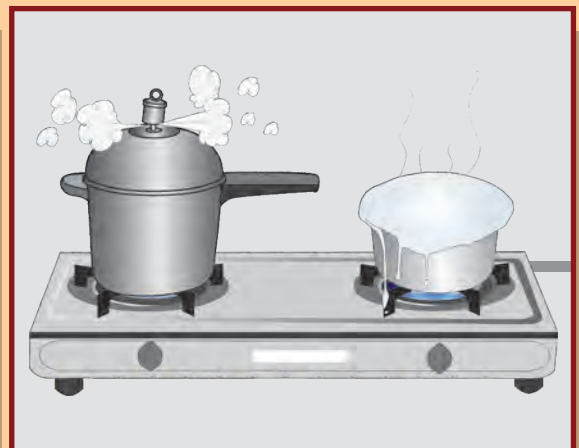
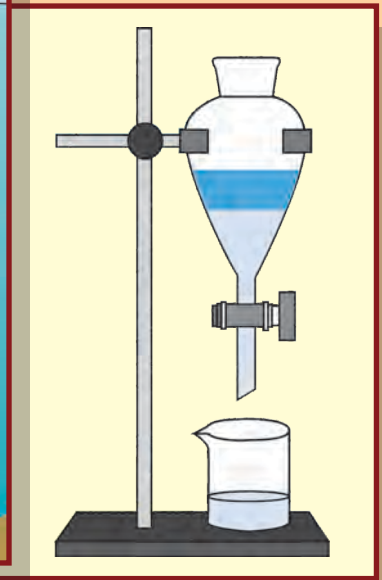
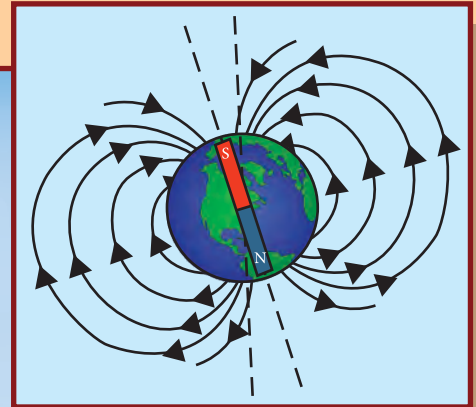
