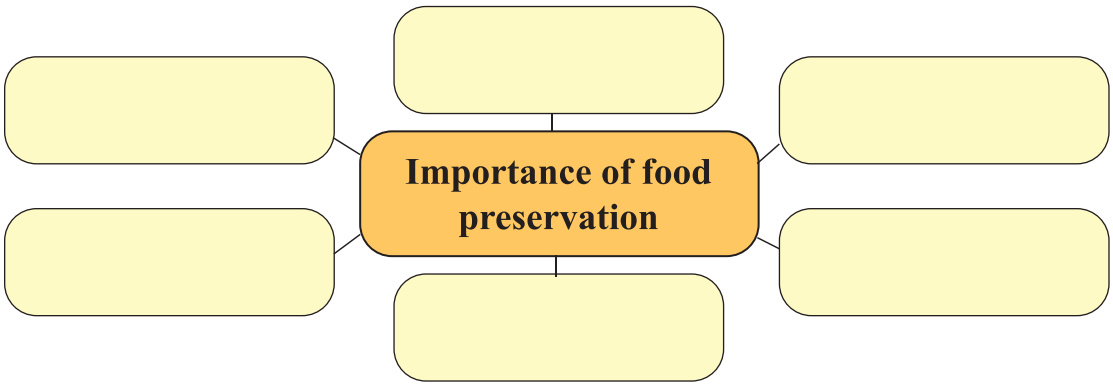
Food is the primary need among all fundamental human needs. Food preservation is essential to ensure sufficient food supply. Moreover, food should be safe for everyone to maintain good helth. Food preservation is crucial for ensuring the availability of adequate and safe food.

Why is food preservation important?

Activity: Identify the importance of food preservation

What to do:

Let us discuss the importance of food preservation with a classmate and write the points in the concept map.



Summary

Whether food is cooked or raw, it naturally gets spoiled or becomes unsafe for eating within a short time. Food remains safe and its quality remain intact if it is preserved. Thus, food preservation protects food from being spoiled quickly and also prevents waste of food.

Let us learn more about the importance of food preservation…

Preservation of food ensures that foods produced in a specific season are available all through the year. For example, potatoes grown in winter are stored in cold storage to meet year-round demand. Food preservation is vital for preventing waste, maintaining quality, and ensuring a steady food supply.

Fish, meat, fruits, vegetables, milk, and dairy products are easily contaminated by microbes. As a result, the food gets spoiled or unsafe to eat. The food preservation process does not let spoilage-causing microbes grow in the food. In our country, crops like rice, wheat, corn, onions, garlic, etc. are produced in large quantities. Through food preservation, these foods can be distributed nationwide and even exported to other countries. With food preservation, food grown in any season can be available all year round. For example, potatoes grown in winter are kept in cold storage to meet the demands for the whole year. The importance of food preservation is endless, as it helps prevent wastage of food, maintains good food quality and ensures a steady food supply.

Exercises

1. Put a tick mark (√) on the correct answer.

a) Which of the following is a carbohydrate-rich food?

☐ Egg ☐ Potato ☐ Butter ☐ Seasonal Fruits

b) Which vitamin is found in large amount in the fruits picture below?

☐ Vitamin B ☐ Vitamin C

☐ Vitamin D ☐ Vitamin K



c) In the curing method, food grains are-

☐ Dried in the Sun ☐ Kept in cold places in low-temperature

☐ Preserved using salt ☐ Mixed with sugar, oil, or vinegar

d) Irregular eating habits may lead to

☐ Quick recovery from infections ☐ Reduced risk of stomach ulcers

☐ A cheerful and uplifted mood ☐ Obesity and depression

2. Answer the following questions in brief.

a) Why is it necessary to consume protein-rich foods?

b) Write the benefits of consuming a balanced diet.

c) Why can malnutrition occur even after consuming sufficient protein and fat-rich foods?

3. Answer the following questions in detail.

a) What is food preservation? Write why food preservation is important?

b) How does regular food intake contribute to maintaining good health?

c) How can a balanced diet chart be prepared at a low cost?

Chapter 4

Adolescence

After birth, we were so helpless! We couldn't walk, speak, or even ask for food when we were hungry. We depended on our parents for everything. Gradually, various physical and mental changes occurred in us. Just as we grow physically, we can express our feelings and tell our own needs ourselves. Changes came in our behaviour too. This is a natural process. Our parents, elder siblings, or anyone older than us have gone through exactly the same experience. The stage in life when a child goes through many kinds of physical and mental changes and grows up, that is, steps from childhood to the teenage years, is called adolescence.

1. Adolescence

? What are the sequential stages of physical changes in human life, and what are the physical characteristics during these stages?



Infancy → Childhood → Adolescence → Adulthood → Old Age

Sequential stages of physical changes in human life

Activity: Identify the sequential stages of physical changes in human life and their characteristics

What to do: Let us…

1. Observe the pictures above carefully.
2. Write the stages of physical changes and their characteristics in the table.

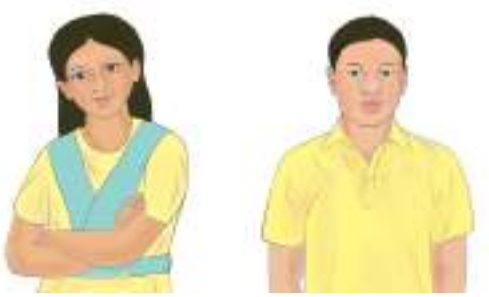
Stage of change	Physical characteristics

Summary

From birth to old age, we all go through several sequential stages of physical changes. Adolescence is such a stage in life when our body transitions from the child stage or childhood to the teenage stage or teenage years.

Let us write in the box below about which stage of physical change we are in and what physical changes we have felt in ourselves.

Let us learn more about adolescence…



Adolescents during puberty

Typically, adolescence for girls begins around 8 to 13 years old, and for boys, it begins around 9 to 15 years old. During this period, the body grows rapidly, leading to increased weight and height. At this time, they feel fear, curiosity, shyness, emotions, sadness, and restlessness. They want to make their own decisions independently. In boys, masculine traits such as a beard and mustache start growing,and their voices become more profound and resonant. Besides, boys' muscles become stronger, and their shoulders become broader.

In the same way, for girls, their bodies become slightly heavier, and feminine traits start to appear. At this time, pimples may appear on the faces of both boys

and girls. Additionally, they may sweat excessively, and the sweat may have an unpleasant odor.

Adolescence is an entirely natural process of growing and maturing. In girls, a small amount of bleeding each month for a few days occurs (menstruation), which is a normal process. There is no need to feel scared, shy, or embarrassed about this. Discussing these matters openly with parents, an elder sister, or a trusted adult family member can help resolve any issues easily. It is important to remember that adolescent changes do not occur for everyone at the same time or in the same manner. Changes may occur earlier for some and later for others.

2. Taking Care of Physical and Mental Health During Adolescence

Adolescence is a very important and sensitive stage in human life. During this time, the body undergoes several new changes, and adolescents experience shifts in thoughts, feelings, and behaviour of boys and girls. Taking care of physical health is essential for healthy and normal development during adolescence. At this time, boys and girls become emotional; feel fear, anxiety, and shyness, and their mood changes often. That is why, during adolescence, taking care of mental health is as important as that of physical health.

? What are the ways to take care of physical and mental health during adolescence?

Activity: Identifing ways to take care of physical and mental health during adolescence

What to do: Let us…

1. Write five ways to take care of physical and mental health based on your own experience.
2. Discuss your observations with classmates.

Sl No.	Ways to take care of physical and mental health
1	
2	
3	
4	

Summary

Living a healthy lifestyle means staying clean, drinking safe water, eating balanced and nutritious food, and avoiding outsourced food. It helps to prevent many physical problems and diseases, thereby maintaining overall health. Additionally, regular exercise, sports, and doing our own tasks promote both physical and mental well-being.

Let us learn more about taking care of physical and mental health during adolescence…

Adolescence is a very important time in our lives. Because it is the time for our physical and mental health development. Consuming a balanced and nutritious diet is essential during this period. Since physical growth happens rapidly during adolescence, we need to eat protein-rich foods, like fish, meat, eggs, milk, lentils, etc. regularly. We also need to eat carbohydrate-rich food like rice, bread, etc. and food made with oil and ghee. Besides, we have to eat different kinds of small fish (like mullet, silver carp, etc.), colorful vegetables, and various types of fruits.

We must avoid excessive fried and roasted foods, soft drinks, outside food, and junk food (such as chips, burgers, pizza, chocolate, sugary items, etc.). These foods contain unhealthy fats and sugars. Eating these increases the risk of obesity, heart disease, and the onset of diabetes at a young age.



Foods to avoid



Drinking adequate safe water



Getting enough sleep

Water is often called the source of life. Therefore, drinking sufficient, safe water

regularly is vital for maintaining good health. Adolescents need at least 8 hours of sleep daily, as adequate sleep is essential for physical growth and development.



Daily hygiene practices

We need to brush our teeth after waking up from sleep and before going to bed at night, take a bath every day, and trim our fingernails and hair. Washing hands regularly with soap or ash after using the bathroom and before eating is very important for maintaining a healthy gut. And if the gut stays healthy, we can remain free from many kinds of complicated diseases.



Regular exercise and sports

Mental health care is also necessary during adolescence. Regular exercise, playing sports, going to bed early at night, waking up early in the morning, and spending time in sunlight are recommended. It helps reduce illnesses.



Wiping the floor



Assisting mother



Reading books



Drawing pictures



Making your own bed



Tidying up own study table



Assisting father



Cleaning the school yard

Activities such as keeping your bed and study table clean, maintaining personal hygiene, and wearing clean clothes all contribute to both physical and mental well-being. Helping to keep the school and home environment clean and assisting parents with their tasks also keep your body and mind in good shape. When your body and mind are healthy, you can complete all tasks joyfully. Additionally, regularly reading books, drawing pictures and practicing religious works can help improve mental health.

3. Perceiving Adolescent Changes as Normal

What can we do to accept adolescent changes as usual?

Activity: Identifying steps to perceive adolescent changes as usual and build a better life

What is needed to do: Let us…

1. Read the two separate incidents carefully given below.
2. Write the answers to the questions in the table after observing the pictures and reading the incidents.

Scenario-1	
Nabila, a fifth-grade student, is a polite, well-mannered, and cheerful girl. She is also good at her studies. Recently, she has noticed that she has grown taller and her old clothes no longer fit her. She feels scared, embarrassed, and worried. She no longer enjoys eating, playing or chatting with her friends. She is also unable to focus on her studies in the classroom.	

Scenario-2	
Nabila's classmate, Sumon, has been frequently absent from school. When his teacher inquired at his home, his mother said that he left for school in his uniform, but did not return home on time. When asked why, he got irritated. His friends said that even when he skipped class, he spent time outside school with older boys.	

a) How old might Nabila and Sumon be?

b) What stage of life are Nabila and Sumon going through?

c) What can Nabila and Sumon do to build a better life?

d) As a classmate, how can you help Nabila and Sumon?

Summary

Instead of feeling scared or shy, adolescent changes should be accepted as normal. Reading books, regular exercise, sports and engaging in creative activities like drawing, dancing, singing, poetry recitation, debates, quizzes, etc., keep both the body and mind healthy.

Let us learn more about building a healthy and normal life during adolescence…

We can help resolve many issues and promote our overall health by discussing the physical and mental changes we experience during adolescence. Open discussion about these changes with grandparents, parents, older siblings, or trusted family members can provide the necessary support and guidance. Information from social media or the internet may not always be reliable or accurate. So, if needed, with the help of parents, older siblings, or a trusted family member, you can visit a nearby health center or talk to a health worker for advice. You can also discuss these things with your teacher.



Activity: Completing a checklist for taking care of physical and mental health



What to do: Let us…

1. Fill out a checklist for a week (7 days) to track healthy lifestyle practices and physical care. Place a tick (√) in the box for tasks you do daily (an example is done for you).
2. After 7 days, analyze the checklist to determine if you are living a healthy lifestyle.

Checklist

Date	Brushed teeth morning & night	Went out in sunlight	Exercised/played sports	Washed hands with soap/ash after bathroom	Made bed & tidied study table	Kept hair & nails clean	Assisted parents with chores	Ate outside/junk food	Bathed	Ate fish/meat/eggs & vegetables
5/5/26	√			√			√	√		

Exercises

1. Put a Tick mark (√) on the correct answer.

a) When does adolescence typically begin?

☐ Childhood ☐ Infancy ☐ Adolescence ☐ Adulthood

b) Which change is observed in girls during adolescence?

☐ Muscles become defined ☐ Body becomes slightly heavier

☐ voices become more profound ☐ Shoulders broaden

c) Why is it important to stay clean during adolescence?

☐ Keeps the body free from diseases ☐ Maintains physical beauty

☐ Ensures good sleep at night ☐ Keeps the mind happy

2. Chose the correct/incorrect statement.

Sl no.	Statement	Correct	Incorrect
1.	Adolescent physical changes are not normal.		
2.	Boys' adolescence typically occurs between ages 9–15.		
3.	There is no need to discuss adolescent changes with parents or elders.		
4.	Adolescent changes do not occur at the same time or in the same way for everyone.		

3. Answer the following questions in brief.

a) What are the ways to keep the body and mind healthy during adolescence?

b) What changes occur in boys during adolescence?

4. Answer the following questions in detail.

a) Describe how adolescent changes are a natural process of growing up for a child.

b) Why is consuming a balanced and nutritious diet important during adolescence?

Chapter 5

Structure of Matter



All around us, we see many things. Every single thing is made of very tiny particles called molecules. A molecule is the smallest part of any substance. If we further break a molecule, we get even smaller particles called atoms.

In this chapter, we will learn about molecules and atoms. We will also learn how saving and reusing different materials can help keep our earth clean and safe to live on.

1. Concepts of Atom and Molecule

What do we get if we divide matter?

Activity: Crushing a piece of chalk to understand the idea of molecules.

What to do: Let us…

1. Take a piece of chalk. Break it into two parts.
2. Give one part to your friend and break it again into two parts.
3. Keep breaking it as many times as you can.
4. Now crush a small piece with a hammer. Take the fine powder in your hand and try to feel how small it is.



5. Now think about this question:
   Do you think the chalk powder can be made even smaller?

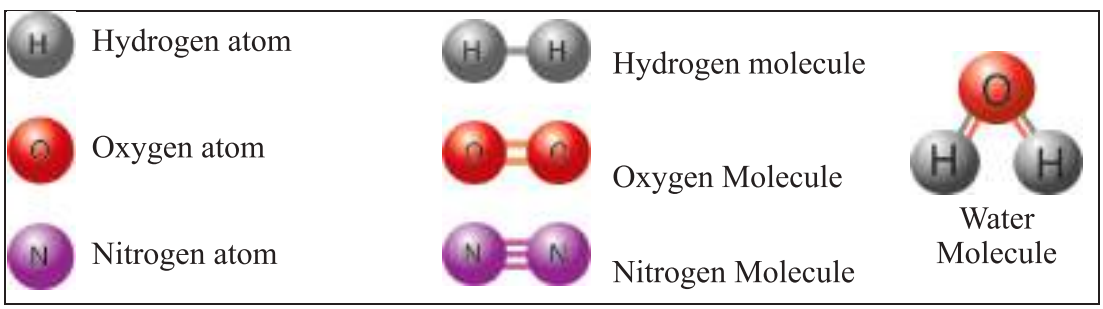
Summary

We can break the fine powder of chalk into even smaller pieces. By making it smaller and smaller, we will get a tiniest part that cannot be seen with the naked eye. If this is broken further, it no longer retains the properties of the matter. This smallest part of the matter is called a molecule.

Let's learn more about atoms and molecules…

The smallest building block of any substance is the atom. An atom is the smallest particle of an element that cannot be broken down further and still retains the properties of that element. The word "atom" comes from the Greek word "atomos," which means indivisible. Atoms are so small that we cannot see them with our naked eyes, not even with powerful microscopes. When one or more atoms of the same kind join together, they form a molecule. If we break a molecule, we get atoms.

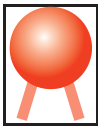
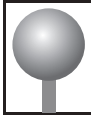
A substance whose molecules are made up of the same type of atoms is called an elementary matter or element. Some elements contain only one atom. For example— sodium. However, some elements contain more than one atom. For example, an oxygen molecule has two atoms. The molecules of some substances are composed of different types of atoms. These are called compound matters or compounds. For example, water is a compound, and its molecule contains two different kinds of atoms: oxygen and hydrogen. A molecule is the smallest part of a substance that retains the properties of that substance.



Activity: Drawing the structer of a water molecule.

What to do:

Let us imagine that an oxygen atom has two hands, whereas a hydrogen atom has only one hand. Let us show with a drawing how the oxygen and hydrogen atoms hold each other's hands to form a water molecule.

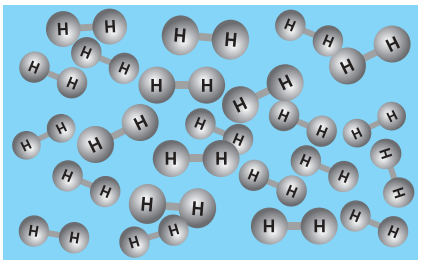
	If we consider this as an oxygen atom	Let us draw the picture of a water molecule.
	If we consider this as a hydrogen atom	

2. The Structure of Matter

Everything we see around us is made of very tiny particles called atoms. When a substance is made of only one kind of atom, it is called an element. For example, iron is an element, and sodium is also an element. The smallest part of iron is an iron atom.



Iron atoms

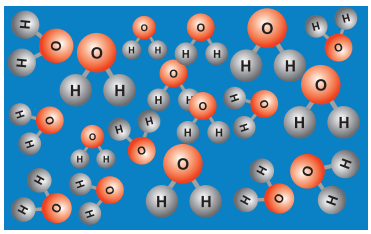


Hydrogen molecule in hydrogen gas

In some elements, two or more atoms of the same kind join together to make a molecule. For example, in hydrogen gas, two hydrogen atoms join to form one hydrogen molecule.

A container of hydrogen gas has countless hydrogen molecules in it.

Some substances have molecules made of different kinds of atoms. These are called compounds. For example, water is a compound. Each water molecule is made of two hydrogen atoms and one oxygen atom. When atoms of two or more different elements join together, they form a compound molecule. The properties of this new compound are

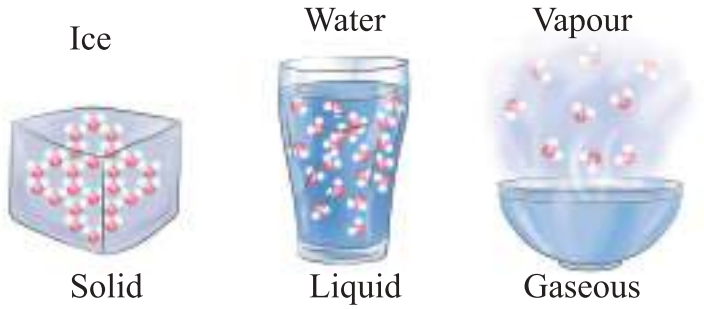


Water molecules

different from the properties of the atoms that made it. For example, the properties of water are completely different from the properties of oxygen and hydrogen.

3.The Three States of Matter in the Concept of Molecules.

We have already learned about the three physical states of matter. Here, we will learn about the three physical states of matter in terms of the concept of molecules.



In solids, the molecules are held together very tightly in a fixed pattern. The force between them (intermolecular force) is very strong, and they cannot move around. That is why solids have a fixed size, shape, and volume.

For example, in ice, water molecules stick closely together. Water molecules have no gaps in between, and they do not move. This is why ice keeps its shape intact.

Liquids

In liquids, the molecules are close to each other. The intermolecular force between them is weaker. They are not arranged in a fixed pattern. For example, in water, the molecules stay close but can move around a little. This is why liquids can flow and can be poured from one container to another.

Gases

In gases, the molecules are far apart and are not connected. The intermolecular force between them is very weak, and they move around very fast in all directions. As a result, steam does not have a fixed shape or volume. Rather, they fill the whole container they are in, and if the container is open, they spread into the air.

4. Separation of the Components of a Mixture

We all have eaten fried gram (chanachur). It is made by mixing many things together, such as nuts, lentils, flattened rice, different spices, and some other

ingredients. In a mixture, different components are simply put together, but they do not form a new substance. Each component in a mixture keeps its own characteristics or properties.

We have already learned about elements and compounds. A mixture is another type of substance where different elements and compounds exist side by side.

Activity: Finding out mixtures and identifying their components.

What to do:

Let us write the names of the mixtures we see around us and their components in the table below. One example is filled in as a sample.

Name of the mixture	Name of the components in the mixture
Oral saline	Salt, water, sugar, or jiggery

How can we separate the components from a mixture?

Activity: Separating the components of a mixture

What to do: Let us…

1. Collect a mixture of sand and iron filings and place it on a piece of white paper.
2. Take a magnet and move it through the mixture. The black, powdery substance is seen to be stuck onto the magnet. This is the powder of iron. Collect this iron powder on another piece of paper.



Separation using a magnet

3. Separate all the iron powder in a few attempts.

Summary

In this activity, the magnetic property of iron is used to separate it from non-magnetic substances. In the same way, we can use a magnet to find iron or iron-made things from water or from any other place. From the activities we have done so far, we have learned that the method of separating components is not the same for all mixtures. To separate the components of different mixtures, we need to use different methods.

Let us learn more about separating mixtures…

In a mixture, two or more substances stay together while keeping their own properties. In some mixtures, the substances are spread out evenly everywhere. This is called a homogeneous mixture. For example, in sugar juice, the sugar spreads evenly in the water. We cannot see the sugar separately. In some mixtures, we can clearly see the different substances. They are not spread evenly—sometimes there is more in one place and less in another. This is called a heterogeneous mixture. For example, a mixture of sand and iron powder is a heterogeneous mixture.

We separate the components of a mixture when we need them. There are different ways to do this. For example, to separate rice grains from husks, we can use the wind. To separate tea leaves from tea, we use a strainer.



We can separate sugar from sugar juice by heating it. When heated, the water changes into steam and vaporizes, while the sugar stays at the bottom. The method we use to separate substances depends on their properties. We can separate components of a mixture by using air, heat, a strainer, or a magnet.



5. Saving and Reusing Materials

When unnecessary things or garbage mix with air, soil, or water, it causes pollution. Air pollution can make us sick with lung diseases. Water pollution can spread various diseases and harm animals, too. Soil pollution causes the soil to lose its fertility, resulting in reduced crop production. Trees and plants also cannot grow properly in polluted soil. By reducing waste and reusing things properly, we can keep the environment clean and stay healthy.



What can we do to save and reuse materials?

Activity: Makeing a list of throw away items

What to do:

1. At home and at school, we throw away many things after using them. Make a list of such items.
2. Write in the table what these items are made of and how we can reuse them.

Item name	Made of	How we can reuse it
Water bottle	Plastic	Use in the kitchen, make a flower pot, or a pen stand

Let us lear more about saving and reusing materials…

Every day we use many things, and often we throw them away without thinking. This harms the environment. By reducing the use, reusing, and recycling things, we can keep our environment clean and safe.

1. Reduce



This is one of the most important steps in protecting our environment. We must use resources carefully and avoid all forms of waste. For example, we should not let water run unnecessarily while bathing or brushing our teeth. Similarly, we should switch off lights, fans, and other electrical appliances before leaving a room. We will always try to be mindful and use only what we really need.

2. Reuse



Sometimes we throw away things that can still be useful. For example, an empty plastic bottle can be turned into a flower pot, a spice jar, or even a pen holder. Paper printed on one side can be reused for drawing or writing on the other side. Old clothes can be cut and used for cleaning our homes. By reusing items in creative ways, we reduce waste and help keep the environment clean and healthy.

3. Recycle

Some things cannot be reused directly. If we keep them properly and send them for recycling, they can be made into new products. For example, tin, plastic, glass, and paper can be recycled to make new things. Recycling reduces waste and helps protect the environment.

4. Composting

In the kitchen, we often get lots of waste from vegetables, fruits, fish, or meat. If we bury this waste properly in the soil, it rots and turns into compost. This compost can be used as a natural fertilizer to grow crops.

Exercises

1. Put a tick mark (√) on the correct answer.

a) In which state of matter do molecules have the strongest intermolecular force?

☐ Mixture ☐ Solid ☐ Gas ☐ Liquid

b) Which of the following is the solid state of water?

☐ Water ☐ Ice ☐ Water vapour ☐ Dew

c) Which of the following will you use to separate sugar from sugar juice?

☐ Air ☐ Magnet ☐ Strainer ☐ Heat

d) If an object is reused instead of throwing it away—

☐ Extra money is spent ☐ The Environment remains good

☐ The environment is damaged ☐ Time is wasted

2. Fill in the blanks.

a) A hydrogen molecule has …… atoms.

b) In the ……. state of matter, the molecules are farthest apart.

c) To make water safe for drinking, we …… it.

d) A water molecule has……. hydrogen atoms.

3. Answer the following questions in brief.

a) How many states of water are there? What are their names?

b) Write two differences between atoms and molecules.

c) Mention any two properties of matter in its liquid state.

4. Answer the following questions in detail.

a) Explain the three states of matter using the concept of molecules.

b) What steps can we take to reduce environmental pollution caused by household waste?

c) If there is dirt in sugar juice, how would you separate the components from that mixture? Describe the process.

Chapter 6

Transformation of Energy

In previous classes, we have learned about the concept of energy and its various forms. In this chapter, we will focus on how energy is transformed from one form into another. Energy is the ability to do work. It is essential for all activities, from playing sports to operating household appliances. Without energy, nothing can move or perform work. Here, we will explore both the transformation and transfer of energy.

1. Transformation of Energy in Various Events and Activities

In Class four, we learned about the different forms of energy. These forms of energy are: heat energy, light energy, electrical energy, sound energy, chemical energy, kinetic energy, and potential energy. Energy can change from one form into another. This change is called the transformation of energy.

How does the transformation of energy occur?

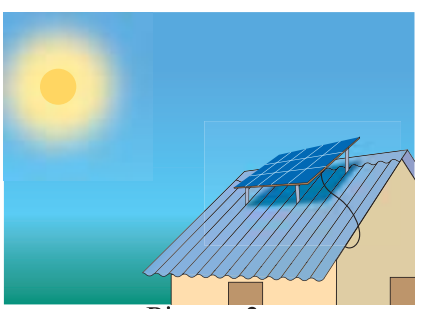
Activity: Observing the transformation of energy.



Picture 1



Picture 2



Picture 3



Picture 4



Picture 5

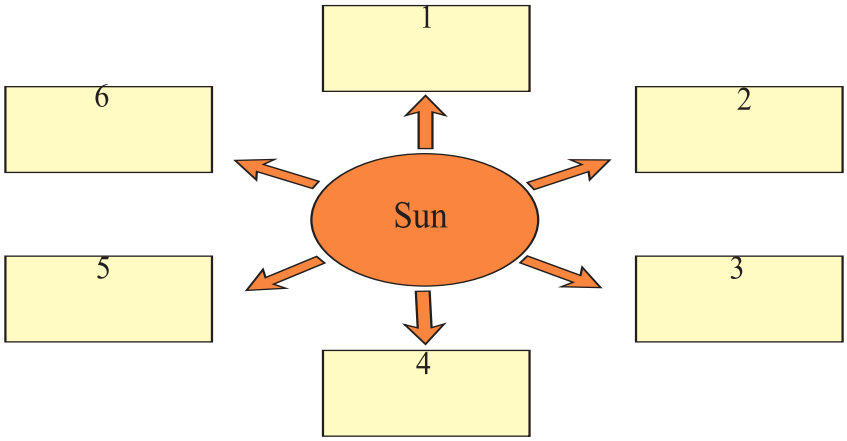


Picture 6

What to Do:

Let us…

1. Carefully observe the different forms of energy available from the Sun, shown in the pictures above.
2. In the concept map, write the forms of energy according to the number of each picture.



Summary

The Sun is our main source of energy. Energy exists in many different forms. The energy we receive from the Sun is called solar energy. We use solar energy directly as light and heat. This solar energy can also be transformed into other forms, such as kinetic energy, heat energy, electrical energy, chemical energy, and light energy.

Let us learn more about the transformation of energy in everyday events and activities...

Energy transformation is the process of changing energy from one form into another. Such transformations happen frequently in our daily lives. As a result,

performing various tasks becomes easier for us. Let us explore some examples of energy transformation in our homes and familiar surroundings.

Electric iron

Energy transformation: Electrical energy → Heat energy

When we use an electric iron, electrical energy is converted into heat energy. This heat, combined with pressure, helps remove wrinkles from clothes efficiently.



Electric fan

Energy transformation: Electrical energy → Mechanical energy

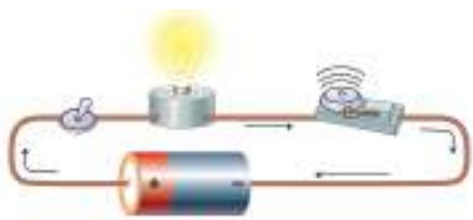


An electric fan converts electrical energy into mechanical energy. Therefore, the fan blades rotate. This movement circulates air around the room, creating a cooling effect. Mechanical energy is the sum of an object's potential and kinetic energy. In other words, the energy possessed by an object due to both its position and motion is called mechanical energy.

Battery

Energy transformation: Chemical energy → Electrical, Light and Sound energy

The chemical energy stored in a battery is first converted into electrical energy. This electrical energy can then be transformed into light energy in a bulb or sound energy in a doorbell.



Electric lamp

Energy transformation: Electrical energy → Light energy and heat energy

An electric lamp converts electrical energy into light energy, illuminating our homes. During this process, some of the energy is also transformed into heat.



Solar panel

Energy transformation: Solar energy → Electrical energy



Solar panels convert solar energy into electrical energy which can then be used for various purposes in homes and industries.

Cooking in the oven

Energy transformation: Chemical energy (coal, natural gas, oil) → Heat energy and light energy

The chemical energy stored in substances such as coal, natural gas, and oil is converted into heat energy by the stove. This heat energy is then used for cooking food.



Television

Energy transformation: Electrical energy → Light energy and sound energy



In a television, electrical energy is transformed into light energy and sound energy. Light energy allows us to see the pictures on the screen. In addition, sound energy enables us to hear conversation and music.

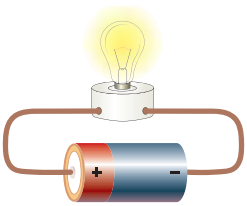
Activity: Examination of energy conversion.

Things we need: Flashlight battery, electrical wires, small bulb

What to do:

Let us...

1. Connect wires to both terminals of the battery.
2. Attach a small bulb to the wires connected to the battery and observe what happens.



3. After a while, disconnect the wires from the battery and carefully touch the bulb with your hand.

Result

We observed that when we connected the wires to both ends of the battery and attached them to the bulb, the bulb lit up. When we touched the bulb with our hand, it felt warm. In the boxes below, write the steps of energy conversion that happened in this experiment.



Summary

In this experiment regarding transformation of energy, the chemical energy stored in the battery is first transformed into electrical energy. This electrical energy is then transformed into light energy and heat energy.

2. Different Ways of Heat Transfer

How is heat transferred?

Heat always flows from a warmer area to a cooler area. The process of heat moving from one place to another is called heat transfer. For example, when we hold a cup of hot tea, we feel the heat in our hands. When water is heated in a pot on the stove, the water at the bottom rises to the top. When we stand in the Sun, we feel warm in our body. These are all examples of heat transfer. Sometimes a material or a medium is needed for heat to travel through, while other times it can move without any medium.

Activity: Observing heat transfer in different ways.

Experiment 1: Heat transfer by conduction.

Things we need: A metal spoon, a cup, hot water, wax or a small piece of candle.

What to do:

1. Let us... Place a small piece of wax on one end of a metal spoon.
2. Dip the other end of the spoon into hot water.
3. After some time, observe the wax and record your observations in the table below.



Do this experiment with the help of your teacher.

Is the wax melted or unchanged? If it has melted, why did this happen? Discuss in your group and write down your opinions.

Summary

Conduction is the transfer of heat through solids. In **experiment 1**, the metal spoon conducted heat from the hot water to the wax, causing it to melt.

Let us learn more about the conduction method of heat transfer…

Conduction: Heat can be transferred through solids by conduction. For example, if you place a metal spoon in hot water, the handle of the spoon quickly becomes hot. In this case, heat moves from the hot water to the colder part of the spoon. The spoon acts as a conductor of heat.

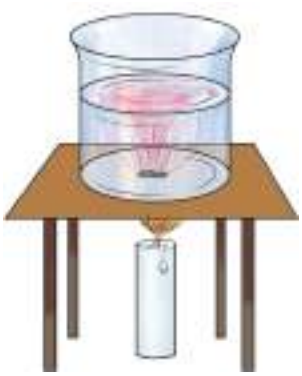
In conduction, the molecules of the substance do not actually move from place to place. Instead, the molecules vibrate and pass their energy to neighboring molecules. As a result, heat is transferred from the hotter part of the object to the cooler part.

Experiment 2: Heat transfer by convection

Things we need: A large clear beaker, water, granulated food colour, a candle or burner

What to do:

1. Let us…Fill the beaker with cold water.
2. Add a small amount of granulated food colour so that it settles at the bottom of the beaker.
3. Place the beaker carefully over a candle or burner and begin heating it.
4. Watch closely to observe how the coloured water moves inside the beaker.



5. Record the observations in the table below.

⚠ Do this experiment with the help of your teacher.

Is colour visible in the water at the top of the beaker? Why does this happen? Discuss in groups and write down your opinions in the box below.

Summary

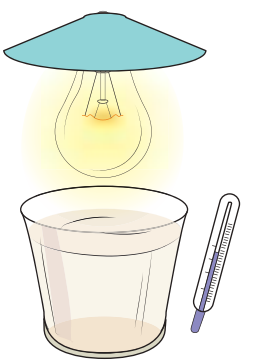
In liquids, heat is transferred by convection. In **experiment 2**, heat was transferred from the bottom of the beaker through the water and circulated throughout the jar.

Let us learn more about the convection method of heat transfer…

Convection: Heat is transferred through liquids and gases by convection. For example, when water in a container is heated, the hot water at the bottom rises to the top. On the other hand, the cooler water at the top moves downward. This movement creates a circular flow that spreads heat throughout the water. In convection, heat is carried from a warmer region to a cooler region by the movement of the molecules themselves.

Experiment 3: Heat transfer by radiation

Things we need: A pot of water, a thermometer, an electric bulb



What to do:

Let us …

1. Pour a small amount of water into a pot.
2. Measure the temperature of the water with a thermometer.
3. An electric bulb is kept switched on for a short time slightly above the water.
4. Measure the water temperature again.

⚠ Do this experiment with the help of your teacher.

5. Record your observations in the table below.

Why and how did the temperature of the water in the container increase? Discuss in groups and share your opinion.

Summary

Radiation is the process of transferring heat directly from a source without the need for any medium. In **experiment 3**, heat was transferred from the bulb to the water without any medium.

Let us learn more about radiation…

Radiation: Radiation is the process by which heat is transferred directly from a source without requiring any medium. For example, when we stand in sunlight, we feel warm because the heat from the Sun travels through the empty space and reaches us by radiation.

3. Heat Transfer in Various Events and Activities

In our daily lives, we experience many situations where heat is involved. For example, when our mother cooks on the stove, irons clothes, or dries rice in the Sun- heat is seen to be used in different ways. Wet clothes dry when heated by sunlight, and we feel warm when sitting near a fire on a winter morning. All these are results of heat transfer. By observing the familiar activities and natural events around us, we can understand how heat moves from one place to another.

How does heat transfer occur in different tasks or events?

Activity: Finding out the methods of heat transfer in different events and tasks.



Picture 1



Picture 2



Picture 3



Picture 4



Picture 5



Picture 6

What to do:

Let us…

1. Observe the above pictures carefully.
2. Think how and why heat is transferring in the pictures.
3. Discuss the methods of heat transfer shown in the pictures with classmates.
4. Write down the methods of heat transfer and corresponding reasons according to the picture number in the table below.

Picture no.	Method of heat transfer	Reason
Picture–1		
Picture–2		
Picture–3		
Picture–4		
Picture–5		
Picture–6		

Summary

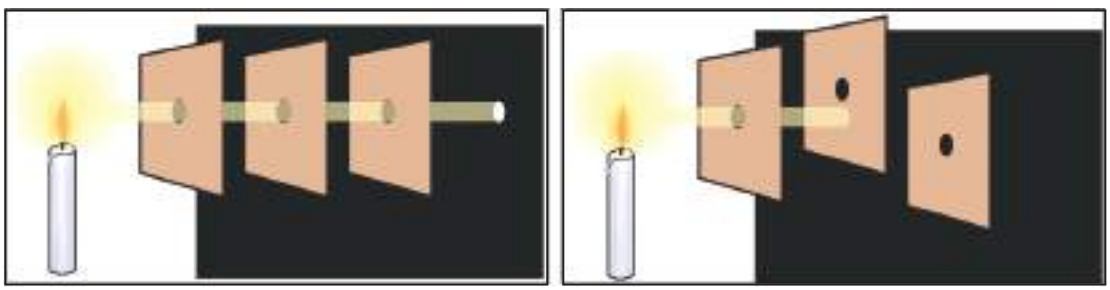
In our everyday environment, heat is transferred in three main ways: conduction, convection, and radiation. These methods can be observed in many natural events and daily activities.

4. Transmission of Light

Light is a form of energy that enables us to see the world around us. It comes from different sources such as the Sun, stars, electric bulbs, candles, and even fireflies. Through light, we are able to observe, understand, and experience our surroundings.

How does light travel?

Activity: Searching for the path of light.



Things we need: A candle, three pieces of cardboard with holes of the same radius at the center.

What to do:

Let us...

1. Divide all the students in the class into several groups.
2. Collect the materials needed for the activity.
3. With the help of the teacher, each group lights a candle on the table.
4. Place three pieces of cardboard in a row in front of the candle.
5. Make sure that the holes in the cardboard pieces are aligned in a straight line.

6. Try to see the candlelight through the holes from the other end.
7. Now, slightly move the cardboard pieces to the right or left so that the holes are no longer in a straight line.
8. Again, try to see the candlelight through the holes.

   Record what happens in both cases in the table below.

Experiment	Observation
When the holes in the cardboard pieces are in a straight line	
When the holes are not in a straight line	

Summary

From this experiment, we learn that light always travels in a straight line. When the three holes in the cardboard are in a straight line, the candlelight is clearly visible. But when the holes are misaligned, the light cannot pass through, and we can no longer see the candlelight. This proves that light travels in straight paths.

Let us learn more about the transmission of light...

Light is a form of energy that enables us to see our surroundings. It travels from one place to another, and its main property is that it always travels in a straight line. That's why when we light a candle or a torch, the light reaches our eyes directly. If an object is placed in front of it, a shadow is formed behind the object.

Light does not always need a medium to travel. For example, light does not require any medium for transmission. Sunlight travels through space and reaches the earth. There is no air or any other substance in space—yet light comes. In this way, when light is transmitted without the need of any medium, it is called radiation. Although the Sun is very far from us, it is because of the transmission of sunlight through radiation that we can experience its light and heat. The process of light transmission varies through different materials.

5. Proper Use, Recycling and Conservation of Energy

In our daily lives, energy is essential for almost everything—moving, lighting, cooking, driving, and operating machines. Without energy, life is unimaginable. This energy can come from electricity, fuel, or sunlight. However, if we overuse or waste it, we may face a serious energy crisis in the future. By using energy properly, we can reduce waste and save it for future generations. Therefore, we should develop the habit of saving energy in our own environment. Let us learn how we can properly use, recycle, and conserve energy at home, in school, and in the surrounding environment.

How can we properly use, recycle, and conserve energy?



Activity: Identifing the areas of energy use in our daily lives.



What to do:

Let us...

1. Discuss with classmates and list the types of energy that are being wasted at school, home, or other places.
2. Suggest practical ways to conserve that energy.

Form of energy	How it is wasted	Ways of conservation

Summary

In daily life, we use different forms of energy such as light energy, heat energy, electrical energy, mechanical energy, sound energy, and chemical energy. We can conseve the energy for the future by using energy wisely and responsibly. Reducing the wast of energy and recycling it is another means to conserve energy.

Let us learn more about the proper use, recycling, and conservation of energy...









Energy is an essential part of human life. We use it daily in homes, schools, workplaces, transportation, and entertainment. But the non-renewabl natural resources that supply us with energy, especially are limited. That is why, it is necessary to conserve energy for future generations by ensuring its proper use.

Energy recycling means using the same energy repeatedly, or using the energy for one task also for another. This helps save energy, reduce pollution, and conserve the energy for the future. Examples of energy recycling: using the heat from the stove after cooking in order to warm water, generating electricity by boiling water with factory heat exhaustion, reusing the kinetic energy of a moving car to charge its battery, and using solar energy to charge batteries for different purposes.

Exercises

1. Fill in the blanks.

a) Energy is the ..... to do work.

b) Mechanical energy is the sum of ..... and ..... energy.

c) The process of heat moving from one place to another is called .....

d) Heat is transferred through solid substances by the ..... method.

2. Choose the correct/incorrect statement.

Statement	Correct	Incorrect
When a pinwheel made of palm leaves is spun with the help of air, heat energy is used.		
Food, fuel, coal, etc., are the sources of chemical energy.		
Heat is transferred through liquid and gaseous media by the convection method.		
Light comes from the Sun to the earth by the conduction method.		
If energy is reused, it can be conserved.		

3. Answer the following questions in brief.

a) Write the names of the different forms of energy.

b) Light propagation does not require a medium - how can we understand this?

c) What type of energy transformation occurs in an electric iron?

d) How can energy wastage be reduced at home? Give a few examples.

4. Answer the following questions in detail.

a) Explain the statement: “The Sun is the main source of energy.”

b) Explain with an experiment that light travels in a straight line.

c) Make a table showing the types of energy we use for different tasks at home.

Chapter 7

Concept of Force

In our daily life, we apply force in many different activities. Force is applied to objects in various ways. We already know that push and pull are two ways of applying force. Force can change the size, shape, or speed of an object. If we apply force by using machines, we can do any work more easily.

1. The Effect of Different Magnitudes of Force on an Object

What happens when different magnitudes of force are applied to an object?

We apply force in many daily activities. For example, activities such as opening and closing doors, pulling a pushcart with loaded goods, or moving a table and chair. All of these require force to be applied.

Activity: Observing the effect of applying different magnitudes of force.



Observation-1

Let us...

1. Look carefully at the two pictures above. In the first picture, the driver alone is trying to pull a pushcart with loaded goods from a low place to a higher place, but is unable to lift it. In the second picture, the driver is being helped by two

friends from behind, pushing the loaded pushcart upward. In the table below, write why the results were different when the driver alone pulled the cart and when his friends helped him.

Observation	Reason
Why couldn't the driver alone pull the cart?	
Why was it possible for the driver to pull the cart when his friends pushed it from behind?	

2. Compare and discuss these reasons with our classmates.

Observation 2

Let us

1. Try to move a heavy table in the classroom, with a few classmates.
2. Make one student try to push the table first. Then two students push the table together. Finally, several students push the table at the same time. Write the results in the table below.

Level of effort	Number of students participating	Result	Reason (Approximate magnitude of force applied to move the table)
First try	1 person		
Second try	2 persons		
Third try	3 or more persons		

3. Compare the results with classmates. Discuss with your friends why these results happened.

Summary

In our daily lives, we apply force to perform many tasks. The two main ways of applying force are pushing and pulling. By applying force, we can move objects or change their size, shape, and speed. When the magnitude of force increases, objects can move faster or farther. Therefore, the effectiveness of force depends on both its strength and the way it is applied.

Let us learn more about the effects of different magnitudes of force on objects…



When we ride a bicycle, we apply force to the pedals. If we push the pedals with less force, the bicycle moves slowly. If we push with more force, the bicycle moves faster. This shows that the speed of the bicycle depends on how much force we apply.

The same thing happens when we play football. If we kick the ball gently, it moves a short distance. But if we kick it with more force, it moves quickly and travels a longer distance.



Magnitude of force

The strength of a force is called the magnitude of the force. Different magnitudes of force cause different effects on an object's speed, direction, and distance. The greater the force, the greater its effect. By applying force, an object can be moved, sped up, slowed down, or even stopped. Using the right magnitude of force for the task makes work easier and saves time.

2. Effect of Friction on Objects

When we roll a marble on the ground, we will see that after a while it stops after a while. Some objects are hard to pull, while others are easy to move. Why does this happen? One main reason is the force of **friction**.

What effect does friction have on an object?

Activity: Observing the effect of friction on objects.

What to do:

Let us …

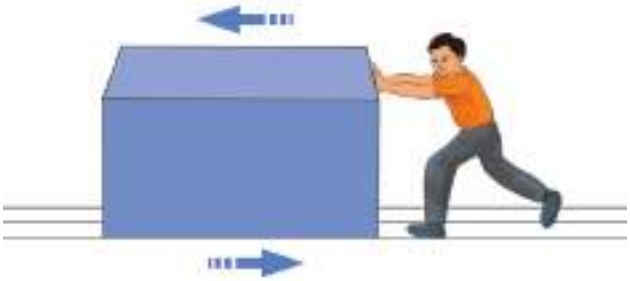
1. Roll a ball on the smooth floor of the classroom, and then roll it on the grass of the playground.
2. Observe in which case the ball travels farther and write the reasons in the table below.

Effort	Observation and its explanation
Rolling a ball on the smooth floor of the classroom	
Rolling a ball on the grass of the playground	

Summary

When an object rolls on a surface, it eventually comes to a stop due to friction. Friction is a force that resists the movement of one surface on another.

Let us learn more about the effect of friction on objects…



When an object moves on another, a force is created at the point of contact, opposing the motion. This force is called friction. When an object rolls, friction acts in the opposite direction to its movement, causing it to slow down. If the surface is smooth, the friction is less. If the surface is rough or uneven, friction increases, and more energy is needed to move the object. Friction is useful in many daily activities; it allows us to hold a pen while writing, write on a board, light a matchstick, and walk without slipping. If we notice, we can understand that walking on an uneven paved road is easier than walking on shiny, smooth tiles. However, friction can also cause problems. Friction makes it harder to pull or push objects. Car engines require more fuel due to friction. Excessive friction can wear out moving parts. In addition, friction can generate heat and even damage machines.

Discussion



Why do vehicles such as bicycles, motorcycles, buses, and trucks have grooves on their tires?

What problems can arise if a vehicle's tires do not have grooves?



Discuss with your classmates to find out the answers to Dipu and Jui's two questions and write them in the box below.



3. Force of the Earth on Objects

One day, the scientist Newton was thinking, sitting under a tree in an apple orchard. At that time suddenly an apple fell from the tree. He wondered, why did the apple fall down? Why didn't it go up? Why didn't it remain still? Doesn't the same question arise in our minds- why does everything fall down whenever we drop it from above?



Why does an object fall down we release it from above?

Activity: Observing the earth's attraction on objects.

What to do:

Let us…

1. Take objects like a ball, pencil, paper, feather, etc. Raise your hand and release each object from above.

2. Observe what happens in each case and record it in the table below.

Name of Object	What happens when it is released from the hand?
Ball, Pencil, Paper, Feather	

Summary

The earth attracts all objects towards itself. This attraction is called the force of gravity. Not just balls, pencils, paper, or feathers, but any object release from above will fall down because of this force.