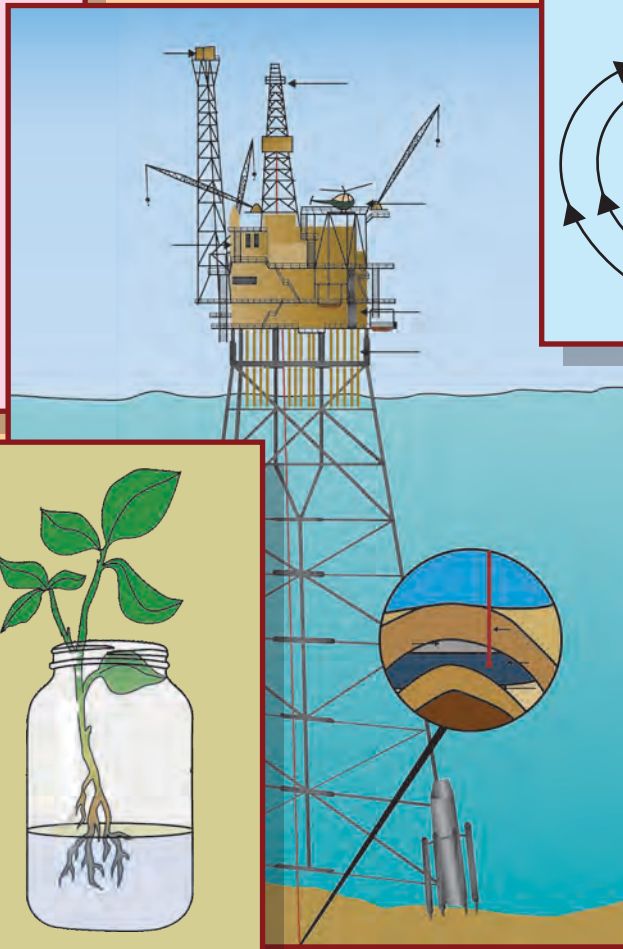
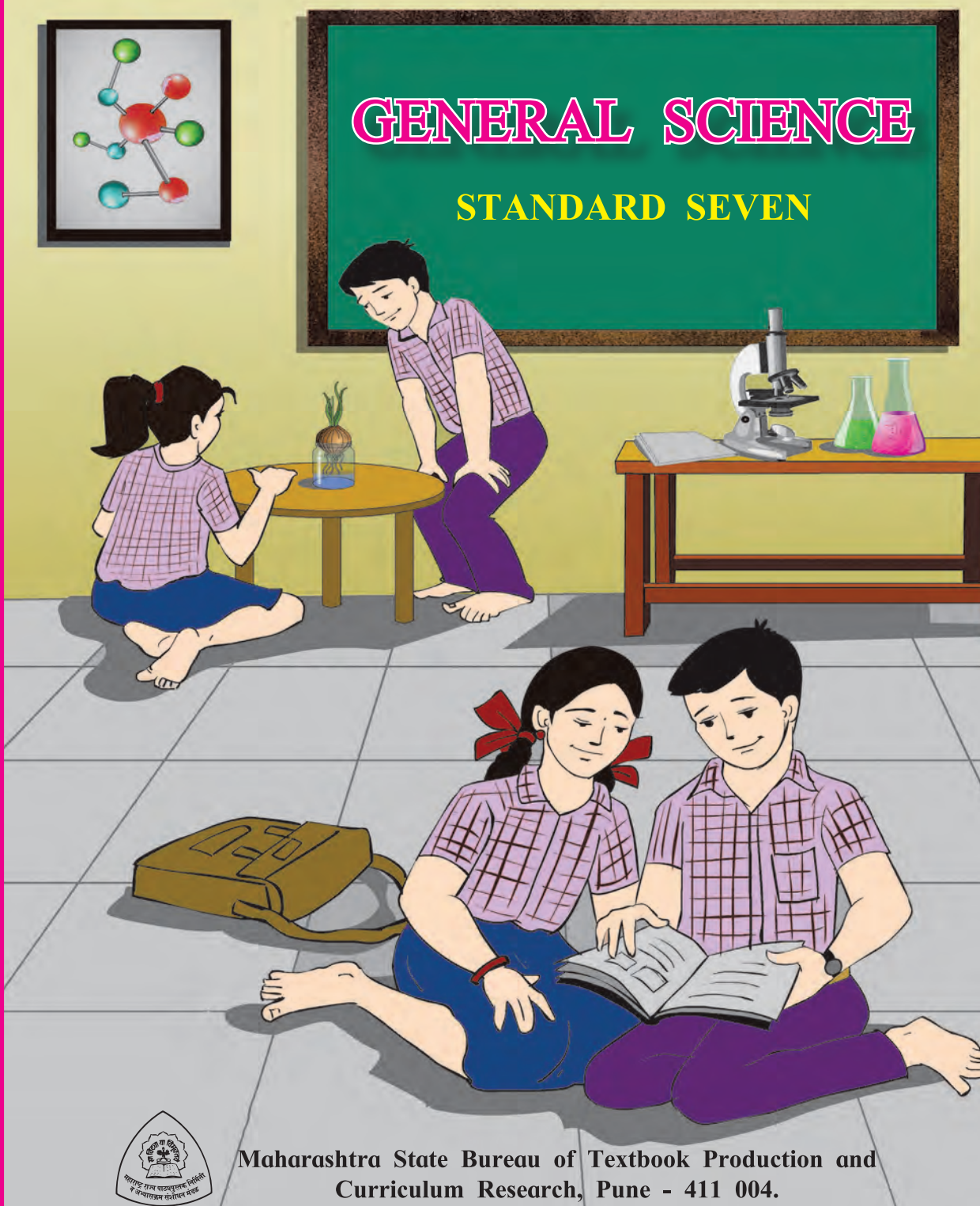