Let us learn more about earth's gravitational force on objects…



If we pay attention, we can see that going up the stairs is harder than going down. This happens because of the earth's gravity. When we go up the stairs, we work against gravity, so it takes more energy. Again, when we go down the stairs, we move in the direction of the earth's attractive force, so gravity helps us. That is why going down is much easier. The force by which the earth attracts all objects toward its center is called gravity.

4. Use of Simple Machines in Daily Activities

In our daily life, we use many types of tools to perform different activities. These tools make work easier by reducing the effort needed. The simple tools that we use every day are called simple machines. They help us lift, push, or move heavy objects with less effort.

What simple machines do we use for different tasks?

Activity: Identifying simple machines in daily life

What to do:

Let us…

1. Fill in the table below with examples of simple machines used in daily activities.
2. Compare and discuss the completed table with a classmate.

Daily work	Simple machines used	How does it help?
Cutting vegetables		
Cutting wood		
Opening a bottle cap		
Carrying weight on both sides of the body		
Tightening a screw		
Going up a ramp		
Drawing water from a well		

Summary

In daily life, we use many simple machines such as knives, scissors, wheel and axles, pulleys, ramps, hammers, and screwdrivers. These tools help us perform tasks like cutting, lifting, pressing, and rotating, making work easier and saving effort.

Let us learn more about the uses of simple machines in everyday life...

In scientific terms, a simple machine is a tool that changes the direction or magnitude of force we use while doing work. In our daily lives, we use many kinds of simple machines that make our tasks easier, faster, and more effective. Examples of simple machines include levers, pulleys, wheels and axles, inclined planes, crowbars, and wedges. Even though they look simple, they serve very important scientific purposes. For example, the handle of a tubewell, the wheels of a rickshaw, the rope and pulley used to draw water from a well, an axe for chopping wood, a bottle opener for opening a lid—all of these are uses of simple machines. They help us work with less effort and save time.

These tools are not only useful at home but also outside. In warehouses, ramps are used to move heavy goods. On construction sites, pulleys are used to lift materials. Hospitals have ramps so that stretchers can be moved easily. In daily life, we also use simple machines like door handles, bottle caps, forks, and screwdrivers. By using them, we make many tasks much easier.

5. The Role of Simple Machines in Simplifying Work

We have learned that simple machines make our daily activities easier, faster, and more efficient. Now let us explore how they actually work.

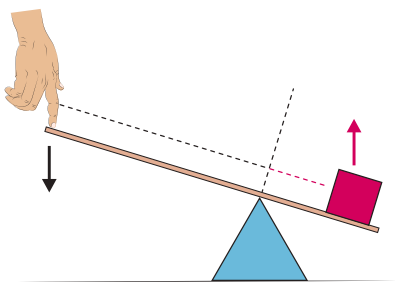
How do simple machines make work easier?

Activity: Working with a simple machine, a lever.

Materials needed: A stick or scale, a few small stones, and a pencil (to use as a base).

What to do:

Let us...



1. Place a pencil on the table.
2. Put a scale across the pencil to use it as a base.
3. Adjust the scale so it can move up and down like a seesaw.
4. Place a small stone on one end of the scale.
5. Press down on the other end with your finger.
6. Move the pencil to different positions under the stick and press with the finger tip.



Did the stone go up? Did it take a lot of force to lift the stone?

If you place the pencil on one side of the base instead of in the middle, why does it become easier to lift things?



Discuss with classmates and write the answers to Dipu and Jui's questions in the box below.

Summary

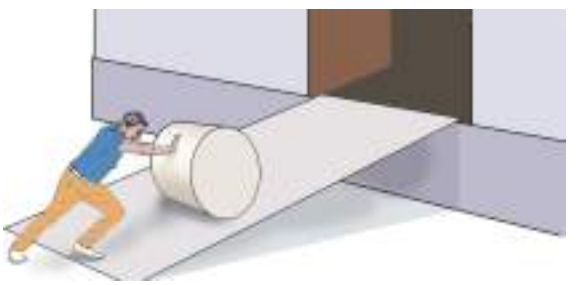
A machine, for example– a lever helps us lift heavy objects more easily by using less force. Simple machines make our daily works easier and allow us to do more with less effort.

Let us learn more about simple machines...

Some simple machines are especially useful in our daily lives, such as the inclined plane, pulley and lever.

Inclined plane





An inclined plane is a sloping surface or a tilted path. It helps us to move heavy objects up or down more easily. For example, when we push something up on an inclined plane, we use less force. If we try to lift something straight up, we must fight against gravity. That means we need to use force equal to or greater than the object's weight. But with an inclined plane, the same work can be done slowly and with less effort. Examples of inclined planes are: wheelchair ramps, stairs, and sloping roads.

Pulley





A pulley is a machine used to lift heavy objects easily with a rope wrapped around a wheel. With the help of this simple machine, we can lift heavy objects upwards by pulling a rope downwards. Have you noticed the hoisting of the flag at school every day? The rope is pulled downwards to raise the flag, and the flag goes up. A pulley is used to hoist the flag. By using a pulley, we can lift heavy objects by applying less force. We can see more examples of pulleys, such as the rope-and-wheel used to draw water from a well and the machine used to lift construction materials during building work.

Lever



A lever is a type of simple machine. With the help of a lever, an object can be easily lifted or moved by applying force to a specific point. When you apply pressure on one side, the weight on the other side lifts or moves. To lift a heavier load with a lever, less energy is required. We use many other such simple machines in different works, such as: seesaws, pliers, can openers, water scoops for irrigation, etc.

Exercises

1. Put a tick mark (√) on the correct answer.

a) What are the two main methods of applying force?

☐ Push and pressure ☐ Pull and push

☐ Push and friction ☐ Pressure and touch

b) When a marble is pushed harder than before, what happens to its speed?

☐ It decreases ☐ It remains the same

☐ It increases ☐ It stops

c) Why does a ball rolling on grass travel a relatively shorter distance?

☐ The grass stops the ball ☐ The grass makes the ball bounce

☐ The friction force is greater on grass ☐ The grass holds the ball back

d) Which of the following tasks requires working against the earth's gravitational force?

☐ Going down the stairs ☐ Holding up an umbrella

☐ Going up the stairs ☐ Dropping a ball to the ground

e) If we want to lift a stone with a stick and a pencil, which of the following techniques should we use?

☐ Directly pushing the stone with the stick ☐ Rolling the stone away

☐ Pushing the stone with the pencil and the stick

☐ Using the pencil as a fulcrum and the stick as a lever

2. Fill in the blanks.

a. An object can be **……** by applying force.

b. The greater the amount of force, the **……..** its effect on an object.

c. Friction works in the **……** direction of the way an object wants to move on a surface.

d. The Earth pulls all objects towards **……...**

e. A device used to make work easier is called a **……..** machine.

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

Statement	T' or 'F'
An object can roll easily on a smooth surface because there is less friction.	
If there were no gravitational force on earth, an object released from above would fly upwards.	
Because of friction, we do not slip while walking.	
Using a lever requires more energy to lift a heavy object.	
With the help of a pulley, a heavy object can be easily lifted by pulling the rope downwards.	

4. Answer the following questions in brief.

a) What is friction?
b) What is an inclined plane?
c) What kind of problems would we face in our movement if there were no friction?
d) Write down the usages of any two simple machines at home or nearby after identifying them.
e) If there were no gravitational force on earth, what would our daily life be like?

5. Answer the following questions in detail.

a) What are friction and gravitational force? Write how these two forces play a role in our daily lives.
b) When a ball is rolled on a smooth and a rough surface, it travels different distances. Explain.
c) If you are asked to lift a heavy stone, what kind of simple machine would you use? Why?
d) You have to create an exhibition on 'Friction' and 'Gravitational Force' for a school science fair. Write a plan to present the characteristics and differences of these two forces to the audience.

Chapter 8

Landform

How beautiful and diverse our world is! Some of its regions consist of high hills and mountains. In other places, there are vast plain lands, many small and big rivers, and the sea. There are also mangroves, evergreen forests, and deltas made by soil carried by rivers (like in Bangladesh). Human settlements and their ways of life are shaped by diverse topography and climate of different regions of the earth.

1. Landforms and Different Types of Landforms



Let us look at the picture on the left side. We live and cultivate on the earth's outer, solid and dry crust or surface.We call it land. The shape and nature of the land in different regions of the earth's surface are different. Some regions are located much higher than the sea level, such as mountains and hills. Some regions have dry, gray deserts, such as the Sahara Desert in Africa. Again, the polar regions of the earth remain covered with ice all the year round. There are also different types of landforms on the sea floor. This diverse structural shape or form of the land in different regions of the earth's surface is called landforms.

What are the types of landforms?

Activity: Identifying different types of landforms

What to do:

1. Let us write the name of our district and 3 characteristics of its land, in the table below.

District Name	Land characteristics
	1. 2. 3.

Summary

The shape and structure of the land in different regions of the world are different. There is also diversity in the land structure of different districts or regions of Bangladesh.

Let us learn more about the different types of landforms...

The landforms of the earth's surface can be mainly divided into three categories.

For example: 1. Hill-Mountain ,2. Plateau (Tableland) and 3. Plain (flat land)

1. Hill-Mountain



Hills



Mountains

Hills and mountains are located higher than sea level. Hills are landforms that are slightly lower than mountains. There are hills in Sylhet, Chattogram, Chattogram Hill Tracts, Khagrachari, Bandarban, Rangamati and Cumilla in Bangladesh. In addition, hills can also be seen in Bogra, Dinajpur, Rajshahi, Rangpur, Tangail and Mymensingh. Mountains are located much higher than sea level, have steep slopes, and extend far. The height of mountains is usually 600 meters or more above the sea level, for example, the well-known Himalayan Mountains.

2. Plateau (Tableland)

A plateau slopes downward. However, its upper surface is generally flat or slightly undulating (wave-like). A plateau is usually lower than a mountain but

higher than a flat land. It is also called a tableland because it looks like a table. The Tibetan Plateau, located in Asia, is the highest plateau in the world. There is a large flat land around the plateau. People on this flat land live by tending animals and growing flowers and fruits.

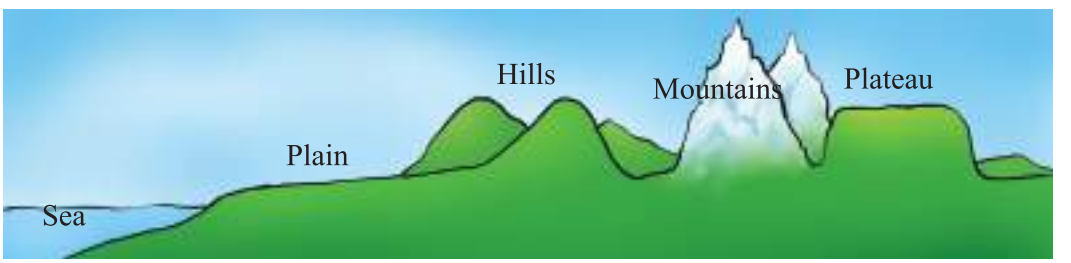


Plateau

3. Plain (flat land)

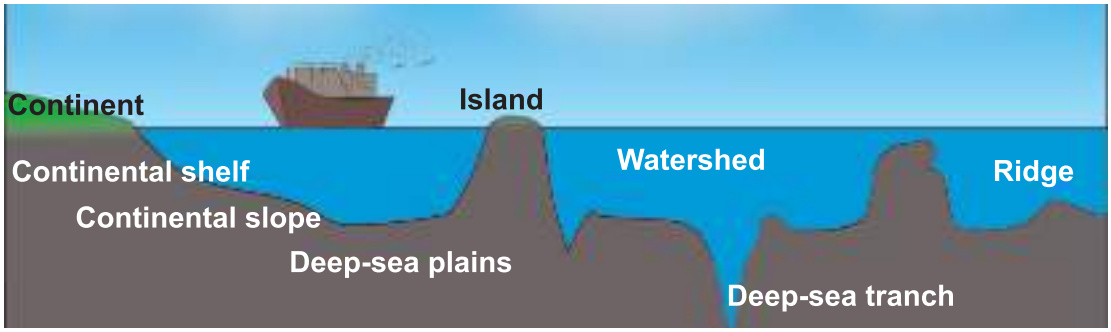
The plains are located slightly above sea level. A vast plain area is formed by flat land. The plains are neither steep nor sloping. Most of the regions of Bangladesh are plain. Plain land is good for farming and people can easily get what they need to live. The soil of this region is fertile because it is made up of alluvial soil carried by the river. So, many crops like rice, wheat, jute, potatoes, vegetables and fruits grow well here. In fact, agriculture is the main livelihood of the people of the plain region. In the plain, many people also live by fishing, hunting, and tending cows, goats and other animals. Thus, due to the favourable environment for living, most people in the world prefer to live in the plains. Therefore, the influence of the plains on human life is immense.





Earth's surface and landforms surface

Not only on land but also under the oceans, there are different types of landforms. These are ocean plateaus, ocean ridges, deep-sea plains, and deep-sea trenches. There are mountains, plateaus, plains, and even deep canyons on the ocean floor.



Earth's watershed or ocean floor landforms

Activity: Identifying landforms on the map of Bangladesh

What to do



Let us...

1. Carefully observe the map and symbols of Bangladesh below.
2. Mark the location of each type of landform in each district of Bangladesh on the map with the help of symbols. If necessary, ask the teacher for help.

2. Causes of Landform Changes

We have learned about the different types of landforms. These landforms may change due to various reasons. These changes can be slow or sudden. They may happen naturally or because of human activities. Sometimes, these changes cause huge changes in the landforms.

What are the causes of changes in the landform?

Activity: Identifying the causes of landform changes.

What to do:

Let us…

1. Fill in the table below about changes in landforms based on what we have seen, heard, or experienced.

Sl No.	Various events seen or heard	Possible changes in landforms	Causes of change (natural or man-made)
1	River erosion	Reduction of usable land on both banks of the river.	Natural
2			
3			

Summary

Landforms change due to various natural causes such as river erosion, earthquakes, volcanic eruptions etc. Landforms also change due to man-made causes such as dam construction, deforestation, mountain cutting, industrialization and urbanization.

Let us learn more about the causes of landform changes...

Natural Causes

Natural causes of landform change include earthquakes, volcanic eruptions, ocean currents, glaciers, airflow, floods and landslides. The processes of natural change usually occur slowly over very long periods of time.

River Erosion



In our country, during the rainy season, floods carry soil and silt that create new landforms. In this way, new char areas and small islands are formed in Bangladesh. But sometimes, because of floods and heavy rain, the strong flow of water causes landslides and river erosion. It is also one of the main causes of landform changes.



Earthquake

Although natural changes in landforms are slow, earthquakes can cause them to occur very rapidly. A strong earthquake can destroy the landforms of an area in a very short time. Such an earthquake happened in Nepal in 2015.

Volcanic Eruption

A volcanic eruption is a natural process by which hot, molten lava and other volcanic materials erupt from a volcano's vent. Molten lava can quickly change the landscape where it flows. It covers fields, rivers, forests and villages. Such an eruption happened on the island of Java, Indonesia in 2021.





Glacier

In icy regions of the world, the movement of ice alters the landforms and forms glaciers. Glaciers are found in the polar regions. These glaciers are melting now quickly. Besides natural causes, global warming is also a reason for this.

Tsunami



A tsunami is a terrible natural disaster. Usually, due to earthquakes, volcanic eruptions, etc. under the sea, the land on the seabed is displaced or broken to result in landform changes.

As a result, the sea water rises much higher than normal waves and reaches the coastal areas. This creates sudden, terrible waves and floods. Then the houses, roads, villages, and the natural environment of that area are badly destroyed. A large amount of water-borne sand and soil is carried and destroys the natural environment. At this time, the landform of the surface may also change.

Man-made Causes

Just as landforms change due to natural reasons, they also change because of our unplanned activities. These changes can harm our lives. Sometimes, man-made causes bring sudden changes in landforms

Deforestation



Trees and forests are being cut down to build roads, bridges, culvart and houses. This is causing soil erosion. Rainfall is decreasing and temperature is rising. The soil is becoming dry and infertile.

Mountain Destruction



In Sylhet, Chattagram, and the Chattagram Hill Tracts, hill forests are being burned for farming, and houses are being built. As a result, the landforms are being damaged, and even a little rain can cause landslides. Cutting down hills destroys the natural balance. In our country, the main cause of landslides in hilly areas every year is the destruction of hills.

Dam construction on the river



The construction of bridges, culverts, and dams on rivers is changing the natural course of the river. It causes erosion in some places and the rise of chars in others. As a result, the landforms are changing significantly. For example, many rivers in Bangladesh have lost their navigability because of the Farakka Barrage.

Urbanization



To accommodate the growing population, new towns and cities are being built by filling rivers and canals. The towns are being expanded. As a result, the landforms are changing a lot. Additionally, waste from factories and urban areas, combined with inadequate sewage systems, is altering the characteristics of the earth's interior and also contaminating its surface.

Brick Kiln

Because of burning bricks in brick kilns, the soil is losing its natural quality. The quality of the soil is getting worse. The land is becoming infertile. Also, the smoke from brick kilns pollutes air.



Industrial and factory waste

Industrial and factory waste is being dumped directly into rivers, ponds, canals, and lakes. As a result, water and soil become polluted and unusable. Various types of plants and animals living in the soil and water are destroyed. As a result, the landform of that area loses its structural characteristics. An example is the Buriganga River in Dhaka.





Overuse of Groundwater

Using too much groundwater increases the risk of landslides. During droughts, when there is little rain, groundwater is usually used to water crops. In some parts of the world where groundwater is scarce, taking too much groundwater has made the land dry.

One of the main reasons for changes in the landscape now is environmental pollution. Due to global warming, carbon dioxide and other greenhouse gases are increasing in the atmosphere. Carbon dioxide can trap heat and emit it back to the earth's surface. So, the earth's temperature is rising. In some places, this extra heat causes droughts. For example, in Bangladesh, there has been very little rainfall for several years. It brings severe heat waves in summer. Rivers and canals are drying up, causing landforms to change.

3. The Effects of Water and Airflow on Landform Changes

The effects of water and wind are also significant in changing the landform. These are the main causes among various natural factors. Ocean currents, strong water currents and strong airflows also cause changes in the landform.

How do water and wind change landforms?

Activity: Observing the effects of water and airflow on landform changes

What to do:

Let us…

1. Think about two events that we see in videos or movies such as ocean storms, tidal waves, desert storms or mountain landslides.
2. Write in the table below what impact these two events had on the environment.

The event what I saw	Impact of that event

Summary

Landforms change because of different natural events caused by water and wind. Heavy rains, strong flood currents, fresh flood from hills and ocean waves can change landforms. In desert regions, strong winds create dust and sandstorms that also change landforms.

Let us learn more about the effects of water and air flow on landform changes...

Water flow

Heavy rains, floods, and fresh flood from hills often cause land erosion due to the intense flow of water. It changes the landform. In Bangladesh, the construction of houses in hilly areas by cutting down hills weakens the soil of the hills. As a result, landslides occur every year due to mountain torrent.



River and ocean currents

The strong current of water in rivers and seas, the flow of water gradually wash away the surface of the Earth and change it to create new landforms. The strong current or flow of water causes landslides or erosion in the areas near the river or



sea. In Bangladesh, many areas disappear into the riverbed every year due to the erosion of the Padma River during the rainy season. Sea storms and tidal waves cause extensive damage to the landforms.

Airflow

In the desert, the air is hot and dry due to intense sunlight. There is almost no rain in the desert. In these regions, dust and sand storms occur due to strong airflow. As a result, dust and sand are carried by the wind and dropped far away, making big piles. These are called sand dunes.



4. Ways to Prevent Land Changes Caused by Man-Made Causes and Conserve the Environment

We have already learned that the primary man-made causes of landform changes are deforestation for agriculture and food production, and urbanization. The changes in landform are changing the environment, ecosystem and climate all over the world, creating extreme environments. As a result, disasters such as floods, droughts, severe cold, storms, tidal waves and wildfires are occurring. Thus, we need to take initiatives to prevent landform changes and conserve them. Land or environmental conservation is the process of restoring the natural characteristics of land or environment by protecting it from damage and destruction.

How can man-made landform changes be prevented and the environment conserved?

Activity: Identifying ways to prevent man-made landform changes and conserved the environment

What to do:

Let us…

1. Mention three events that are causing changes in landforms due to human activities that we have observed in reality or seen it in a picture or video.
2. Write briefly in the table below the ways to prevent the above changes and conserved the environment.

Sl No.	The event of landform changes	Ways to prevent change and conserved the environment
a		
b		
c		

Summary

Stopping deforestation, planting more trees, creating grasslands and reservoirs, planned waste management, planned urbanization, river conservation etc. play an important role in preventing landform changes and preserving our environment. If we love nature and are aware and responsible, it is possible to prevent and preserve landform changes.

Let us learn more about the ways to prevent man-made landform changes and conserved the environment...

1. Every year, soil erosion is increasing due to floods, landslides, storms, tide surges and river erosion. Soil erosion is one of the main causes of landform changes. Stopping deforestation and planting more trees will strengthen the soil structure which will prevent soil erosion. Grasslands can be created to retain water in the soil. By creating artificial ponds or reservoirs rainwater can be stored, and the land can be cultivated through irrigation during the dry season. This also reduces the use of groundwater.

2. Unplanned construction of dams, bridges, culverts, river dredging, excessive sand extraction from rivers, and filling of wetlands must be stopped. Urbanization by filling rivers and destroying mountains must be stopped. Rivers must be saved. For this, laws must be enforced if necessary. It is important to stop destroying agricultural land or cutting down mountains to build houses, urbanization, and factories, and to conserve land.

3. To raise awareness about land conservation campaigning can be done through newspapers, television, magazines, social media, and textbooks. Advertisements, and articles can also be published in this regard. Educational institutions should take initiatives to increase awareness and build care for the environment by highlighting the importance of land conservation through role plays and posters.

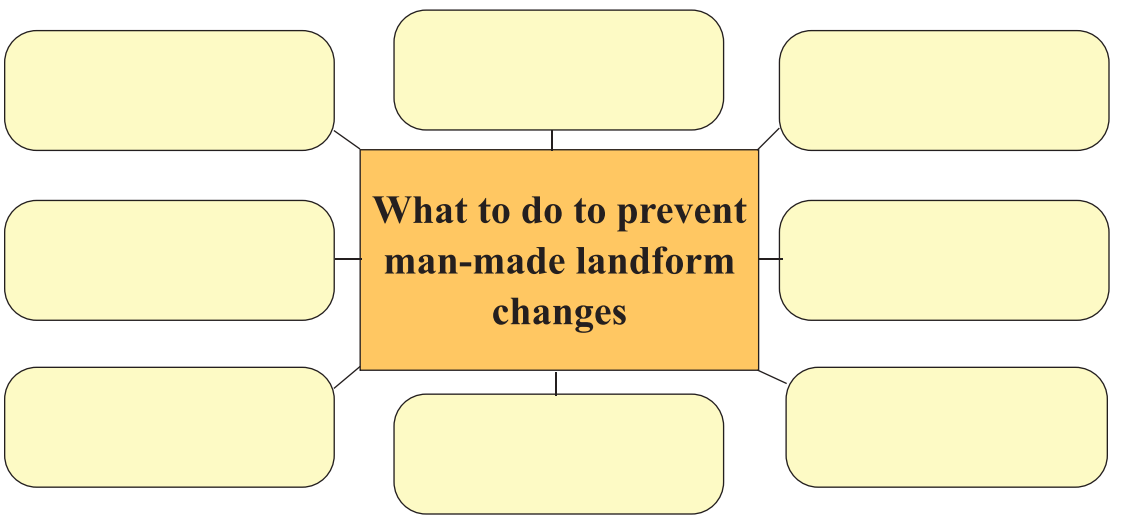
We need to make this world safe and habitable for our future generations. For this, everyone needs to be careful and aware in preventing and conserving landform changes. Let us all strive to conserve the environment by loving nature and understanding its contribution and importance.

Activity: Creating and displaying awareness posters

What to do:

Let us…

1. Draw the concept map given below by enlarging it on a poster paper.
2. Fill in the concept map by writing down what we can do to prevent human-induced landform changes.
3. Now hang the poster with the concept map in a place where everyone can notice it, both in the classroom and outside the classroom.



Exercises

1. Put a tick mark (√) on the correct answer.

a) Which landform is suitable for cultivation?

☐ Mountains ☐ Hills ☐ Plain land, ☐ Plateau

b) Plateau is-

☐ High ground with steep slopes ☐ Surface flat, slightly wavy

☐ Composed of river alluvial soil ☐ Located slightly above sea level

c) What is the natural cause of landform change?

☐ Dam construction on the river ☐ Volcanic eruption

☐ Deforestation ☐ Burning bricks in kiln

d) Which of the following occurs as a result of uncontrolled river mining?

☐ River erosion can be prevented ☐ River erosion may increase

☐ The navigability increases ☐ The flow of the river remains usual

2. Fill in the blanks.

a) The main cause of hill destruction is .....

b) Creation of ..... among all is essential to prevent and conserve landform changes.

c) ..... occurs when factory waste is dumped into rivers.

d) One of the natural causes of landform change is .....

3. Answer the following questions in brief.

a) Explain what kind of changes in the landforms of hills can occur as a result of farming on hill slopes.

b) Write two man-made causes of landform changes.

4. Answer the following questions in detail.

a) What is land conservation? Why is land conservation important? Explain.

b) The river was filled and paved roads were constructed. What type of effect do such activities have on the landform and environment of the area? Explain.

Chapter 9

Conservation of Environment

The environment means everything around us, including soil, water, air, light, houses, residences, rivers, mountains, trees, vehicles, factories, animals, birds, and other living beings. In a natural environment, humans and other living beings can survive well. When harmful things mix with soil, water, or air, the environment gets polluted. The environment becomes polluted due to various reasons. A polluted environment makes it difficult for humans, animals and other living things to survive. Therefore, it is necessary to conserve the environment healthy. In this chapter, we will learn how we can protect the environment.

1. Sources and Causes of Environmental Pollution

What are the sources and causes of environmental pollution?

Activity: Identifying the sources and causes of environmental pollution by observing the surroundings of schools and homes

What to do:

Let us…

1. Look around the school and home to see what is polluting the environment and what elements of the environment are being polluted. Write this information in the table below.

2. Take help from the teacher if necessary.

Source of pollution	What is polluting the environment?	Which element of the environment is being polluted?
Car	Black smoke from the car	Air

Summary

Soil, water, air and noise pollution are caused by various human activities. People cause environmental pollution by using the open fields as toilets and throwing waste here and there. In addition, excessive use of fertilizers and pesticides in agriculture pollutes the environment.

Let us learn more about environmental pollution...



Soil pollution



Air pollution



Water pollution

Human activities are mainly responsible for environmental pollution. Soil and water are polluted due to the dumping of dirt, garbage, waste from humans and animals like feces, industrial and hospital waste etc. People cause soil and water pollution by throwing polythene everywhere, using too much fertilizer and pesticides on land. Smoke produced in cars, brick kilns, industrial factories, etc. causes air pollution. Air is also polluted by smoke from burning trees and polythene. Water is polluted by liquid or chemical waste produced in factories.

2. Effects of Environmental Pollution

What problems do we face because of pollution?

Activity: Finding out the effects of environmental pollution.

What to do:

Let us…

1. Find out if there is soil, water and air pollution around the house and school.
2. In the table below, write the harmful effects of pollution on humans and other living beings.

Type of pollution	Harmful effects of pollution
Soil pollution	
Water pollution	
Air pollution	

Summary

Due to various human activities, soil, water and air become polluted. Environmental pollution causes damage to crops grown in the soil. Water becomes unusable and other aquatic animals, including fish, are harmed. Air pollution makes breathing difficult and causes various diseases.

Let us learn more about the effects of pollution…

Soil, water and air pollution have various effects on the environment. Due to air pollution, bad smells and germs spread in the air. It makes breathing difficult. Animals and birds also struggle to survive. Due to air pollution, the global temperature is increasing. As a result, the polar ice melts and the sea level rises up. The lowlands of the world are getting flooded. Places for people to live are getting reduced. Breathing in polluted air causes various diseases in the human lungs. These include breathing problems, asthma, lung cancer etc.



Effects of air pollution



Effects of water pollution

Water becomes unusable due to water pollution. The amount of clean and safe drinking water decreases. The lives of fish and other living beings in water are in danger and many of them may die. This reduces the possibility of people getting animal protein from fish. It causes trouble in using water to grow crops. Also, using polluted water lowers crop production. Various diseases occur in humans and other living being by consuming crops produced with polluted water. Due to water pollution, people suffer from various waterborne diseases, such as cholera, diarrhoea, dysentery, and various skin diseases.

As a result of soil pollution, plants cannot grow in the soil and agriculture suffers. Earthworms and beneficial bacteria are killed. Soil fertility is reduced due to soil pollution. Crop production on land decreases. Farmers suffer from financial loss. People suffer from various diseases by eating crops grown with polluted soil. People are affected by various diseases.



Effects of soil pollution

3. Prevention of Environmental Pollution

Ways to prevent soil pollution

Prevention of soil pollution includes reducing the use of chemical fertilizers and pesticides in farming and increasing the use of organic fertilizers (compost, cow dung etc.). Disposing of garbage in designated landfills and using recyclable materials such as cloth or jute bags instead of plastic or polythene also reduce soil pollution. We can prevent soil pollution by properly treating and disposing of industrial waste. We learnt that tree roots hold the soil and stop erosion. So, by planting more trees, we can save our soil from erosion.

Ways to prevent water pollution

Water pollution can be prevented by treating industrial and factory wastewater (through treatment plants) before releasing it into rivers and canals. We can reduce water pollution by disposing of plastic and garbage (market bags, bottles, packets etc.) in the right place instead of different water bodies like the rivers, ponds, and canals. If too much fertilizer is applied to the land, it pollutes the water in the river or pond through the run off due to rain. Therefore, it is necessary to use fertilizers and pesticides in the right quantity. To prevent water pollution, it is also necessary to improve the sewerage system. By creating awareness among people about the importance of fresh water, we can also reduce water pollution.

Ways to prevent air pollution

Using more environment friendly vehicles like CNG-driven vehicles, electric cars, or bicycles, we can prevent air pollution. Other ways include reducing smoke by repairing the engine and exhaust system of vehicles regularly, installing smoke or dust filters in factories, stopping the burning of polythene

and plastic and afforestation and planting more trees. Therefore, air pollution can be prevented by raising awareness, adopting good work habits and using modern technology.

4. Conservation of Environmental

What can we do to conserve the environment?



Activity: Finding ways to conserve the environment



What to do:

Let us…

1. Draw a table like the one below in the notebook.

Type of pollution	How to prevent pollution
Soil pollution	
Water pollution	
Air pollution	

2. Discuss with classmates how to prevent soil, water and air pollution in our respective areas and write them on the board.

Summary

Activities that pollute soil, water and air should be avoided. In particular, people should not throw human waste and liquid water into ponds, canals and rivers. We can stop environmental pollution by throwing waste in proper places instead of here and there.

Let's learn more about environmental conservation...

Environmental pollution can be prevented by reducing the use of fossil fuels and by reusing polythene and plastic. It gives safety to the environment.This protects the environment. By preventing wastage of electricity and fuel, we can also conserve our environment. Throwing household waste only in a proper or safe place, not here and there, is another way to reduce pollution. Environmental pollution can be reduced by using hygienic toilets instead of open toilets. If solid and liquid waste from industries is directly discharged into the soil and

water, and if gaseous waste is released directly into the air, the environment becomes polluted. Therefore, we can reduce soil, water and air pollution by treating industrial waste before it goes into the environment. We can reduce air pollution by planting trees at home, school and on unused land or through social afforestation. the environment can be protected. To reduce pollution and conserve the environment, we can make school students and nearby people aware.



Disposing of household waste at designated bins



Watering the plants



Social forestry

Exercises

1. Put a tick mark (√) on the correct answer.

a) Which environmental element is polluted by factory smoke?

☐ Soil ☐ Water ☐ Air ☐ Light

b) Which of the following is polluted when excess fertilizer is used on the land?

☐ Plants ☐ Water ☐ Air ☐ Soil

c) Which element of the environment is polluted by liquid waste from industries near the river?

☐ Water ☐ Air ☐ Soil ☐ Garden

2. Match the right column with the left.

Environmental elements	Cause of pollution
Soil	Chemical fertilizers
Water	Industrial waste burning
Air	Polythene

3. Answer the following questions in brief.

a) Write down what substances are found polluting the soil around your school area.

b) How does water pollution harm humans and other living beings?

4. Answer the following questions in detail.

a) Write how water pollution can be prevented.

b) Write how to dispose the household waste to reduce environmental pollution.

c) Write down some ways you and your family can do to reduce pollution due to plastic.

Chapter 10

Motion of the Earth

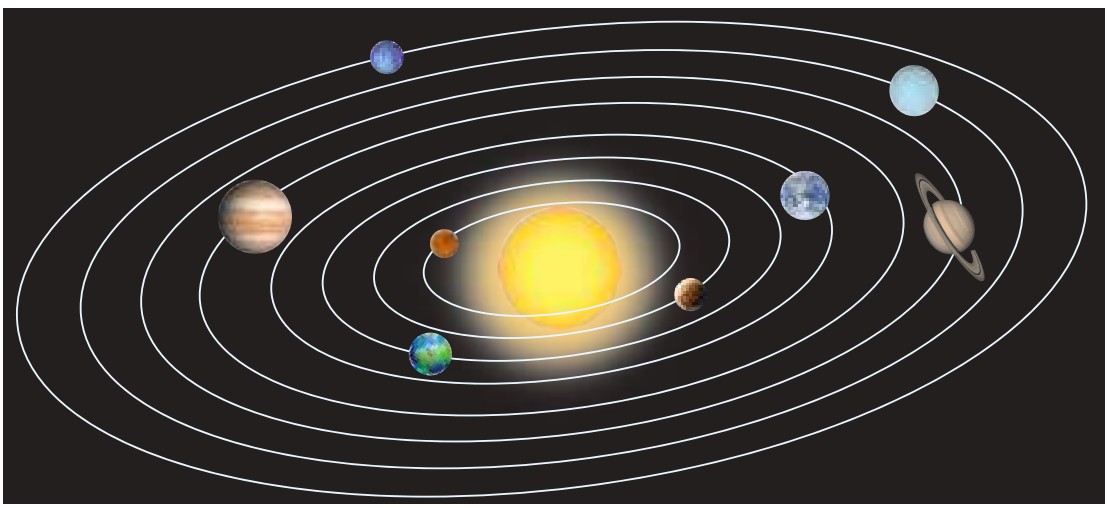
In the previous class, we learned about the solar system and its planets and satellites. There, we also learned a little about the earth. In this chapter, we will find out how the earth moves in the solar system and what changes occur due to the earth's motion.

The earth is continuously rotating in the solar system. It rotates on its own axis on one side and also revolves around the sun.

1. Types of the Earth's Motion

What type of motion of the earth causes the change of day and night?

Activity: Observing the earth's motion, and the change of day and night using a sun-Earth model.



What to do:

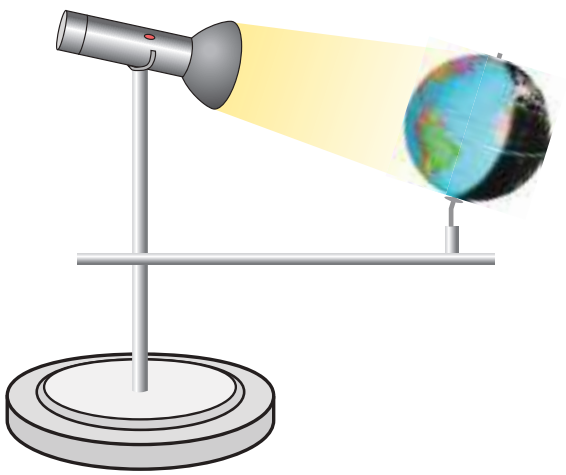
Let us …

1. Observe the above picture. We learned about the solar system in Class IV. We also learned that the sun is at the center, and various planets and satellites revolve around it.

2. Think about the position of the earth and the sun in the picture. Why does the sunlight come to some places on the earth? And think about the fact that the sun never shines. Write our thoughts in the table below. Besides, draw the table in the notebook, and write in it.

The reason why sunlight comes to any part of the world during the day	The reason why the sun does not shine in any part of the world at night

3. Discuss this matter with nearby classmate. And, write the new information in the table, if there is any.



Model of sun and earth

4. Make a model of sun and earth. Using this model, try to understand why the sun shines or does not shine at any part of the world during the day and night.
5. Discuss what we need to make a model of sun and earth. Use torchlight, football, metal wires, and sticks to make this model. It can also be done in some other ways.
6. Mark the names of countries including Bangladesh on the Earth model. While marking the names, mark the names of different countries located around the world. In this case, we can take the help of the globe or a map.
7. Rotate the model of the Earth around its axis and observe where the sunlight

(torchlight) falls in a particular place and where the sunlight does not fall.

8. Rotate the model of the Earth (football) once around the sun (torchlight).
9. When the sun shines in Bangladesh, observe which other countries have the sun shine and which do not, and write it in the table below.

In which countries does the sun shine when the sun shines in Bangladesh?	In which countries does the sun not shine at the same time?
1. 2. 3.	1. 2. 3.

10. Discuss with your nearby classmates why sunlight sometimes falls and sometimes does not fall in some places on earth. Through discussion, try to understand why there is day and night on earth.

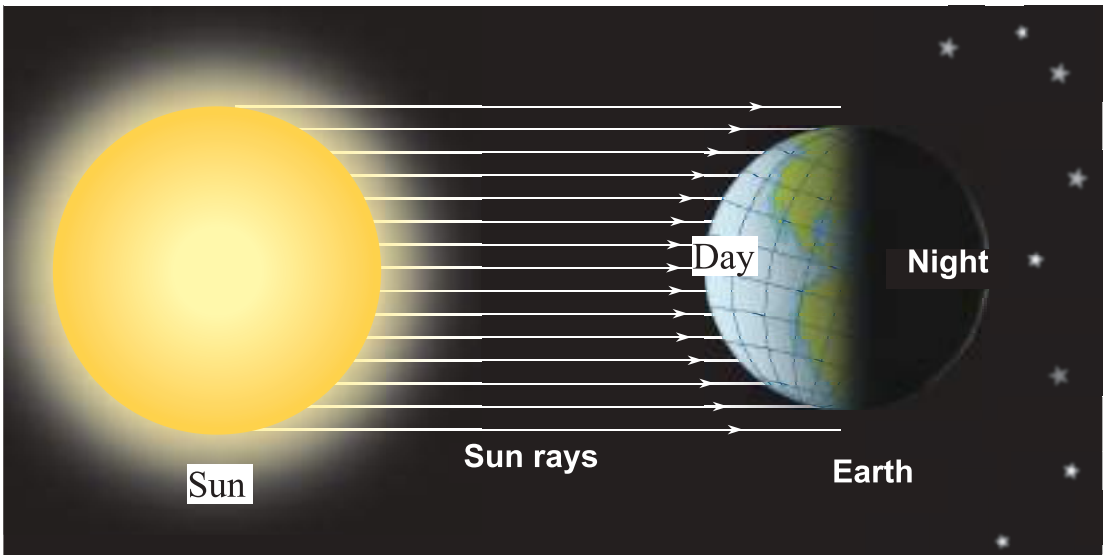
Summary

The sun gives light to the earth. When the earth rotates on its axis, it is called the diurnal motion of the earth. Due to this diurnal motion, the sun lights up one side of the Earth, while the other side remains dark. The side where the sun shines is day, and the opposite side is night. Again, when the earth revolves around the sun once, it is called the annual motion of the earth. Due to this annual motion seasonal changes occur on the earth.

Let us learn more about the reasons for the occurrence of day and night on the earth...

There are eight planets in the solar system revolving around the sun. The earth is one of them. It revolves around the sun in a specific orbit. When it revolves around the sun, it rotates around its axis like a spinning top. This rotation of the earth around its axis is called diurnal motion. It takes 23 hours, 56 minutes, and 4 seconds for the earth to rotate once around its axis. This time is considered as one day on Earth. However, we calculate one day as 24 hours.





The shape of the earth is roughly spherical. When the earth rotates around its axis like a spinning top, with the sun on one side, one side of the earth receives sunlight. The part of the earth that faces the sun receives sunlight. It is day in that part of the earth. On the other hand, the other part of the earth does not receive sunlight and remains dark. Then it is night in that part of the earth.

Day and night occur due to earth's diurnal motion. Because of day and night, different parts of the earth receive different amounts of sunlight. We get heat and light from the sun. By using sunlight, we can do necessary work during the day. Due to the presence of sunlight, plants grow on the ground. Crops grows in the field. We can save our lives by eating these food. We work all day and take rest at night. We can work again in the morning.

2. Seasonal Changes

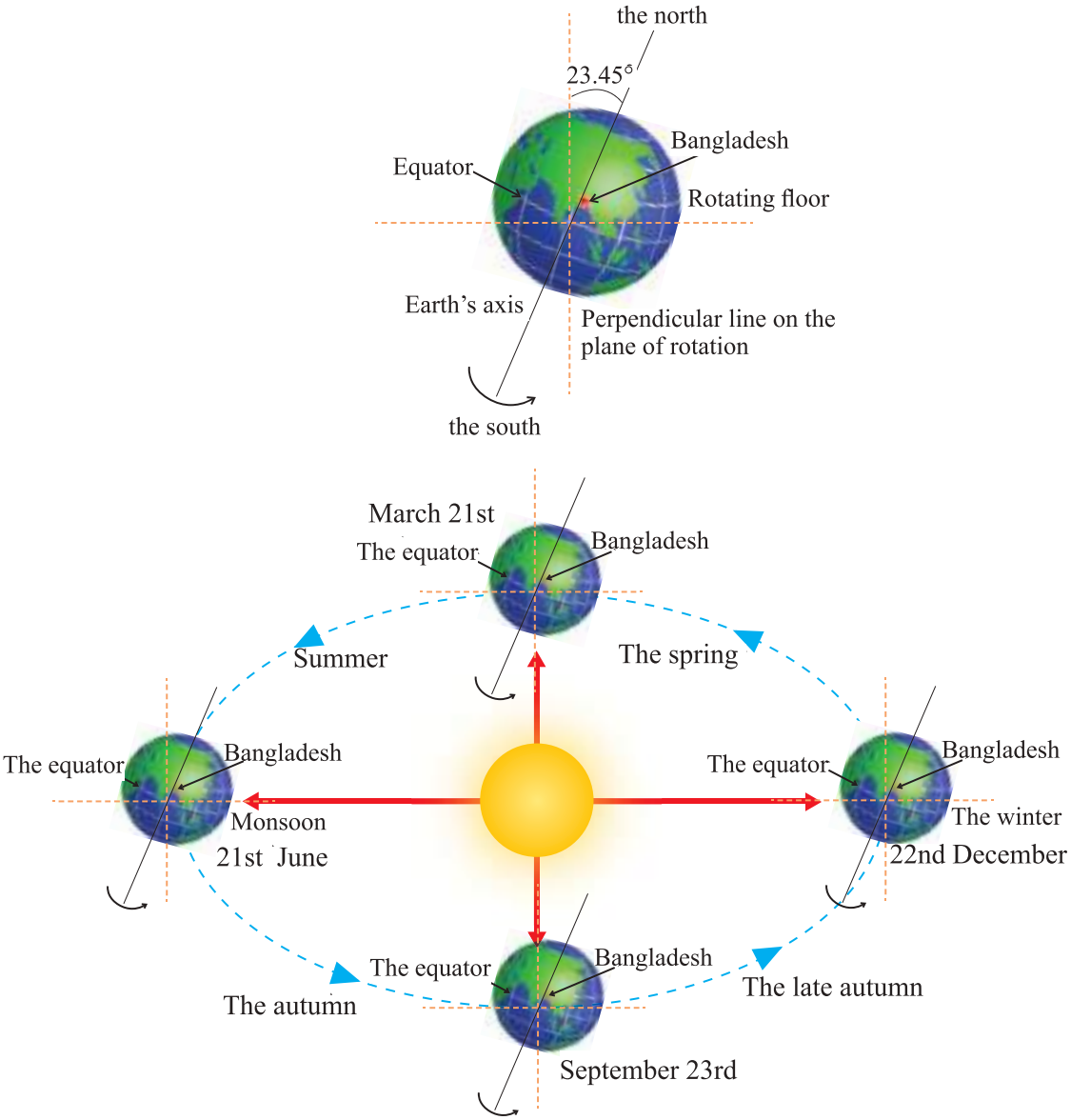
What causes seasonal changes?

Activity: Identifying seasonal changes using a model of the sun and earth
Things we need: A model of sun and earth.

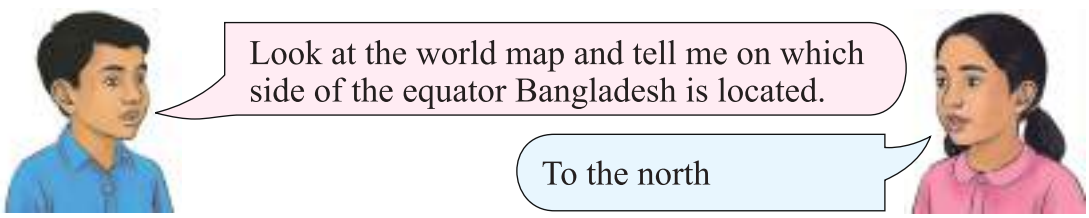
What to do:

Let us...

1. Observe the picture above, and find at what time of year the sunlight falls on the regions (Bangladesh, India, Myanmar).



2. Using the model of the sun and the Earth, observe the earth as it revolves around the sun. Then fill in the table below and discuss with nearby classmates while filling in the table. One has been filled in as an example.



Time	How the sun shines in the region of Bangladesh.	How the temperature in the Bangladesh region is	The seasons in Bangladesh region.
Month of June	Steeply	High	Summer
Month of December			
Month of March			
Month of September			

3. Discuss the facts we learned with classmates. Through discussion, try to find out what differences can occur in Bangladesh region due to the difference in the distance of the sun from the earth at different times of the year. Correct the answers to the above questions by discussing with classmates, if needed.

Let us learn more about seasonal changes...

The imaginary line connecting the north pole, the south pole, and the center of the earth is called the earth's axis. The earth rotates on its axis like a spinning top around this axis. When the earth revolves around the sun, the axis is slightly tilted. We have already learned about the diurnal motion of the earth. Apart from the diurnal motion, there is another type of motion of the earth. The earth revolves around the sun once in 365 days and 6 hours. This motion is called the annual motion of the earth. For this reason, 365 days are considered as a year. One extra day is added after every four years to count the extra six hours. When the earth revolves around the sun, the axis is slightly tilted. As a result, some times of the year in the northern hemisphere, the earth is tilted toward to the sun, and at other times the southern hemisphere is tilted toward to the sun. Bangladesh is located in the northern hemisphere of the earth. Light from the sun comes to our region in a slanted way at certain times of the year, and vertically at other times. As a result, at some times of the year the temperature in our region remains low, and at other times the temperature in our region remains high.

As the earth goes around the sun and its axis is tilted, the length of the day changes. For these reasons, we have six seasons in our region every year. These are summer, rainy season, autumn, late autumn, winter and spring. A primary idea about three of these seasons is given below.