# GENERAL SCIENCE

## STANDARD SEVEN



The Coordination Committee formed by GR No. Abhyas - 2116/(Pra.Kra.43/16) SD - 4  
Dated 25.4.2016 has given approval to prescribe this textbook in its meeting held on 3.3.2017



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## The Constitution of India

### Preamble

WE, THE PEOPLE OF INDIA, having solemnly resolved to constitute India into a SOVEREIGN SOCIALIST SECULAR DEMOCRATIC REPUBLIC and to secure to all its citizens:

JUSTICE, social, economic and political;

LIBERTY of thought, expression, belief, faith and worship;

EQUALITY of status and of opportunity; and to promote among them all

FRATERNITY assuring the dignity of the individual and the unity and integrity of the Nation;

IN OUR CONSTITUENT ASSEMBLY this twenty-sixth day of November, 1949, do HEREBY ADOPT, ENACT AND GIVE TO OURSELVES THIS CONSTITUTION.

## NATIONAL ANTHEM

Jana-gana-mana-adhināyaka jaya hē  
Bhārata-bhāgya-vidhātā,

Panjāba-Sindhu-Gujarāta-Marāthā  
Drāvida-Utkala-Banga

Vindhya-Himāchala-Yamunā-Gangā  
uchchala-jaladhi-taranga

Tava subha nāmē jāgē, tava subha āsisa māgē,  
gāhē tava jaya-gāthā,

Jana-gana-mangala-dāyaka jaya hē  
Bhārata-bhāgya-vidhātā,

Jaya hē, Jaya hē, Jaya hē,  
Jaya jaya jaya, jaya hē.

## PLEDGE

India is my country. All Indians  
are my brothers and sisters.

I love my country, and I am proud  
of its rich and varied heritage. I shall  
always strive to be worthy of it.

I shall give my parents, teachers  
and all elders respect, and treat  
everyone with courtesy.

To my country and my people,  
I pledge my devotion. In their  
well-being and prosperity alone lies  
my happiness.

## Preface

Dear students,

Welcome to Std VII.

We have great pleasure in offering to you this General Science textbook, based on the new syllabus. In Stds III to V you have acquired some knowledge of Science from your Environment Science textbooks. Last year, however, you began to study Science from a separate General Science textbook.

The basic purpose of this textbook can be said to be 'Understand and explain to others'. You will learn Science through many activities such as Observe and Discuss, Use your brain power ! Find Out, Think about it, etc. Do take part in all these activities. Use the activities Can you recall? and Can you tell? to revise the science you have already learnt.

The textbook also includes many activities and experiments under the titles Try this and Let's try this. You must yourself carefully carry out these activities, experiments and observations. Wherever necessary you may, of course, take the help of your teachers, parents or classmates. On some occasions you may have to look for some information. You must use the library or technology like the Internet for that purpose. A number of activities that explain the science behind everyday events, have been given. You too must make your own efforts to use science in everyday life. What you learn from the lessons in this textbook will not only help you with the studies of higher classes, but will also enable you to do many new things and equip you with many new skills.

Take all precautions while doing the activities and experiments given in the textbook and encourage others to take the same precautions. Understand Science and learn to use it. Lastly, a gentle reminder to you that, while carrying out activities related to plants and animals, all care must be taken to avoid doing them any harm or causing them injury.

Do tell us about the parts that you like as well as about the difficulties you face as you read and understand and study this textbook. We are especially eager to know about the questions that come to your mind as you study science. Do write to us about them.

Our best wishes for your academic progress.