Summer



During the months of Boishakh-Joishtho in Bangla year, or during April-June, the northern hemisphere of the earth tilts towards the sun. Thus, the length of the day in this region increases, and the sun shines directly on theearth. Due to this, the temperature in Bangladesh and the surrounding areas is relatively high, and it feels intensely hot. We call this time summer. During this time, the air remains dry, and the canals and small water bodies in our region dry up.

Rainy Season



Bangladesh has six seasons. The rainy season comes after summer. During the Bangla months of Ashar-Shraban (June - August), the northern hemisphere of the earth is tilted towards the sun.

During this period, the wind blows from the south to the north. Since there is the Bay of Bengal in the south of Bangladesh, there is a lot of water vapour with the wind. As a result, there is a lot of rainfall in this region during this period. For this, the temperature in Bangladesh and the surrounding areas decreases comparatively. We call this period the rainy season. During the rainy season, rivers, canals, ponds, and creeks in our region remain full to the brim.

Winter



During the months of Paush-Magh in Bangla year and November-December-January in the English year, the northern hemisphere of the earth is tilted away from the sun. During this time, the length of the day in this region is short, and the sun shines on the planet obliquely. For this, the temperature in the surrounding areas including Bangladesh, remains relatively low, and it feels cold. We call this time winter. During this time, the air remains dry and the wind blows from the north to the south.

3. The Impact of Seasonal Changes on Daily Life

How do we deal with the effects of seasonal changes in daily life?

Activity: Observing people's lives in different seasons.

What to do:

Let us…

1. Notice the images showing people's lives in different seasons.
2. Discuss with nearby classmates what steps need to be taken in which season to live a healthy and safe life, and find the answers to the following questions.
    a) What kind of clothes do we wear in which season?
    b) What kind of food do we eat in which season?
    c) What do we do every day, depending on the season?
    d) What measures do we take in different seasons to protect our health?



3. Write down what we have learned from our discussion in the table below. We can also draw a table in the notebook.

Season	Dress	Food	Daily work	Health protection
Summer				
Rainy season				
Winter				

Summary

In our country, nature behaves differently in different seasons. It is very hot in summer, cold in winter, and it rains during the rainy (monsoon) season. Therefore, we need to change our lifestyle to adjust to the different changes in nature.

Let us learn more about lifestyle due to seasonal changes...

Bangladesh is a country of six seasons. Each season has different characteristics. To live a healthy life, we need to follow various ways to adjust to nature in each season. During the summer, the temperature in nature remains high, and we have to be careful because it feels very hot. Wearing thin cotton clothes during this time is good for health. Besides, during winter, the temperature falls and we feel cold. So, we have to wear thick or warm clothes or clothes made of wool.

During summer, we should drink plenty of water and eat juicy fruits along with our normal food. After coming home from the hot sun, drinking cold water is not good for health. In winter, drinking mildly warm water is good for health. In summer, we should go out less because of the intense heat and use an umbrella when we go outside. In the rainy season, heavy rainfall fills rivers, canals, and ponds with water. We should learn how to swim, but it is not safe to bathe alone. During the rainy season, we should carry an umbrella or a raincoat when going outside. At this time, the roads become slippery, so we must walk carefully.

During seasonal changes, childcare must be adjusted according to changes in temperature, humidity and rainfall. In summer, it is important for children to bathe regularly and maintain cleanliness. At this time, one has to be aware of good health. Skin care is specially important in winter. During the rainy season, washing hands regularly is essential to prevent the spread of infectious diseases. Mosquitoes increase in the rainy season. So we must protect ourselves from mosquito bites. In winter, children often suffer from cold-related diseases. Therefore, kids need special care during this time.

Exercises

1. Put a tick mark (√) on the correct answer.

a) Which is located at the center of the solar system?

☐ World ☐ Sun ☐ Moon ☐ Star

b) When it is midnight in Bangladesh, in which country is it day?

☐ India ☐ Pakistan ☐ UK ☐ United States

c) Which of the following occurs due to the diurnal motion of the earth?

☐ Day and night ☐ Seasonal change ☐ Full moon ☐ New moon

2. Mark the true sentences with T and the false sentences with F.

a) In January, the northern hemisphere of the earth remains farthest from the sun.	True	False
b) Autumn starts at the end of October.		
c) Autumn comes after summer.		
d) There are three types of motion of the earth.		

3. Answer the following questions in brief.

a) How many seasons are there in Bangladesh? What are they?

b) Write two sentences about the rainy season in Bangladesh.

5. Answer the following questions in detail.

a) Explain the reason for the occurrence of day and night.

b) What motion of the earth causes the seasons to change? Explain the reason.

c) How is safe living affected by seasonal changes?

Chapter 11

Climate Change

Climate is the average weather of a region over many years. Weather changes every day, but climate changes slowly over many years. The climate of the world is not the same as it was before and is changing day by day. This is called climate change. Due to this change, sometimes the weather becomes unusually hot, excessive rainfall occurs and at other times there is dryness. There are several elements of climate, such as sunlight, temperature, rain, wind, etc. When these elements change, the climate changes. There are both natural and human causes behind climate change. In this chapter, we will learn about the causes and effects of climate change and how to adapt to these changes.

1. Elements of Climate

We have learned about different elements of weather in class four. The elements of weather are also the elements of climate. The weather of a place depends on the climate of that place.

What are the elements of climate?

Activity: Identifying the elements of climate by observing nature.

What to do: Let us

1. Collect information about today's weather by observing nature. Let's write down the weather information in the table below.

Weather information	What did we see?
How is the sky? (Cloudy, sunny, rainy)	
Which way is the wind blowing to or from? (Direction of the wind flow)	
Is the wind blowing strongly? (Intensity of wind flow)	
Are you sweating or feeling dry? (Air humidity)	

Summary

Weather report is given by indicators like air temperature, air humidity, sky condition, wind direction, wind speed, and chance of rain in a place. These are basically the elements of weather. The average weather of a place over a long period, usually 25–30 years, is called the climate. So, the elements of weather are also the elements of climate.

Let us learn more about the elements of climate...

Air temperature, air humidity, wind direction, wind speed, and rainfall are the main components of climate. When we describe the climate of a place, we talk about the average values of these components over many years. Bangladesh is a country of six seasons. But due to climate change, it is now hard to notice the differences among them. Prediction about the weather is given analyzing the climate of a region.

Temperature







Due to the changes in time and seasons in a place, it sometimes feels hot and sometimes cold. We know how hot or cold the air of a place is by measuring its temperature. The temperature of a place is measured with a thermometer.

Wind direction





In Bangladesh and its neighboring countries, the wind blows from the south to the north and from the southwest to the northeast in the summer. In winter, the wind blows from the north to the south. When we describe the weather of a place, we mention the direction of the wind. Wind blows because of differences in temperature and air pressure in different regions.

Wind speed

Just as the wind blows to a direction in all regions, including Bangladesh, it also has speed. No matter which direction the wind blows to, sometimes it is strong and fast, and often it is slow and gentle.



Air humidity



The Bay of Bengal is located to the south of Bangladesh. When the wind blows over the sea, it brings water vapour from the sea towards the land. This air is called humid air. When describing the weather of a place, we show the amount of water vapour in the air as a percentage.

Rainfall

In summer, when the wind blows from the south to the north in Bangladesh, it brings a lot of water vapour from the Bay of Bengal. At the same time, water evaporates from rivers, canals, beels, and ponds, turning into vapour. This vapour rises, cools, and forms clouds. Later, the clouds turn into water droplets and fall as rain. The more water vapour in the air is, the more rainfall there will be.



2. Difference Between Weather and Climate

Weather is the condition of the sky and air at a certain place and in certain time. While climate is the average weather of a place over many years. So, weather and climate are not the same.

What is the difference between weather and climate?

Activity: Analyzing data to determine the difference between weather and climate.

What to do: Let us…

1. Monitor today's temperature, wind speed and sky conditions. If necessary, collect the information using weather apps. Take help from the teacher, if needed, and write it in the notebook.

2. Observe the list of average temperature, annual rainfall, and relative humidity of Bangladesh for the last 10 years. We can also collect the average of other components of weather for the last 10 years.

Year	Average temperature (Degree Celsius)	Average annual rainfall (mm)	Average relative humidity (%)
2015	25.70	2200	78
2016	25.72	2250	79
2017	25.73	2300	80
2018	25.75	2105	77
2019	25.77	2100	76
2020	25.78	2300	78
2021	25.70	2400	80
2022	25.74	2500	81
2023	25.76	2600	82
2024	25.77	2700	83

Source: World Bank and Space Research Organization

3. Based on the information provided, record the difference between weather and climate in the table below:

Weather	Climate

Let us learn more about the difference between weather and climate...

There is a close relationship between weather and climate. But they have certain differences. The weather is the short-term condition of the environment in a place. Weather conditions can change rapidly. On the other hand, climate is the average weather condition of a place over 25–30 years. Climate changes occur slowly. Weather is determined by measuring temperature, humidity, and rainfall at a given time. But climate is understood by studying weather data for many years.

3. Climate Change

Weather does not remain the same every day. Changes in weather are natural. But climate change means a significant permanent change in the elements of the weather. The climate of a place does not change suddenly; it changes slowly over time.

How does climate change take place?

Activity: Analyzing the annual average temperature of the earth and Bangladesh to understand climate change.

What to do: Let us…

1) Look at the table below. It shows the average annual temperature of the world for the last fifty years (five decades) and the average annual temperature of Bangladesh for each decade.

2) Observe the table and find out what changes in the average temperature of the world and Bangladesh has taken place. Has it increased or decreased? Write it in the column at the right side of the table.

Year (Decade)	Annual average temperature of the earth (degree celsius)	Annual average temperature of Bangladesh (degree celsius)	Noticeable change (decrease or increase)
1970 – 1979	14.0	25.55	
1980 – 1989	14.1	25.74	
1990 – 1999	14.3	25.87	
2000 – 2009	14.5	26.13	
2010 – 2019	14.8	26.32	

3) Discuss the information with nearby classmates. If needed, ask questions to the teacher to understand better.

Summary

The temperature of the earth is gradually increasing because of global and regional climate change. This rising trend is becoming permanent. If the climate keeps changing in this way, the earth may one day become unsuitable for living.

Let us learn more about climate change...

In the past, Bangladesh had six seasons with distinguishable features. There were scorching heat in the summer and regular rainfall in the rainy season. In the autumn, there were kans grass blossoms and fragrance of newlly harvested paddy in the late autumn. Dense fog could be found in the winter and beauty of flowers could be enjoyed in the spring. Now, because of climate change, it is hard to know when it will be hot or when it will rain. In the past, summer was tolerable, and winter was long. Today, it is difficult to bear the heat. In the past, rain in the months of Ashar–Shravan was regular and timely. Now, the onset and duration of the summer and the rainy season is irregular. Previously, farmers knew when to plant seeds. But in recent times, rain often comes too early or too late.

As a result of climate change, dengue fever, cold, sneezing, and diarrhoea are now common. Even a few decades ago, diseases were not so frequent. In the past, cyclones, floods, and river erosion used to occur occasionally. Currently, these disasters occur almost every year due to global climate change. When such a permanent change in the elements of weather of a particular region occurs, it is called climate change. Climate change depends on weather changes.

4. Factors of Climate Change

The climate is not the same everywhere in the world. Some places are hot, and some are cold. In some places, thereis a lot of rainfall, while in others, there is little rainfall. These differences in climate happen due to some geographical factors. These factors are called determinants of climate.

What are the factors of climate change?

Activity: Map observation

What to do:

Let us…

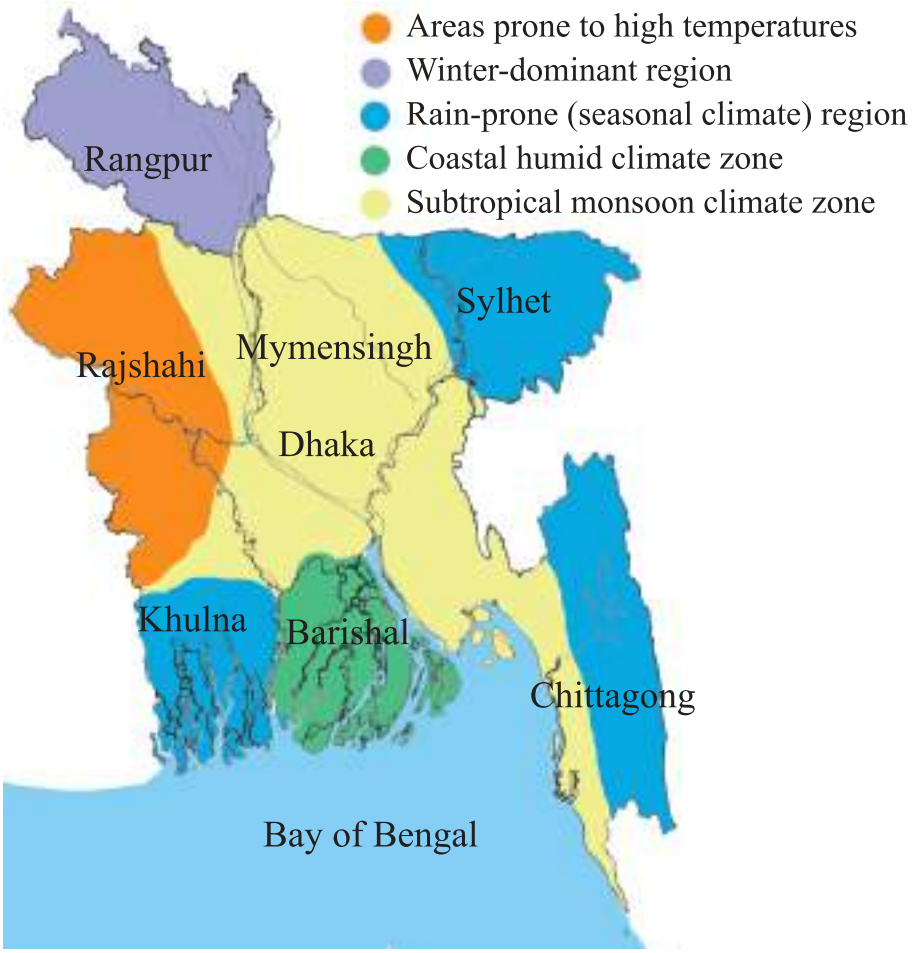
1. Think about the following questions observing at the regional climate-map of Bangladesh.

a. Why is winter felt more in the mountainous areas?

b. In which region is the heat felt more?

c. Why is there more rainfall in forests?

2. Discuss the questions with your classmates and write the answers in the notebook.



Summary

The climate of different regions is not the same. It can vary because of temperature, wind flow, height of land and other factors.

Let us learn more about some of the main factors of climate change...

Latitude: The Earth is round and its axis is tilted about 23.5 degrees. Because of latitude, different places get sunlight differently. Near the equator, sunlight falls straight, so these places are hot. Near the poles, sunlight falls slanting, so those places are cold. That is, the greater the distance from the equator, the lower the temperature of that place.

Altitude (height): The higher you go, the colder it gets. Generally, temperature drops by about 6 degrees Celsius for every 1000 meters of height. That is why, even if two places are at the same latitude, hilly areas are colder. For example, Dinajpur in Bangladesh and Shillong in India are on the same latitude. Dinajpur is on the plains, but Shillong is on the mountains, so Shillong is colder. So, due to the the difference in altitude, temperature varies.

Distance of a place from the sea: Places near the sea usually have mild weather. It is not too hot or too cold. This is because sea water heats up and cools down slowly, which affects the climate of nearby areas. For example, Cox's Bazar, Chattogram, and Patuakhali are near the sea, so their climate is gentler than Rajshahi. Therefore, the distance of a place from the sea affects its climate.

Direction of wind flow: The weather of a place depends on many factors. For example, if the wind brings more water vapour to an area, there is a lot of rain there. In the south of Bangladesh, during the monsoon season, winds blow from the southwest carrying water vapour from the Bay of Bengal, which causes heavy rainfall. But in winter, dry and cold air enters the interior of the country from the north, so there is no rainfall then, and it feels cold.

Ocean currents: If the ocean currents are warm or cold, their influence affects the winds in the coastal areas. For example, in the southern coastal areas of Bangladesh (Chattogram, Cox's Bazar, Teknaf, Patuakhali, Barguna, Barisal), temperature and humidity increase in summer due to the warm currents of the Bay of Bengal.

Location of mountains: Where there are mountains or hills, the movement of air is obstructed. As a result, there may be more rainfall in that area. For example, there is a lot of rain around the Himalayas. Thus, the location of mountains affects the climate.

Land slope: The climate of an area also depends on the slope of the land. If the land slope is such that the sunlight falls directly on it, the temperature will be higher there. Land slope is an important determinant of climate.

Nature of soil: Sandy soil (loam soil) heats up or cools down quickly. But alluvial soil heats up or cools down slowly. Different types of soil have different heat retention capacities. Therefore, the nature of the soil also affects the climate.

Forests: Where forests are abundant, temperatures are controlled, rainfall is high, and storms are less frequent. That is why, forests are also an important factor in regulating the climate.

5. Causes of Climate Change

The temperature of the earth is increasing day by day because of different natural factors and human activities. Global warming means the increase in the average temperature of the earth.

What are the causes of climate change?

Activity: Finding out about the greenhouse effect, one of the causes of climate change, by doing an experiment.

What is needed: The materials required for the experiment are: a few equal-sized ice cubes, two small plates (or tea-cup plates), one glass, and sunlight.

What to do: Let us…

Put some ice cubes of the same size on both plates. Cover the ice on one plate with the glass. Then put both plates under the sun. Watch which plate's ice melts faster. Write down the reason for the faster melting in the space below.



Summary

We must have seen that the ice on the plate covered with glass melted earlier. This is because the heat of the sun easily enters through the glass. But the heat inside the glass cannot escape. It gets trapped by the glass walls. As a result, the heat inside the glass is higher than outside. Therefore, the ice melts faster due to the higher heat.

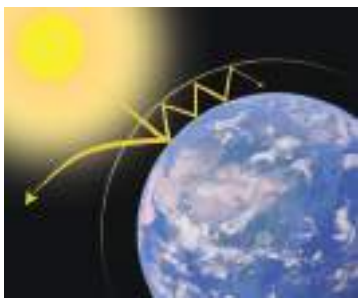
Let us learn more about the causes of climate change...

Climate change occurs due to some natural causes, such as volcanic eruptions, changes in the Earth's rotation, water currents, and cyclones. Climate change also occurs due to some man-made causes, such as the use of fossil fuels, cutting down mountains, deforestation and carbon emissions.

The main cause of climate change is the increase in the amount of greenhouse gases in the atmosphere. These gases are increasing day by day due to various human activities. In cold countries, agricultural work is done inside glasshouses. This house is called a greenhouse because green plants are grown by trapping heat inside it. The temperature inside the greenhouse is higher than outside.



Greenhouse



Greenhouse Effect

When sunlight and heat reach the earth, the earth's atmosphere acts like a greenhouse. There are various gases in the atmosphere. Some of these are greenhouse gases, for example, water vapour, carbon dioxide, and nitrogen oxides. These gases in the atmosphere act like the walls of a greenhouse. The heat from the sun warms the earth's surface. But because of the presence of greenhouse gases in the atmosphere, this heat cannot escape. It gets trapped around the earth as it happens in a greenhouse. As a result, the temperature of the earth increases. This is called the greenhouse effect.

We cut down a large number of trees from forests for our needs, and sometimes unnecessarily. These trees absorb the harmful greenhouse gas carbon dioxide from the atmosphere. As a result, the environment stays cool. When the number of trees decreases, carbon dioxide in the atmosphere increases. So, the temperature of the earth increases.

6. Natural Disasters Caused by Climate Change on the Environment

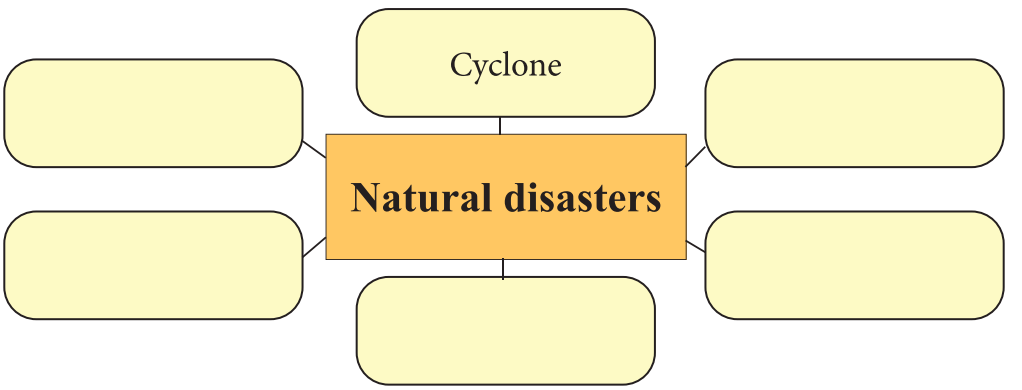
What natural disasters occur due to the impact of climate change?

Activity: Making a list of natural disasters in our own environment.

What to do:

Let us…

1. Make a list of the natural disasters that occur in our country and write them in the concept diagram below. For example, cyclone is a natural disaster.



Let us learn more about natural disasters caused by climate change in the environment....

According to the climate of Bangladesh, different natural disasters occur at different times of the year. For example, in the months of Baishakh–Jayishtha, the temperature of the atmosphere increases and it remains high then. Storms come from the southwest of the country, which are known as Kalbaishakhi. During this time, it rains heavily with thunder and lightning. Again, the months of Ashar–Shravan are the rainy season, during which there is heavy rainfall.

Winter begins in the month of Paush. Like Bangladesh, other countries of the world also experience different natural disasters at different times of the year according to the climate of that region. However, due to different climates, the timing of natural disasters also varies. In the past few years, the number of cyclones, floods, droughts, heat waves, sea level rise, forestfires, tornadoes, and other natural disasters has increased.

Natural disasters caused by climate change in Bangladesh and their impact

Bangladesh is a coastal country. Natural disasters occuring here due to climate change are directly affecting our people. As a result, normal life is being disrupted. Many people are losing their jobs. Agriculture is facing huge losses.

Severe heat-wave and drought



We must have noticed that the temperature in our country is gradually increasing every year. An excessive increase in temperature is called a heat-wave. Due to heat wave, crop production decreases. Even the crops produced are destroyed. During this time, rainfall decreases. Due to extreme heat, soil dries out, hardens, and cracks. We call this drought.

Cold wave

In the months of Paush–Magh, cold winds blow from the north of our country. Due to these winds, sometimes the temperature drops abnormally. Then we feel severe cold. Severe cold affects our daily affairs. However, severe cold is rare in Bangladesh.

Kalbaisakhi storm



During the intense heat of summer, the land becomes hotter than the sea. In summer, the air over the land becomes lighter and rises. The air from the sea flows towards the land. Due to the high temperature difference between the water and the land, the speed of the wind increases and thunderstorms occur. This thunderstorm is known as Kalbaisakhi in our country. Kalbaisakhi

storms are confined to an area of approximately 20 kilometers. There is also a high probability of hail during this storm.



Tornado

A tornado is a powerful, rotating column of wind. This rotating wind flows from the ground to the clouds within a very small area. Sometimes a tornado is confined to a single village, and the village can be destroyed by it.

Cyclone

In extreme heat, the air above the ocean becomes lighter and rises. This creates low pressure over the ocean. The low pressure turns into a world wind, which is known as a cyclone (cyclones in Bangladesh occur due to low pressure created in the Bay of Bengal). The affected area of a cyclone at sea is about 500 to 800 kilometers.