**Pune**

**Date :** 28 March 2017

Gudi Padwa

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Chaitra 7, 1939



**(Dr Sunil Magar)**

**Director**

Maharashtra State Bureau of Textbook  
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## For Teachers

- We learn many new facts while studying science. So, young children with a lot of curiosity find the subject enjoyable. However, the real objective of learning science is to learn to think about the world and all the events that take place in it, in an objective and rational manner so as to lead a happy confident life. Through the study of science we also expect children to develop social consciousness, awareness about conservation of the environment and adeptness in handling technology.
- We need to have adequate factual information and understanding about our world. However, in a rapidly changing world, the knowledge gained today may not suffice tomorrow. Hence, the skills required for obtaining knowledge must be learnt. These are the very skills that are learnt in the process of studying science.
- Many topics in science are more easily learnt by direct observation than by reading about them. Some abstract phenomena become visible through the effects they have. Hence, we do experiments related to them. They help to learn the skills of inference and verification. While learning science, these skills are learnt and internalized. This is an important objective of learning science.
- That we should be able to articulate what we have learnt, explain it to others, use it for further studies and finally bring about the proper changes in our behaviour is also an expectation from the learning of science. That is why, it is important to ensure that along with the content of the subject, these skills are also developed.
- **Can you recall?** is a section for reviewing the related topics already learnt, while the purpose of **Can you tell?** is to introduce a topic by bringing together what the children might already know about a topic through their own reading or experience. **Try this** is meant to give some specific experience while **Let's try this** are the parts that teachers must demonstrate to the class. **Use your brain power!** makes children apply the knowledge gained. **Always remember—** gives some important instructions or values. The sections **Find out**, **Do you know?** and **Science watch** are to create an awareness of the vast information that cannot be included in the textbook and to inculcate the habit of doing reference work independently.
- Teachers can see for themselves that this textbook is not meant for reading and explaining but for guiding students to gain knowledge by carrying out the given activities. Reading the textbook **after** the children have carried out the activities and discussed them in the class will make it easy and will also help to bring together and reinforce what they have already learnt. The attractive pictures will support their efforts to learn.
- Teachers should prepare well for discussions under **Can you tell?**, **Use your brain power!** etc. and for the various activities and experiments. They should maintain an informal atmosphere during such discussions and activities, encourage everyone to participate and make efforts to organize Science Days, presentations in the class, etc.

- **Front Cover** : Experiments and activities included in the textbook.
- **Back Cover** : Flamingos and other birds visiting Bhigwan in Pune District.

## Competencies related to General Science : Std Seven

### The living world

1. To recognise the characteristics of and differences between various plant organs and to tabulate and compare them.
2. To describe and explain the functions of plant organs, through observation, activities and experiments.
3. To recognise and explain the various changes that have taken place in living organisms because of their environment and geographical conditions.
4. To observe the fundamental components inside living organisms using a compound microscope.
5. To compare the various cells of organisms, by observation.
6. To draw the structures of cells accurately and to explain/describe them.
7. To explain with reasons the role of micro-organisms in various everyday processes.
8. To find the commonalities among the great variety of living things and to explain the system of classification of living things correctly.
9. To recognise the inter-relationship between body movements and muscles.
10. To explain the processes of feeding and digestion along with the related structures, correctly and in the proper sequence.

### Natural Resources and Disaster Management

1. To recognise the natural resources in our surroundings and to explain clearly their properties, their composition and the effects they have on each other and on human life.
2. To verify by experiments the properties of air, water and soil.
3. To explain the inter-relationship between soil examination and production of crops.
4. To explain uses of natural resources in human life.
5. To participate in programmes for the protection and conservation of natural resources and to make related presentations.
6. To do a scientific cause and effect analysis of the disasters that have occurred in the local region and to create an awareness of the measures instituted for their management.

### Diet and Nutrition

1. To explain the processes of feeding and digestion along with the related structures, correctly and in the proper sequence.
2. To explain the importance of food safety in everyday life from a scientific point of view.
3. To recognise the causes of food spoilage and food wastage and to suggest measures for their prevention.
4. To detect the adulteration of foodstuffs by means of experiments and to raise awareness about adulteration.
5. To take steps to keep food safe and to prevent food wastage as and when the occasion demands.
6. To explain, based on observations, the variety that is seen in living things, related to the processes of feeding and nutrition.
7. To recognise the disorders that occur due to deficiencies of food constituents and to give remedies for the same.
8. To be aware about health issues and to motivate others in that direction.

### Energy

1. To explain the relationship between work and energy.
2. To recognise the different types of energy and to explain the uses of fuels in this respect.
3. To suggest remedies for the crises that have arisen as a result of the overuse of fuels and to draw the attention of others to them.
4. To explain the science behind the generation of electrical energy and its usefulness/uses in day to day life.
5. To be able to conduct experiments related to the properties of various forms of energy such as heat, sound, light and magnetic energy and to make inferences and draw conclusions.
6. To make various gadgets based on the characteristics of magnets.
7. To determine the type of sound from its intensity.
8. To try to remove superstitions prevailing in society by explaining the causes of some natural phenomena on the basis of the properties of light.
9. To verify that applications of heat transmission are made use of in many places.

### Matter

1. To explain the forms, properties and states of the materials of daily use and give information about their effects.
2. To separate the various materials, and constituents of materials in everyday use, by using scientific methods.
3. To explain the scientific causes of the changes that have taken place in substances and to classify the changes.
4. To state the inter-relationships between various changes according to properties.
5. To explain the science behind the production of substances/materials of everyday use.
6. To explain the benefits and disadvantages of the use of commonly used substances.
7. To produce some substances for everyday use.

### Motion, Force and Machines

1. To give information about common physical quantities and their inter-relationships, and about methods of measurement of these quantities and the devices used for the purpose.
2. To explain the possible errors in measurement and their causes.
3. To be able to use the concepts of distance, measurement of distance and the relativity of motion in everyday life.
4. To solve numerical problems based on the relationship between speed and velocity.

### The Universe

1. To gain some knowledge of various concepts in astronomy and to explain the importance of sky-watching.
2. To look for and identify constellations by sky-watching.
3. To make efforts to remove some misconceptions related to zodiac signs and *nakshatras*.

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# 1. The Living World : Adaptations and Classification



## Let's recall.

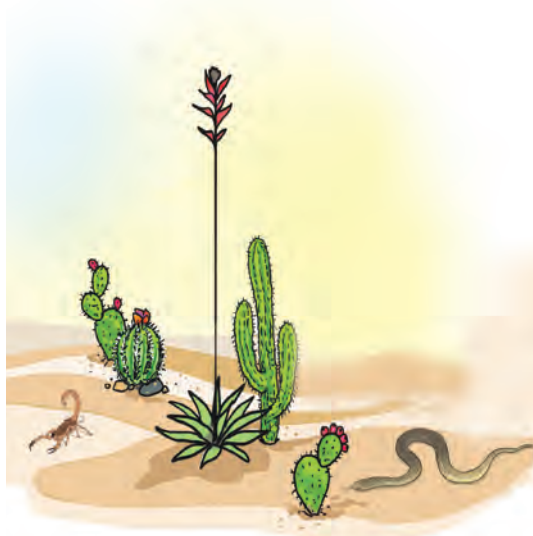
In what different ways is the diversity in living things seen?

A great variety of plants is found on the earth. Some plants have colourful flowers. Some plants grow in water whereas some are to be found in deserts which have a scarcity of water. Some plants are found only in snowy regions. Some plants cannot be seen without a microscope whereas some are huge in size. Like plants, animals too show diversity. Some are unicellular, others, multicellular. Some are vertebrates whereas others are invertebrates. This world is full of a variety of animals – aquatic, terrestrial, amphibian, reptilian, aerial, etc. These observations give rise to the question – How did this great diversity come into being?



## Can you tell ?

Are the plants and animals from Kashmir and Rajasthan of the same type? Can you elaborate on any differences between the two?