Increase in water salinity in coastal areas

In extreme heat, the ice in the Himalayas melts and flows into the sea through rivers. The water in the polar regions of the world remains frozen. As the world's temperature rises, this ice melts and the sea level rises. As a result, salty water enters into the coastal areas (Khulna, Satkhira, Bagerhat, Barguna). There is a possibility that the low-lying coastal areas of Bangladesh will be submerged due to the rise in sea level. As a result, many people may lose their shelters.

Floods



The flow of water in the rivers of Bangladesh has decreased. This has caused accumulation of silt on river bed and has reduced the capacity of the river to retain water. This region, including Bangladesh, receives heavy

rainfall during the months of Ashar–Shravan–Bhadra. At the same time, because of high temperatures, the snow in the Himalayan mountain melts and flows into the rivers. As the capacity of the rivers decreases, the melted water from Himalay and excess rainwater enter the low-lying areas. As a result, houses, schools, markets, and other places in these areas are submerged in water. This is called flooding.

Impact of climate change on human life

Just as climate change is causing natural disasters, it is also having physical, mental, social, and economic effects on human life.

What are the effects of climate change on human life?

Activity: Identifying the impacts of climate change on human life.

What to do:

Let us…

1. Look at the pictures below and think about the effects of climate change, then write them in the notebook.

2. Discuss with classmates, and if we get new information, let us also write it down in the notebook.







Summary

Climate change has an adverse impact on the environment around us. Along with reducing agricultural production, it disrupts human life in many ways, including. We also suffer from various diseases.

Let us learn more about the impact of climate change on human lives...

Climate change has the following main impacts on human life:

- Excessive heat or cold harms public health (e.g., heatstroke, respiratory problems).
- Allergies, asthma, and skin diseases are increasing due to pollution.
- Mosquito-borne diseases (e.g., dengue, malaria) are on the rise.
- Drought or excessive rainfall disrupts crop production. If agricultural land is destroyed, food shortages can occur.
- Natural disasters kill many people and damage homes, roads, and infrastructure. The cost of repairs or disaster prevention increases, which raises the cost of living for ordinary people. Houses are submerged in floodwaters, and people are left homeless.
- As sea levels rise, coastal people lose their homes. People move from one place to another in search of safety; they are called climate refugees.
- Frequent disasters, losses, and uncertain futures create mental stress among people.
- Job opportunities in agriculture, fisheries, tourism, and labor-intensive sectors decrease. The standard of living goes down.

Adaptation strategies to adverse conditions caused by climate change

As a result of climate change, people around the world are facing many adverse conditions, including cyclones and floods.

Adaptation strategies play an important role in coping with these situations.

? What adaptation strategies can be adopted in the face of adverse conditions caused by climate change?



Activity: Selecting adaptation strategies to adverse conditions caused by climate change.



What to do:

Let us…

1. Observe the following pictures carefully.

2. Think about the adaptation strategies shown in the pictures for the adverse

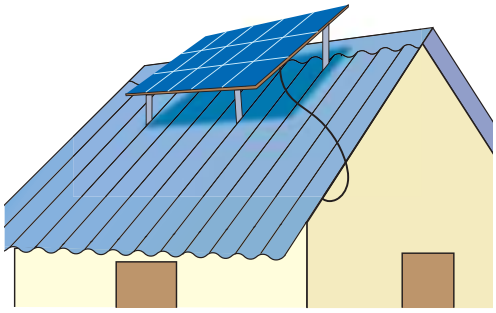
situations caused by climate change, discuss them with nearby classmates, and write them in a notebook.

3. Think of and write down more strategies in addition to the adaptation strategies shown in the pictures.









Summary

People adopt various adaptation strategies to cope with the adverse environment caused by climate change.

Let us learn more about adaptation strategies to adverse conditions caused by climate change...

Bangladesh is one of the countries most affected by climate change in the world. Two steps are essential to address this damage:

A. Reducing the rate of climate change
B. Adapting to climate change

A. Reducing the rate of climate change: Climate change can be reduced by lowering the amount of carbon dioxide in the air. To reduce the rate of climate change, the government, the public, and various social organizations of the

country need to take different programs. For example:

- Make everyone aware of the causes of climate change and its harmful effects.
- Create forests in coastal areas.
- Plant trees around homes and schools.
- Reduce the use of fossil fuels (petrol, diesel, natural gas, etc.).
- Increase the use of renewable energy (solar power, hydropower, wind power).

B. Adaptation to climate change: Bangladesh is one of the countries whose people and resources are being affected by climate change. Therefore, we must give importance to adapting to the climate change that has already occurred. At the same time, we must be prepared to deal with climate change in the coming days. The preparations that must be made to adapt to climate change are:

- To stay safe from floodwaters, houses should be built on high ground or with a loft.
- During floods, crops should be cultivated on floating platforms.
- We need to cultivate tolerant crops that can survive in low water or excessive heat, such as drought-tolerant rice.
- Rainwater should be stored during the rainy season for use during droughts.
- More and more trees need to be planted.
- Dams should be built on the sea coast, etc.

Exercises

1. Fill in the blanks.

a) ..... is located in the southern part of Bangladesh.

b) Crop production ..... due to severe heat wave.

c) Air humidity is a ..... factor in climate.

d) The higher the altitude, the ..... the temperature.

2. Choose the correct/incorrect statement.

	Correct	Incorrect
a) Monsoon winds blow in winter.		
b) After making landfall, the cyclone gradually weakens.		
c) Drought is more common in the southern part of Bangladesh.		
d) We can know about the weather by observing the sky.		

3. Answer the following questions in brief.

a) Write the names of the elements of climate.

b) Write three differences between weather and climate.

c) Why does Kalbaisakhi storm occur?

d) Write five causes of climate change.

4. Answer the following questions in detail.

a) Discuss the factors of climate change.

b) Explain the greenhouse effect in relation to climate change.

c) What are the natural disasters caused by climate change?

d) What measures should be taken to address the problems caused by climate change?

Chapter 12

Technology in Our Lives

Technology is used in every field of our daily life. Nowadays, there is hardly any sphere of life in Bangladesh where the touch of technology has not reached. In this chapter, we will learn how technology is gradually developing.

1. The Development of Evolving Technology

In ancient times, people used to travel from one place to another on foot or by riding horses. Since the invention of the wheel, revolutionary changes gradually took place in transportation — for example, we can see the use of bullock carts, pushcarts, rickshaws, buses, trains, metro rail, etc. on land routes. Moreover, some of the most fascinating inventions of the modern era are driverless cars and flying cars. In this way, the progressive development of technology continues in communication, education, healthcare, agriculture, sports and entertainment.

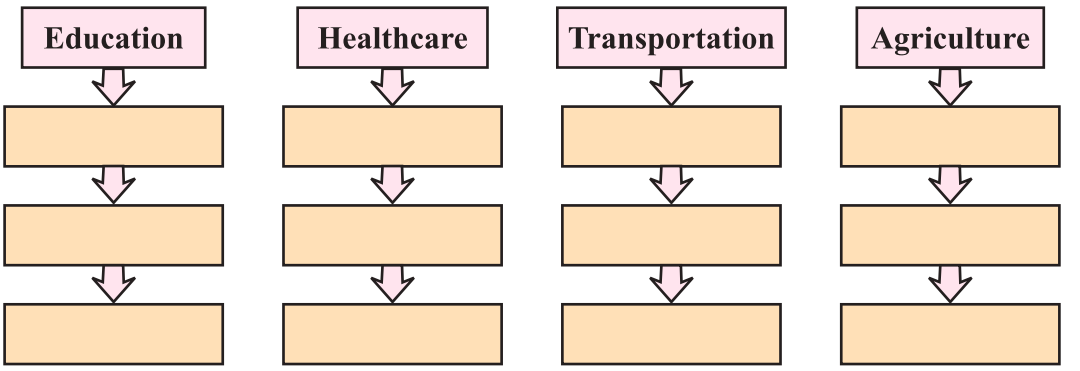
? How can we identify the evolution of technology used in daily life?

Activity: Making a list of evolving technologies used in different areas of life.

What to do:

Let us …

1. Draw a table in our notebook as shown below.



2. Make a list of the evolution of technology according to each field. Start with the oldest technology and end with the newest.

Summary

We have learned about the evolution of various technologies in communication, education, agriculture and healthcare. We are using these technologies in many ways. We can live comfortable and pleasant lives by means of welfare of technology. In fact, technology has brought significant changes to our quality of life.

Let us learn more about evolving technology...

Evolution of technology in communication

The fastest development of technology has taken place in communication. Once, people communicated through pigeons, horse messengers, letters, telegraphs, faxes and telephones. Now, various modern technologies– such as mobile phones, email, and social media (Facebook, Messenger, Instagram, Imo, WhatsApp, etc.) are used for communication.






Evolution of technology in education

From the invention of pens, paper and the printing press, technology in education has been evolving every day. Examples include whiteboards, cameras, computers, the internet, multimedia projectors, robotics and smart boards. With technological progress, it is now possible to gain desired knowledge online while staying at home, without attending educational institutions in person.





Evolution of technology in healthcare

From thermometers and stethoscopes to X-rays, Ultrasonography, ECG, MRI and CT scans, technology has long been used in healthcare. Delicate and precise surgeries are now performed by robots in association with development of

technology. In developed countries, virtual reality is being used to provide advanced training to doctors. Drones are quickly delivering essential medical supplies, such as blood, medicines, injections, vaccines, and test samples to hospitals. In short, technological development has enriched our healthcare services.





Evolution of technology in agriculture

Agricultural tools have evolved from cultivating with a plough, harvesting crops with a sickle, tilling the land with a tractor, watering fields with irrigation pumps, and separating grains with pedal threshers. Technology has significantly developed in every stage of farming– from production to collection and preservation. Robots are now used for planting seedlings and harvesting crops. Drones help analyze soil, spray fertilizers and pesticides, and design crop planting layouts. Artificial intelligence provides accurate information and solutions about rooftop gardens, crop diseases and pests. Biotechnology makes it possible to create plants with special traits, helping people grow nutrient-rich, pest-resistant and high-yielding crops.





Evolution of technology in entertainment

Once, the radio was the only medium for broadcasting sports and entertainment. After the invention of television, we have gained the opportunity to enjoy games and shows. We can now watch distant games and programs live through television, computers, and mobile phones by satellite technology. It is mainly due to the evolution of technology that we enjoy these benefits.





2. Safe Use of Various Technologies

In our daily life, we cannot do anything without using technology. It is very important for us to know how to use different technologies safely.

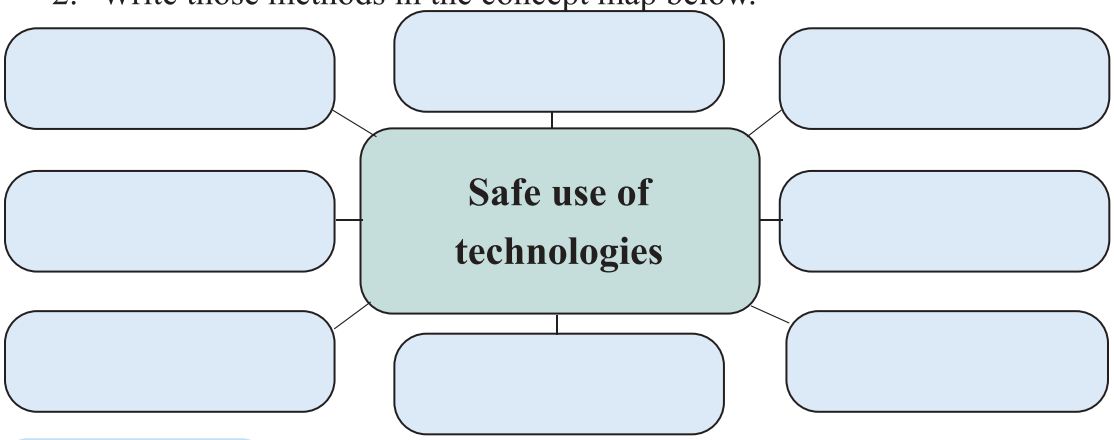
How can we safely use various technologies?

Activity: Ways to use evolving technologies safely.

What to do:

Let us…

1. Think about the safe ways to use the technologies we use every day.
2. Write those methods in the concept map below.



Summary

Although the use of technology makes our lives easier, reckless use can cause accidents. Therefore, technologies must be used safely.

Let us learn more about the safe use of technology…

Technology has made our lifestyle easier. We need to know how to use this technology safely. Before using any technology, we must carefully read the instructions provided by the manufacturer.

Robots

A robot is a machine or device that can work automatically. Robots are used for the tasks that are generally difficult, time-consuming, or require a lot of labor. Robots are used in teaching students, decorating homes, in the military, healthcare, agriculture, factories, offices, culture, and for creating pleasant environments.

Safe use of robots:

- To use the robot only for the purpose it was designed.
- The operator must receive proper training.
- Regular maintenance of robots should be done so that they remain functional and safe.

Artificial intelligence (AI)

Why do the same kinds of cartoons or videos that we watch frequently on mobile phones or computers appear in front of us again when we turn on those devices later? Think about it.

This happens because of Artificial Intelligence (AI). At present, the ultimate stage of technological evolution is Artificial Intelligence. Using AI technology, various tasks — such as in agriculture, education, healthcare and entertainment can easily be performed.

Safe use of artificial intelligence (AI)

- Accurate and true information must be used in AI systems.
- Without permission no personal information should be used in AI systems.
- Users of AI must receive proper training on how to use it safely.

Virtual reality (VR)

Virtual Reality refers to a science-based imagination that creates the sense of reality without being truly real. Through VR, different complex areas of education, healthcare, communication, training and entertainment can be presented in a real life three-dimensional way.

Safe use of virtual reality:



- Before using a VR device, learn its instructions and safety warnings.
- Avoid content that causes mental stress; take breaks if necessary.
- If you experience motion sickness such as headaches or eye strain, take a 30–60 minutes break.
- Wear special contact lenses or 3D glasses when necessary.
- Be cautious while allowing children to use VR.

Automation

We see in real life or in videos that when a school water tank fills, the motor turns off automatically, and when the water runs out, the motor turns on again. Similarly, food or medicine can be produced without direct human touch. This process of working automatically is called automation. In modern times, automation is used in production across all industries.

Safe use of automation:

- To check regularly if the system is functioning properly.
- Users must be trained and remain alert while using automation.

Drones

A drone is a type of flying robot that can be controlled remotely by humans. The main purpose of creating drones is to make dangerous tasks easier for people.

Safe use of drones:

- To learn the safety rules and restrictions for operating drones.
- To keep the drone under constant observation while flying it.
- Not to operate another drone nearby while one is in use.
- Drone operators must receive proper training.

Each computer or network has its own security system. It is important to know how to use them safely so that no one can break through that security barrier.

3. Introduction to Computers

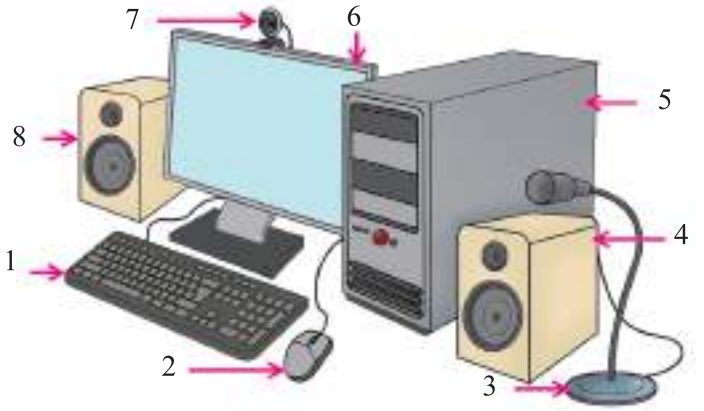
Computer is an important invention in the age of information technology. Now a days, many essential tasks can be done easily with a computer.

What are the different parts of a computer?

Activity: Identification of different computer parts.

What to do: Let us…

1. Observe the picture carefully.
2. Write the names of the computer parts in a notebook according to the serial numbers indicated in the picture.
3. Compare the list with the one made by the classmate sitting next to you.



4. With the teacher's help, observe the different parts of a real computer or laptop.
5. Match the parts of the real computer or laptop with the items on your list.

Learn more about the different parts of a computer…

A computer is an electronic device that can solve various mathematical and logical problems very quickly and accurately. To operate a computer, both hardware and software are needed.

Hardware

All the components of a computer that can be seen or touched are called hardware. Examples: CPU, monitor, keyboard, mouse, printer, scanner, speakers, etc.

Software

Software is a type of program or set of instructions that helps a computer perform specific tasks. Software is of two types: system software and application software. We will learn more about them in the next year in class six.

A computer has several important parts. Without these, it cannot function. The four main parts of a computer are:

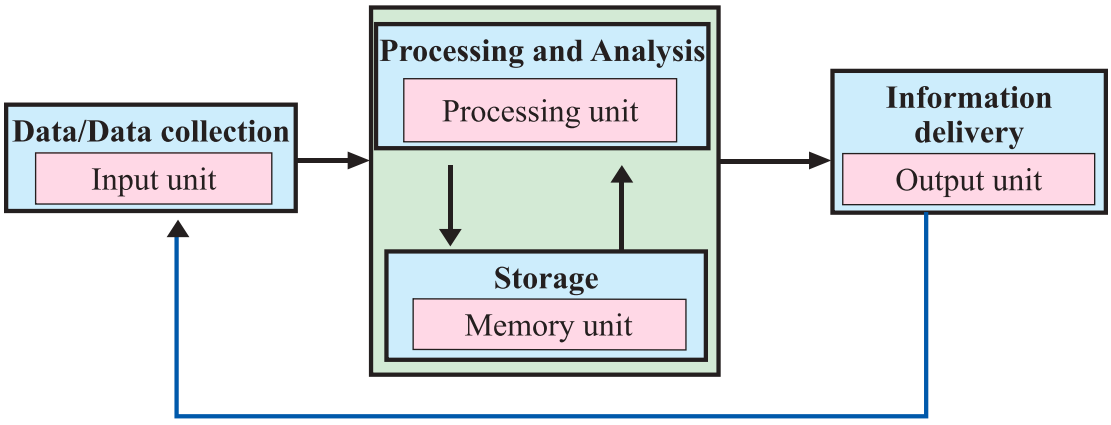
a. Input unit
b. Processing unit
c. Memory or Storage unit
d. Output unit

4. Functions of the Different Parts of a Computer

No part of a computer can work alone or individually. A computer works through the coordination of its different parts.

What are the functions of the different parts of a computer?

Activity: Exploring the functions of the different computer parts



Computer organsation

What to do:

Let us...

1. Draw a table in the notebook similar to the one shown below.
2. With the help of our teacher, complete the work according to the instructions on the left side of the table. While doing the task, write in the table which part performs which functions. While completing the work, look at the picture of the computer organization above and think carefully before writing.

Activity	Name of the computer part (Unit)
a. Type "3 + 2" into the computer	
b. Where is the sum (5) calculated?	
c. Where is the number 5 stored?	
d. Where do we see the result 5?	

3. Discuss and compare the names of the parts we wrote in the right-hand column with nearby classmate.

Summary

The functions of the different parts of a computer are not the same. First, data is entered into the computer through the input unit. Then the data is processed

and stored in the memory unit through the processing unit. Finally, the result is provided through the output unit. In this way, the computer works using its different parts.

Let us learn more about the functions of the different parts of a computer...

a. Input Unit

The devices we use to enter data into a computer are called the input unit. Examples: Keyboard, mouse, scanner, digital camera, microphone, webcam.

Keyboard: Used to type or write anything.	
Mouse: Used to click on items and to scroll up or down.	
Scanner: Used to convert a document into a soft copy and send it to someone.	
Microphone: Used for voice input.	
Webcam: Used to take pictures, record videos, and talk to others through video calls.	

b. Processing unit

The full name of the processing unit is Central Processing Unit (CPU). When we give various instructions while using the computer, CPU processes them and shows the result on the display or monitor.

c. Memory or storage unit

After processing, this unit helps store the information. It can store data temporarily or permanently. Just as we store information in our brains and use it when needed, a computer stores information in its memory unit and uses it when required.

The memory or storage unit is of two types:

RAM (Random Access Memory): Temporary memory.	
ROM (Read-Only Memory): Permanent memory where stored data cannot be deleted or changed.	

d. Output Unit

The output unit includes devices through which we can see, read, or listen to the results obtained after data processing.

Examples: Monitor, projector, printer, speakers, headphones.

Printer: Used to print information or images on paper or documents.	
Speakers: Used for listening to sounds.	
Monitor: Used to view information, pictures and videos.	
Headphones: Used to listen to sounds and speak when needed.	

Exercises

1. Put a tick mark (√) on the correct answer:

a) Which device is used to deliver injections or vaccines to hospitals quickly?

☐ Robot ☐ Drone ☐ Ambulance ☐ Motorcycle

b) Why should we use Artificial Intelligence (AI) in agriculture?

☐ To identify crop diseases and get accurate information

☐ To apply fertilizer to the field

☐ To harvest crops ☐ To plant seeds

c) Liban's father has gone to Saudi Arabia. Liban wants to see and talk to his father. Which medium should Liban choose in this situation?

☐ Telephone ☐ Email ☐ Fax ☐ WhatsApp

2. Fill in the blanks:

a) …….. is used to create plants with special traits.

b) A computer is an…….device.

c) At one time, the medium for broadcasting sports and entertainment was…….

d) A robot operator must receive proper…...

3. Answer the following questions in brief:

a) Write the names of technologies used in education.

b) How can AI (Artificial Intelligence) be used safely?

c) How does the evolution of technology make our lifestyle easier?

d) If images are not visible on the computer, how will you understand which part is not working?

4. Answer the following questions in detail:

a) Describe the functions of the main parts of a computer.

b) What precautions should be taken while using Virtual Reality?

c) Write about the functions of the devices used in the input unit.

Chapter 13

Using Information and Communication Technology for Problem-Solving

In the chapter 'Technology in Our Lives', we have learnt about the continuous development of technology and its safe use. In this chapter, we will learn how to solve problems using the knowledge of technology that we have gained. At the same time, we will find strategies for the safe use of information and communication technology.

1. Use of Technology in Various Daily Activities

We do many activities every day- calculating, writing, drawing pictures, searching for information, sending messages, etc. With the help of technology, these activities can be done more easily, quickly, and efficiently. In particular, computers and mobile phones have now become essential helpers in our lives.

In what activities do we use technology in daily life?

We constantly use technology in some way or another. Thanks to technology, for making our life easy and comfortable.

Activity: Using technology for different activities

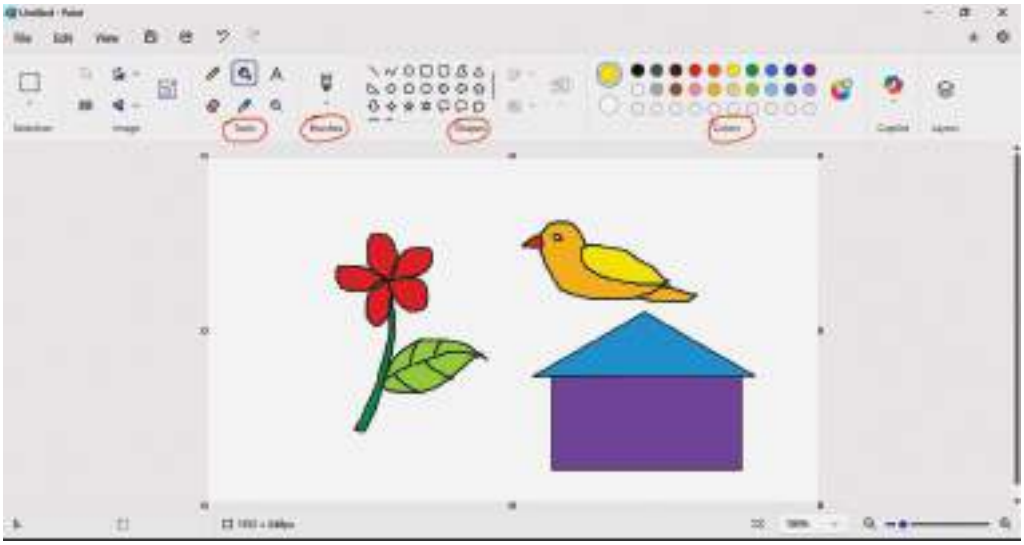
a. Drawing a picture

Things we need: **Paint** program on a computer

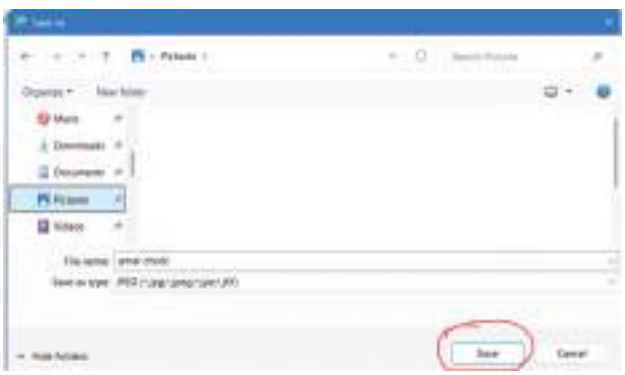
What to do:

Let us...

1. Open the Paint program on the computer.
2. Use Tools, Brush, Shapes, and Colors in the Paint program to draw flags, flowers, birds, etc., as our wish.
3. Click on the **File** menu at the top-left corner of the Paint window, then go to the **Save As** sub-menu.



4. Select any file type from the right side of the submenu, for example: PNG, JPEG.
5. Give the file a name, for example: my picture.
6. Choose where we want to save the file and click the Save button.
7. Print the drawn picture or present it in class using a projector.



b. Collecting information from the internet

Things we need: A computer or mobile phone with an internet connection

What to do: Let us...

1. Open the browser (Google Chrome, Firefox, or Microsoft Edge) on a computer or a mobile phone.
2. In the browser's address bar, type **www.google.com** or the address of any other search engine and press **Enter** to go to the search engine.
3. In the search box of the search engine, type what we want to know, for example– flowers, fruits, birds of Bangladesh, etc., and click the **Search** button or press **Enter**.



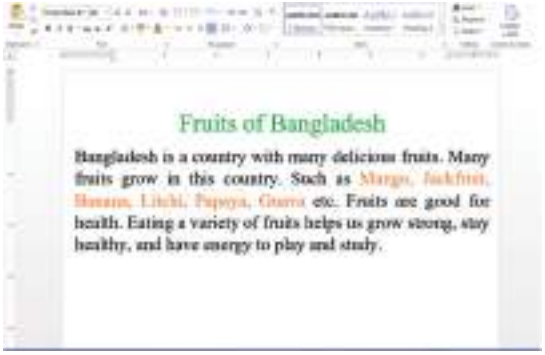
4. Click on a few website links and read the necessary information from those websites.
5. Write the collected necessary information in a notebook.

c. Writing using the Word program

Things we need: The Word program on the computer

What to do: Let us...

1. Open the Word program on the computer.
2. Select a **Blank Document**.
3. Write a paragraph on any topic on the blank page of the Word window.
4. Change the font size, style, and color as our wish.
5. Click the **File** menu at the top-left corner of the Word window and then click on **Save As**.
6. Select where we want to save the file.
7. Give the file a name, e.g., Fruits of Bangladesh, and choose the file type, for example– Word Document.





8. Click the **Save** button.

Summary

We use various technologies to make our daily lives easier. By using technology, we can receive services more quickly and conveniently.

Let us learn more about the use of technology…





We have already learned about various uses of technology. There are even more technologies we can use in our daily life. Closed-circuit television (CCTV) cameras are used for monitoring offices, schools, shops, homes and streets. They help detect thieves or criminals and assist in criminal investigations. Drones are used in weddings, events, film shootings, rescue missions in remote areas, border surveillance and forest protection. Satellites are used for weather forecasting, communication via TV and mobile phones, and national security surveillance. Microwaves are used for heating food, making cakes and biscuits, and conducting research work in laboratories. In this way, we can use many technologies to receive services easily with in a short time.

Nowadays, mobile phones and computers are used for many important purposes, such as knowing agricultural product prices, buying and selling online, business transactions, daily sales in shopping malls and in medicine shops. Mobile phones and computers are also used for creating unique IDs for students, managing stipends, storing student information, sending messages to parents, and providing emergency lessons in schools. We use apps to measure distances, locate places, and find out how long it will take to reach a destination. Today, almost all kinds of activities are done with computers and mobile phones such as- paying bills online, buying tickets, consulting specialist doctors, watching movies and dramas, reading newspapers, using social media, playing games, browsing the internet, using ChatGPT.

2. Problem Solving with Logical Instructions Using Scratch Program

Problem Solving with Logical Instructions

In class four, we learned about the different components of the Scratch and their functions. We also got a basic idea of how to create programs using block code. Now we will learn how to solve mathematical problems using Scratch program.

How to solve a problem by following instructions or code?

Before doing any activity, we plan it. To do the activity correctly according to the plan, we follow some rules or instructions step-by-step. Let us play the following game by following step-by-step instructions.

Activity: Calculating and guessing the Number

What to do: Let us…

1. Stand in a circle in a group of 6–8 members as shown in the picture.



2. Choose a number at the beginning of the game (for example, 24).
3. Allow each team member to roll the three dices provided at a time.
4. Using the numbers that appear on the dices, calculate using any of the four operations (+, −, ×, ÷) as needed.
5. Every team member calculates but does not say the answer aloud. Let the student who rolled the dices have time to calculate and announce the answer.

6. After rolling the dices, whoever's result matches the chosen number will be the winner and proceed to the next round. Those who's result do not match will be out of the game.
7. If there are multiple winners in the first round, choose another number and continue the game. Finally, there will be one winner.



This game is very enjoyable. Through this game, we can develop skills in addition, subtraction, multiplication, and division.

It is fun to do mental math without using a pen and a notebook.



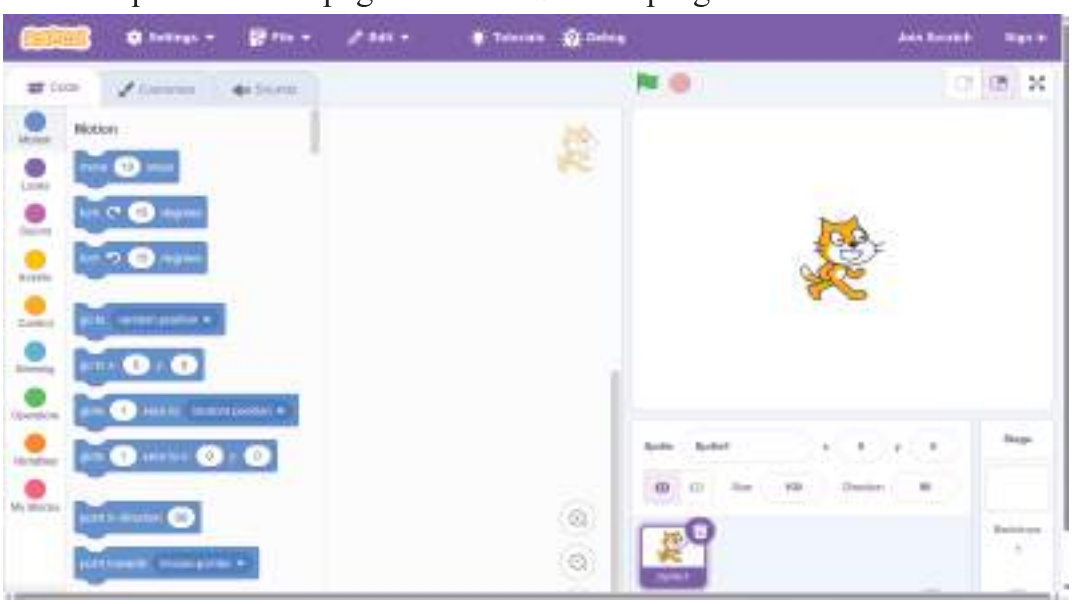
Think about the topic below:

8. What factors did you have to consider to win the game? Let us calculate and guess the Number.
9. What did we learn from this game?

Activity: Finding the larger number using the Scratch program

What to do: Let us...

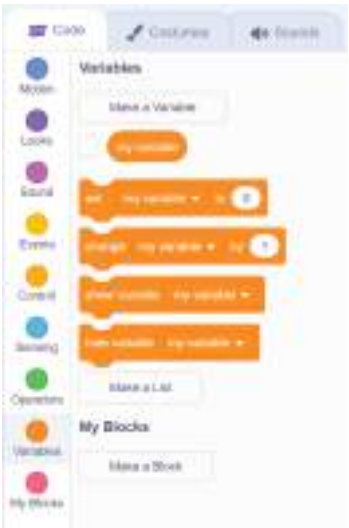
1. Open the web browser (For example, Google Chrome) on a computer with an internet connection. Type **scratch.mit.edu** in the search bar and go to the Scratch website. Scroll down and select the language. Then, click **"Create"** at the top of the homepage to launch Scratch program.

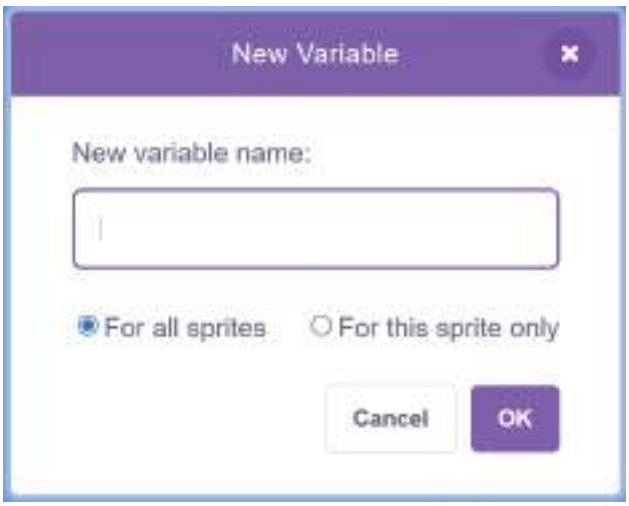


2. After that, clicking **Events** in the code area, drag the 

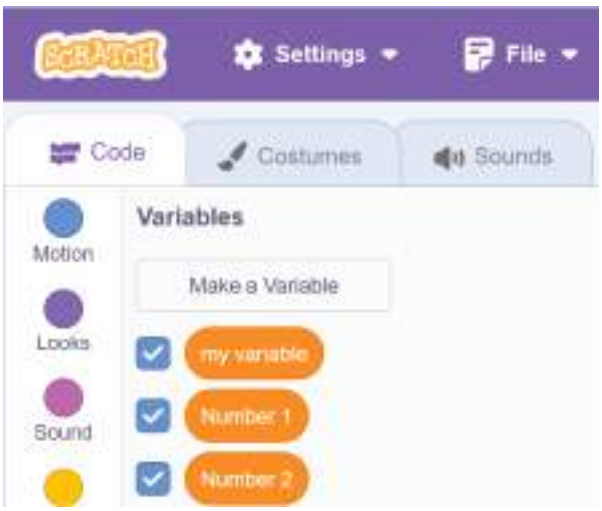
block code to the script area.

3. Now click on **Variables** in the code area, again click on **Make a Variable.** A new window will appear. Type "Number 1," and click **OK** to create a variable named "Number 1."





4. Similarly, create another variable named "Number 2."



5. From the **Looks** in the code area, bring the block 

into the script area and attach it

the block 

.

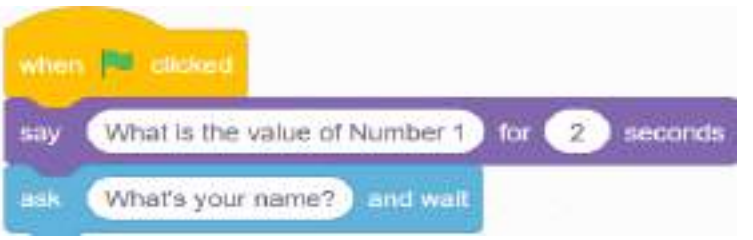
6. Now replace the word "Hello!" by the sentence "What is the value of Number 1?"



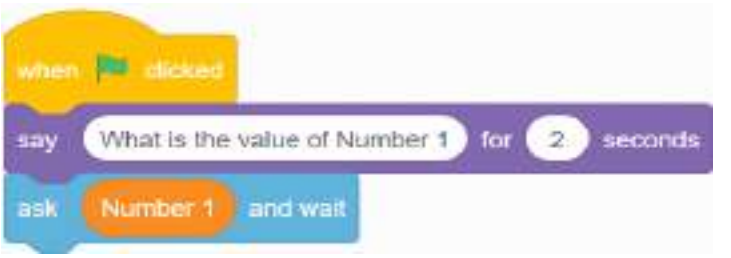
7. From the **Sensing** of code area, bring the block



in the script area, and attach it below the previous blocks.

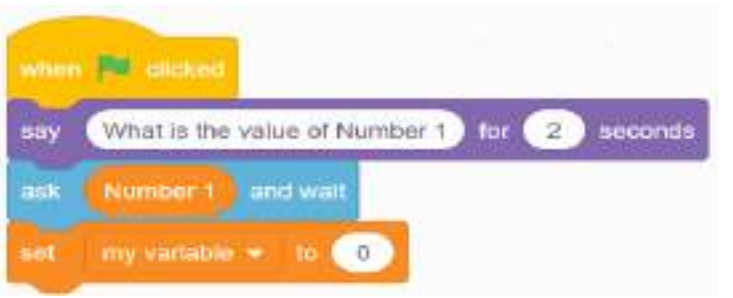


8. Then dragging number 1 from the variables of code area , put it on "What's your name?"

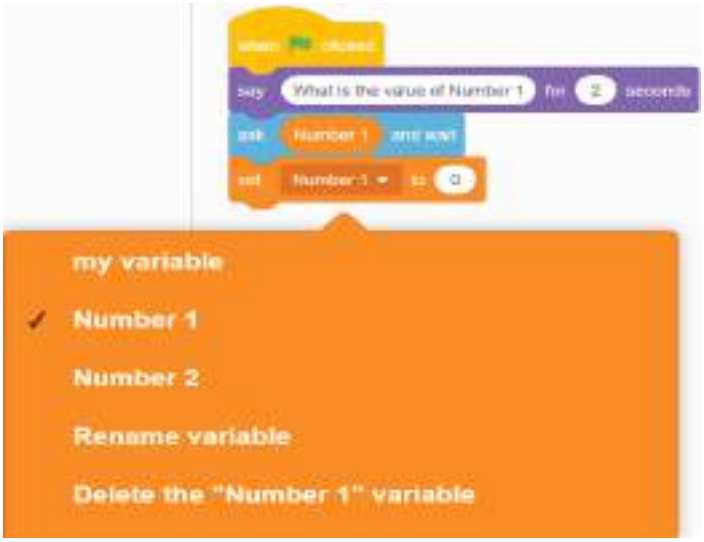


9. From the **Variables**, drag the block 

and attach it under the previous blocks in the script area.

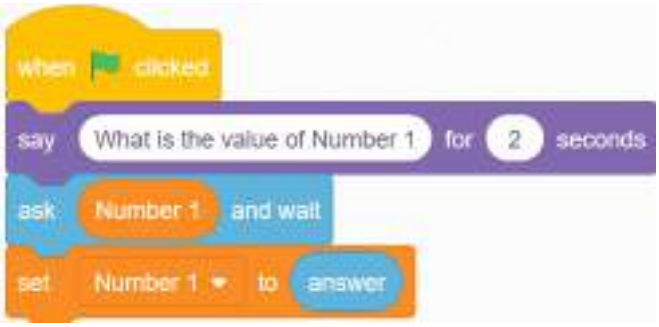


10. Clicking on **my variable** in the script area select number 1.

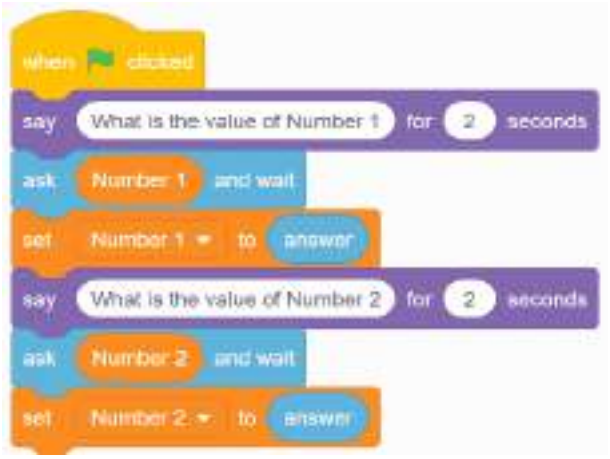


11. Drag the 

block from **Sensing** and put it on **0**.



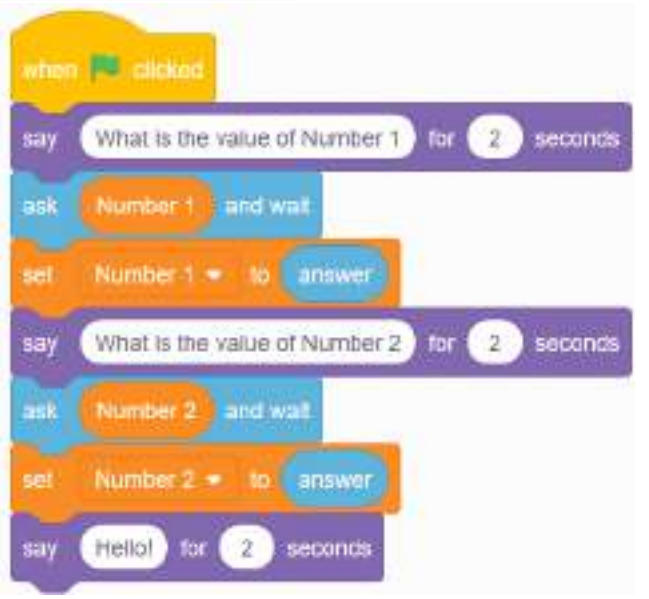
12. Repeat steps 5 to 11 to create the variable for "Number 2."



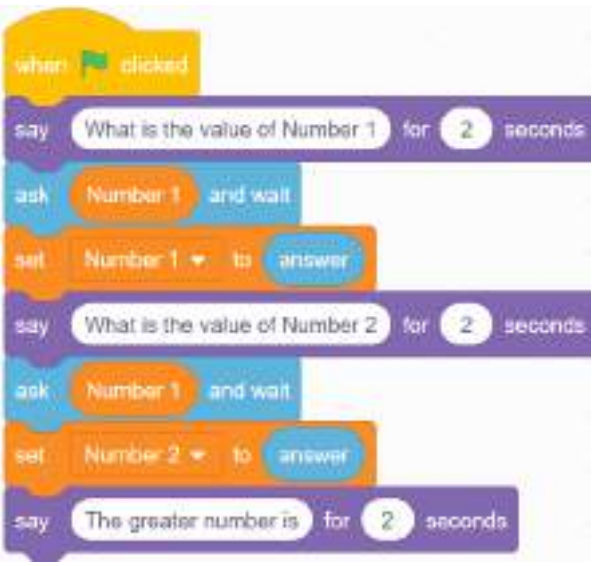
13. From the **Looks** of code area, bring the block

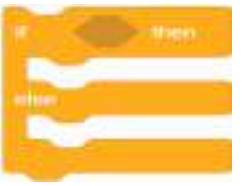


and attach it below the previous blocks .

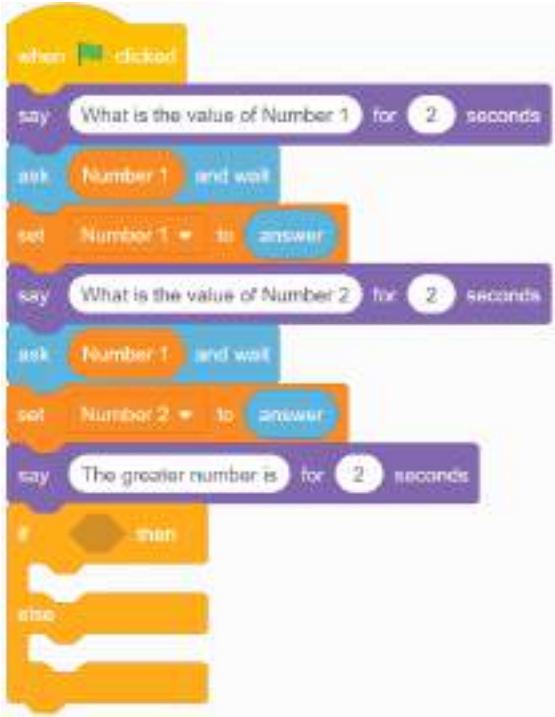


14. Write "The greater number is" in place of the word "Hello!"

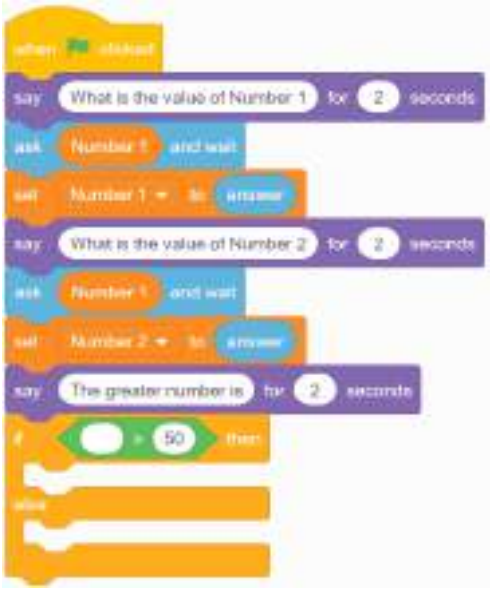


15. Dragging the block  from **Control** in the code area.

attach it with the previous blocks in the script area.

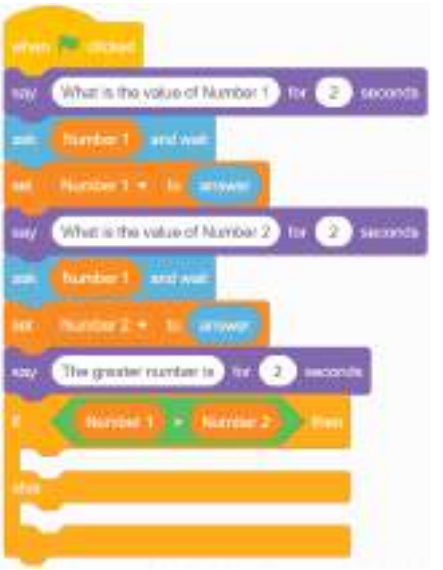


16. From **Operators** of the code area bring the block  into the script area and place it between **If and then** as shown below.

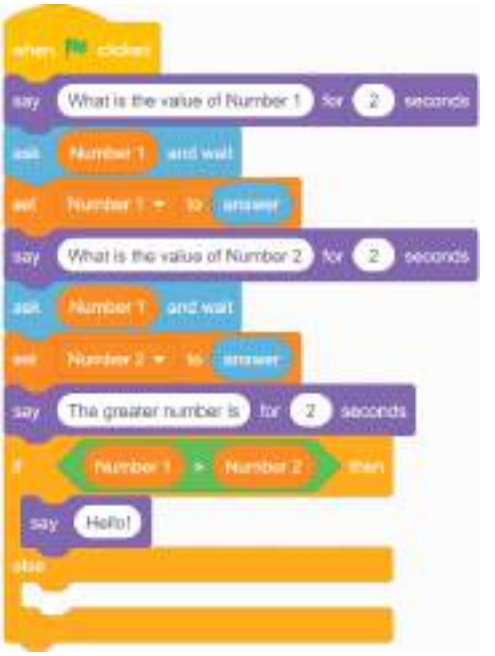


17. Drag **Number 1** and **Number 2** from the **Variable** of code area, place

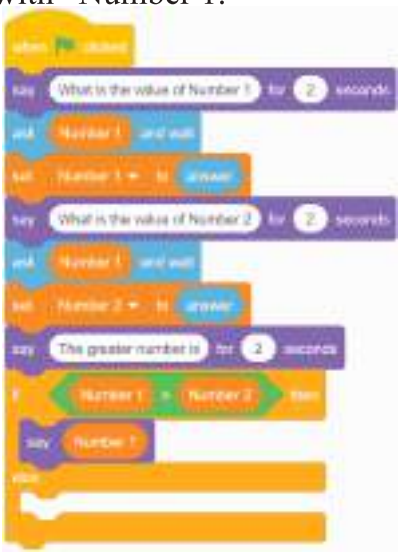
them in between **if and then** of the block  as shown in the picture below.



18. From the **Looks** of code area drag the block  into the script area and place it as shown in the picture below.

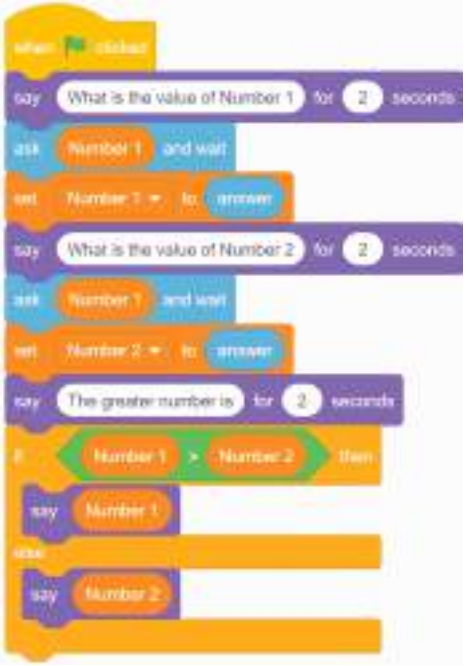


19. Now from **Variables** of code area drag Number 1 into the script area. Replace "Hello!" with "Number 1."



20. Similarly, drag another 

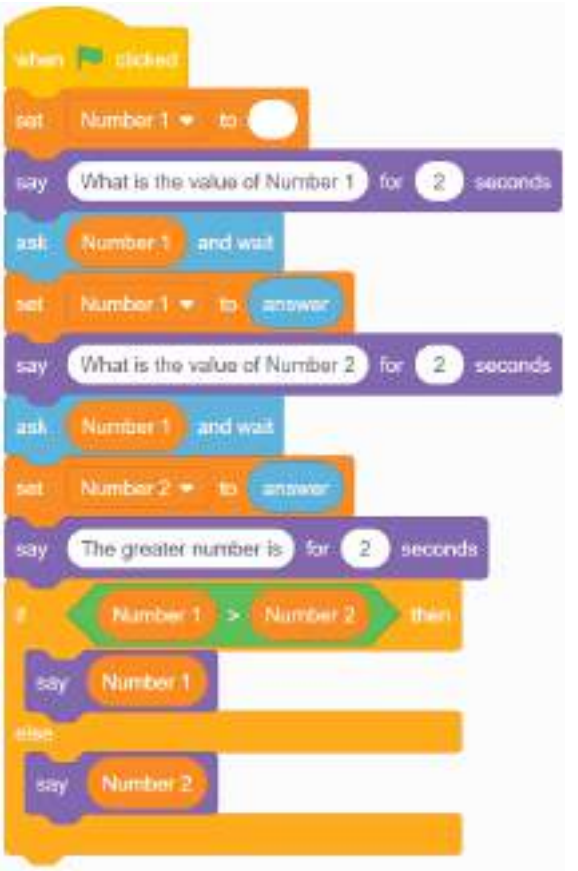
block into the script area and attach with the previous blocks.
21. From the **Variables** of the code area drag the **Number 2** into the script area. Replace "Hello!" with "Number 2".



22. Now from the **Variables** of the code area, drag the block 

into the script area and drop it under the block 

. Which is located at the begaining. Then , click on **my variable** and select **Number 1**. Delete the "0" written beside it.



23. In the same way, from the **Variables** of the code area, drag the block 

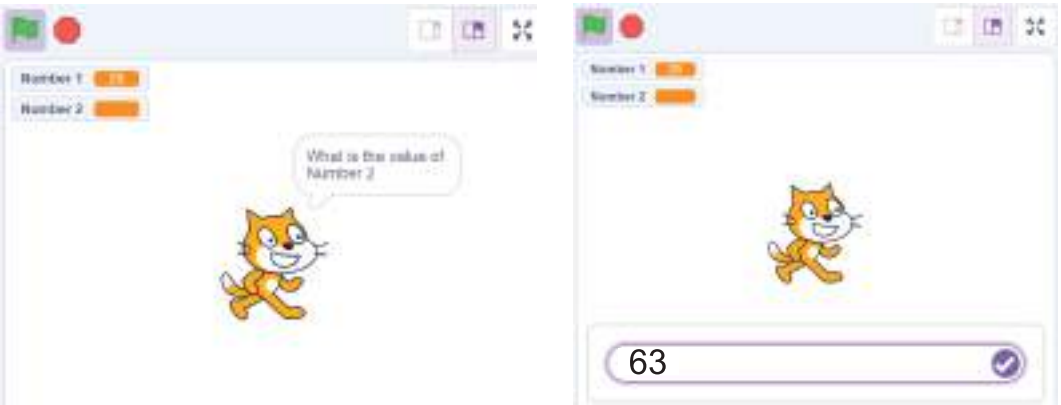
into the script area and attach it just below the block 

. Then click on my **variable** and select **Number 2**. Delete the "0" written beside it.

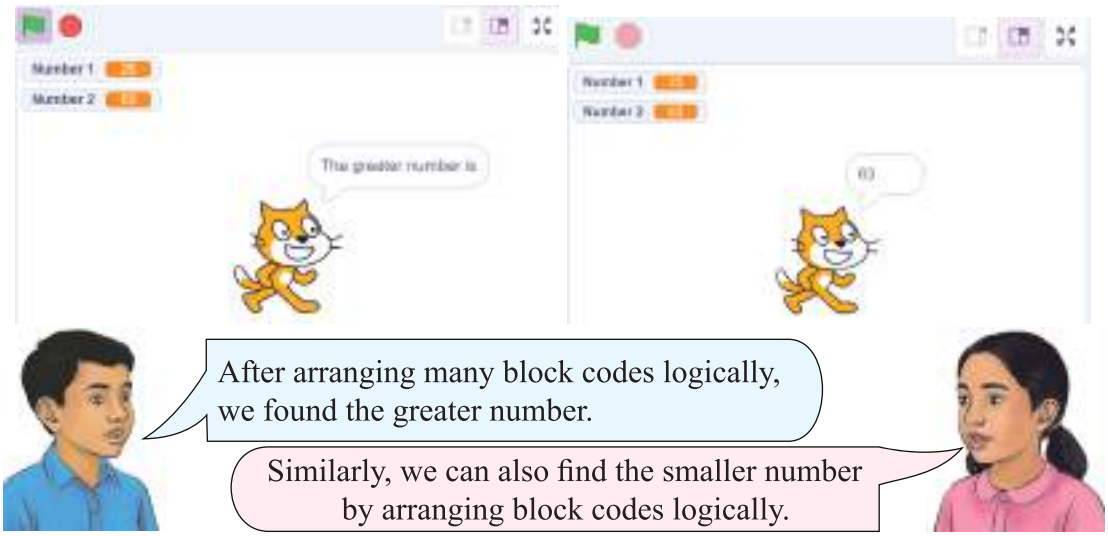
24. Now click on the flag at the top of the Stage. The Sprite will ask "What is the value of Number 1?". In the empty space at the bottom of the Stage, type any number, for example 25.



25. Then click on the tick mark (√) . Again the Sprite will ask "What is the value of Number 2?". In the empty space at the bottom fo the Stage, type any number greater then 25, for example 63. Then click on the tick mark (√).



26. The sprite will answer: “The greater number is 63.”



Summary

To find the greater number, we logically arranged many block codes together, which is called a program. The process of logically arranging code or codes to solve a specific problem or activity is called programming. In the future, we will learn how to solve various problems by using code.

3. Science and Technology

There is a close relationship between science and technology. All technologies have been invented using scientific knowledge. Science helps us understand nature, living beings, objects, energy, and more. Technology, on the other hand, is the application of scientific knowledge to make human activities easier.

How do we use scientific knowledge in technological inventions?

Activity: Determining the relationship between science and technology

What to do: Let us…

1. Find out what scientific knowledge is used in different technologies. One example is given below:

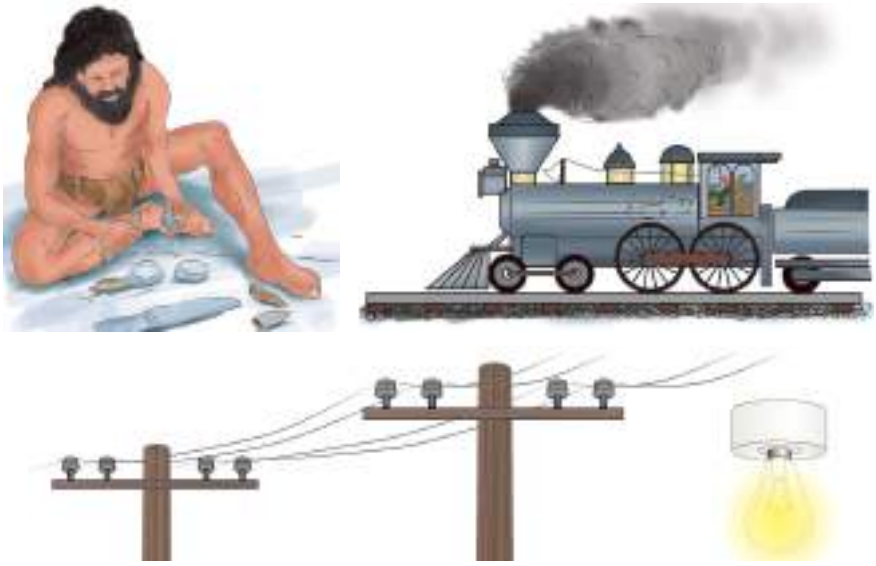
Technologies	Scientific knowledge
Television	Conversion of electrical energy into light energy and sound energy
Car	
Electric Bulb	
Refrigerator	
Electric Fan	

2. Discuss the relationship between technology and scientific knowledge with classmates.

Summary

Science is knowledge about nature and natural phenomena. It explains and analyzes natural events based on data obtained through observation and experimentation. Technology is the practical application of science to solve real-life problems. Technology invents various products, tools, and methods to improve the quality of human life.

Let us learn more about the relationship between science and technology…



Electricity was discovered using scientific knowledge. To improve life, new technologies are constantly being invented to solve real problems by using electricity. Humans invented simple technologies like stone tools, fire, clothing, metal tools, and the wheel. Using the power of steam discovered by scientists, people invented the steam engine, which was used to run factories, trains, and ships. Later, there was a significant advancement in technology. Continuous improvements have been made in agriculture, education, medicine, industry, and transportation using scientific knowledge.

Scientists also use technology during research on nature. For example, using telescopes, scientists are able to observe various objects in space. They use microscopes to explore things in nature that cannot be seen with the naked eye. Technology does not depend only on science— the progress of science also depends on technology. In other words, there is an interrelationship between science and technology.

4. Importance of Technology in Personal, Social, and National Life

In our daily life, we use many technology-based devices. Technology is applied in almost every sector, including education, healthcare, agriculture, and industry. Technology plays a vital role in leading a developed and dynamic life at the personal, social, and national levels.

Why is technology important in personal, social, and national life?

Activity: Realizing the importance of technology in personal, social, and national life

What to do: Let us…

1. Draw a table like the one below in the notebook.
2. Think about the following situation and fill in the table:

Suppose, the weather news on television says that there will be a severe cyclone and tidal surge on the coast. How will the individual, society, and state be benefited after receiving such a news due to the progress of information technology?

Benefits to the Individual	Benefits to Society	Benefits to the State

3. Discuss this activity with classmates and write down any new ideas we get from them.

Summary

In the above event, meteorologists understood from the radar station that the air pressure at the coast was dropping drastically. After analyzing this data, they announced that there would be a severe tidal surge. This news was broadcast on television. People saw the news and got a chance to be prepared. Coastal residents, animals, and fishing boats moved to safe shelters or cyclone centers. This not only saved individual lives but also helped the community protect their property and lives using this information technology. National assets were also protected as the ships remain safe in the harbours.

Let us learn more about the importance of technology in personal, social and national life…

Many countries in the world have abundant natural resources. Without technology, these resources cannot be found or utilized. Appropriate technologies are needed to search for and extract resources from underground, mountains and oceans.

To meet our country's demand of food, high-yielding varieties of paddy such as IRRI, BRRI, and BR-33 have been developed, which is mainly a contribution of genetic technology in agriculture. Agricultural technology has achieved remarkable success in fighting famine in some areas of Bangladesh; now there is no famine in those areas.

Apart from this, different technologies contribute to our lives in education, healthcare, sports, and entertainment. In other words, technology plays an important role in human welfare at the personal, social, and national levels.

5. Receiving and Providing Technology-Based Services in Personal, Social and National Life

The level of development of a country depends on how fast its government institutions can deliver services. With the advancement of technology, in some countries, almost 100% of public services are technology-based.

What technology-based services can we receive and provide in personal, social, and national life?

Activity: Making a list of technology-based services received and provided

What to do: Let us…

1. Make a list of all the technology-based services we receive.

Technology-based services we receive

2. Draw a table like the one below in the notebook.
3. From the list written earlier, identify which services are used at the personal, social, and national levels and write them in the respective columns. Some services may be included in multiple columns.

Technology-Based Services at the Personal Level	Technology-Based Services at the Social Level	Technology-Based Services at the National Level

Information about National Services

List of emergency services provided by the Government of Bangladesh and the call center numbers of those services:

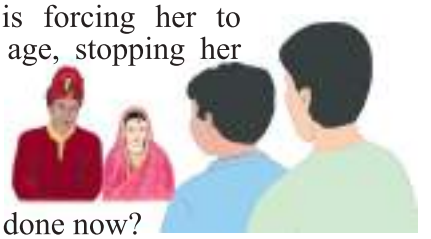
Services	Call Center Number
National Emergency Service	999
National Service Call Center	333
Agriculture Call Center	16123
Call Center for Migrants (Ministry of Expatriates' Welfare and Overseas Employment)	16135
National Women's Organization "Ask Apa" Helpline	10922
Health Portal – Call to Get Doctor's Advice	16263
Call to Prevent Violence or Trafficking of Women & Children – Ambulance Will Arrive at Your Doorstep	109
National Legal Aid Helpline	16430
National Human Rights Commission Helpline	16108

Activity: Identifing technology-based mediums for receiving and providing state services.

What to do: Let us…

1. Carefully observe the pictures below. Think about what should be done in each situation.
2. For each case, write in the right column what service you would receive or provide and why.
3. Write the call center number from the emergency service list next to it.

Situations:

Sumaiya's father is forcing her to marry at an early age, stopping her education.  What should be done now?	
 A serious road accident has occurred. What should be done?	

 From the weather report, we learn that, there will be a severe cyclone in the sea in the coming days. What should we do before going for fishing in the sea?	
 Babu is very sick. We cannot delay. He must be taken to the hospital immediately.	
 Nuha: There is a spelling mistake in my National ID card. What should I do?	
 My father is having breathing difficulty. What should I do?	
 My paddy field is infested with a new type of pest. What should I do?	
 A fire has broken out in the slum near our neighbourhood. What should we do now?	

	The trees in the social forestry project are being cut down without permission. What can we do?	

Discuss with classmates the services and numbers you identified from the Call Centres. Write down any new ideas you get from them.

⚠ **Remember:** In times of danger, we should never feel shy or afraid to call emergency services. We do not generally share our personal information with strangers, but it is safe and mandatory to share it with emergency service providers.

6. Health and Social Risks Caused by the Use of Technology

The world is now at our fingertips because of technology. We find the use of technology wherever we look. Mobile phones, smartphones, tablets, laptops, and computers have become essential in our daily lives due to the advancement of technology. But their overuse can create certain health and social risks.

What health and social risks can arise from the overuse of technology?

Activity: Identifying the health and social risks caused by the overuse of technology.

What to Do: Let us…

1. Think about the problems caused by overuse of technology and write them below:

Health risks from technology use	Social risks from technology use

Summary

We are becoming very much addicted to using mobile phones, smartphones, tablets, laptops, and computers. We must remember that too much of anything is bad. Spending too much time with technology can have harmful effects on our body and mind, which is risky for our health.

Let us learn more about helth and social risk caused by the use technology…

Overuse of technology leads to physical inactivity and hampers the proper physical development of children. Overuse can cause sleeplessness. Prolonged use of device may cause back and neck pain, eye problems, and other physical complications. Watching violent or cruel content online can put children at psychological risk. Any frightening videos, such as fires, accidents, murders, floods, or wildfires can negatively impact children's mental health.

We use mobile phones, televisions, and computers with internet connectivity every day. While technology makes our lives easier, it can also create problems. Children, even adults, get so busy with mobile phones or TV that they talk less with family members. Instead of playing outside or meeting friends, they spend time on phones or computers, which creates distance among friends. Children's physical and mental growth gets hampered . Sometimes internet contains false information, which can be dangerous for children. Excessive use of technology disrupts the schedule for studying, playing, and eating, which harms physical and mental health. Therefore, we should make moderate use of technology.

7. Safe Use of Technology at Personal, Social, and National Levels

Technology is an inseparable part of our life. If we do not use it consciously, it can be risky. That is why we must ensure the safe use of technology at the individual, social, and national levels.

How do we safely use technology at personal, social, and national levels?

Activity: Determining the importance of technology and safety measures.

What to Do:

Let us…

1. Write in the table below the names of some technologies, why these technologies are important, and what to do to use these technologies safely.

Technology name	Why it is important	Steps for safe use

2. Discuss the activity with classmates and write down if any new idea is generated.

Let us learn more about the safe use of technology at the personal, social, and national levels...

We must know the safe use of all technologies developed by using scientific knowledge. We are to use different technologies at personal, social, and national levels. To ensure safe use, we can:

1. Keep passwords for phones, computers, laptops, etc. secret.
2. Use different passwords for different services.
3. Install antivirus software and scan computer regularly.
4. Be careful when sharing personal information on social media or other online platforms.
5. Avoid excessive use of phones, computers, laptops, tablets, and the internet.
6. Like, comment, and share on social media only after verification.
7. Avoid visiting any site unnecessarily.
8. Avoid spreading false or misleading information that could confuse people.

Correct and safe use of technology makes our lives easier and better, while misuse can put individuals, society, and the state at risk. Therefore, we must remain alert when using technology.

Exercises

1. Put a tick mark (√) on the correct answer:

a) Which of the following can you do with a map-related app?

☐ Draw pictures ☐ Buy tickets
☐ Locate place ☐ Play games

b) You want to see the stars in the night sky more clearly. Which instrument will you use?

☐ Microscope ☐ Magnifying glass
☐ Mirror ☐ Telescope

c) What problem might occur from long-term mobile use?

☐ Eye problems ☐ Hand pain
☐ Mental unrest ☐ Chest pain

2. Fill in the Blanks

a) Thanks to technology, we live an easy and **……** life.
b) Scientists used the power of steam to invent the……...
c) As a result of technology's **……**, health and social risks are increasing.

3. Identify Correct and Incorrect Statements

	Correct	**Incorrect**
IRRI, BRRI, and BR-33 are improved varieties of wheat.		
We should use easily guessable passwords.		
To get emergency ambulance service, we will call 16263.		
We can solve mathematical problems using block code.		

4. Answer the following questions in brief:

a) What is meant by science and technology?
b) What technology-based services do we use at the national level?
c) How can we reduce the health risks caused by misuse of technology?

5. Answer the following questions in detail:

a) What are the uses of computers in daily life?
b) Explain the interrelationship between science and technology.
c) What steps should we take to ensure the safe use of technology?

Glossary:

Word	Word Meaning
Adaptation	The process by which plants or animals adjust to survive in their environment.
Annual Motion	The Earth's revolution around the sun along its orbit.
Attractive Force	The force that brings two objects closer together.
Chemical Energy	Energy stored within matter.
Coastal Area	Parts of the sea or lake close to the shore.
COVID-19	An infectious disease causing a severe lung problem.
Cyberbullying	Spreading false information or posting embarrassing or insulting pictures, images or videos of someone on social media.
Diurnal Motion	The rotation of the earth around its own axis causing day and night.
Drone	An unmanned aerial vehicle.
Ecology / Ecosystem	All living organisms and non-living elements of a place and their mutual interactions.
Electric Device	Electrical equipment.
Energy Conservation	Saving energy for future use without wasting it.
Equator	An imaginary line running horizontally from the east to the west across the earth, dividing it into two equal parts– the north and the south.
Flying Car	A vehicle that can travel both on the road and in the air.
Food Chain	The process by which energy is transferred from producers to the highest consumers through eating relationships among animals.
Food Web	A network-like structure formed when several interconnected food chains are combine within an ecosystem.
Frictional Force	The force that resists motion due to rubbing between surfaces.

Word	Word Meaning
Genetic Engineering	A technology that uses genes from living cells.
Google Map	A type of digital map.
Inclined Plane	A simple machine made of wood, bamboo, sand, or cement, used to lift heavy objects upward with ease.
Indivisible	Something that cannot be divided further.
Interaction	Plants, animals and non-living elements in nature are closely connected with each other and with their environment.
Interrelationship	The connection between two things such as science, and technology.
Internet	A network made up of many interconnected computer networks.
Lever	A type of simple machine that helps to lift heavy objects.
Living Place	Living place of organisms / Habitat.
Metro Rail	A train that operates only within a city.
Microscope	An instrument used to see objects that are invisible to the open eye.
Mixture	Two or more substances existing together side by side. The components can be seen separately.
Northern Hemisphere	The area situated to the north of the equator.
Plane of Reflection	A surface that blocks light rays and changes their direction.
Pneumatophore	Upward-growing branches of roots spread over soil or water that help plants take oxygen for respiration.
Pole	An imaginary line connecting the two points at the top and bottom of the earth's surface; the upper point is the north pole, the lower point is the south pole.
Password	A secret number or code used to block unauthorized access to a device.

Word	Word Meaning
Radar	A device using waves to determine the distance, height, and direction of moving or stationary objects.
Recycle	Making a new item from something after it has already been used once.
Refrigerator	A device used to cool and preserve food and drinks.
Reuse	Using an object again for another purpose instead of throwing it away.
Robotics	A branch of technology concerned with designing, building, operating and applying robots.
Safe Water	Clean, germ-free, and pollution-free water suitable for drinking.
Satellite	An artificial body used to forecast weather and transmit information.
Seed Dispersal	Scattering of a plant's seeds by birds, wind or other agents.
Smartboard	A whiteboard with multiple features that can also be used as a computer monitor.
Southern Hemisphere	The area situated to the south of the equator.
Technological Evolution	The gradual improvement of any technology.
Telescope	A device used to observe distant objects.
Tidal Wave	Sea water swelling and hitting the coast.
Transformation	Change of a substance or energy from one form into another.
Woolen Cloth	Clothing made from animal wool is used in winter to keep warm.

The End

Academic Year 2026, Class Five–Science



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Call **109** (Toll free, 24 hours) National Help Centre to redress and prevent violence against women and children.

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