1.1 Desert

Coniferous trees like pine and deodar flourish in snowy regions like Kashmir. However, in the deserts of Rajasthan, plants like cactus and acacia (*babhul*) are to be found. The camel, a desert animal, is not found in Kashmir. What is the reason for these differences?

## Adaptation

Gradual changes occur in the body parts and also in the behaviour of organisms which help them to adjust to their surroundings. Such changes are called **adaptations**. They take place over a long period of time.

## Adaptation in plants

Observe and complete the chart. (Include other plants from your own region too.)

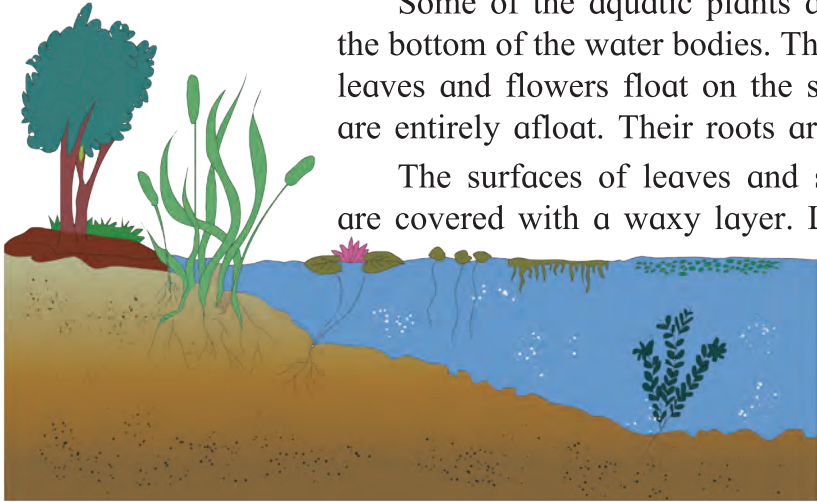
Plant	Habitat	Type of root	Characteristics of leaves	Characteristics of stem
Lotus	Aquatic	Fibrous	Large and round with waxy layer	Hollow and flexible
Cactus				
Banyan				

## Adaptation in aquatic plants



## Try this.

Visit various water bodies such as a river, brook, pond, lake, in your surroundings. What differences do you observe between terrestrial and aquatic plants?

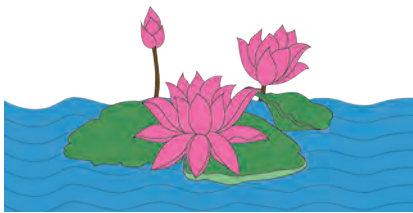


1.2 Aquatic plants

Some of the aquatic plants are firmly rooted in the soil at the bottom of the water bodies. Their stems are submerged, while leaves and flowers float on the surface. However, some plants are entirely afloat. Their roots are not anchored in the soil.

The surfaces of leaves and stems of many aquatic plants are covered with a waxy layer. Leaves of some aquatic plants

are thin and slender like a ribbon. This shape helps them to withstand fast currents of water. Air spaces in stems and petioles of aquatic plants are useful for floating in water.



1.3 Lotus stalk



**Use your brain power !**

1. Why does water trickle off lotus leaves?
2. Why don't the leaves of these plants rot in water?
3. Why are their roots short and fibrous?

### Adaptation in desert plants



**Try this.**

Take two potted plants – one, a cactus and the other, a leafy plant. Tie plastic bags loosely around the leaves of these plants and keep them in sunlight from early in the morning. In the afternoon, bring those pots into the classroom and observe them.

Has the same quantity of water collected in both bags?

Desert plants are either leafless or their leaves are like small needles or have been modified into thorns. As a result, they lose very little water by evaporation. The stem stores water and food and is therefore fleshy. The stems are green as they perform photosynthesis in the absence of leaves. Their roots penetrate deep into the soil in search of water. There is a thick layer of a waxy substance on the stems of these plants, too.



1.4 Cactus

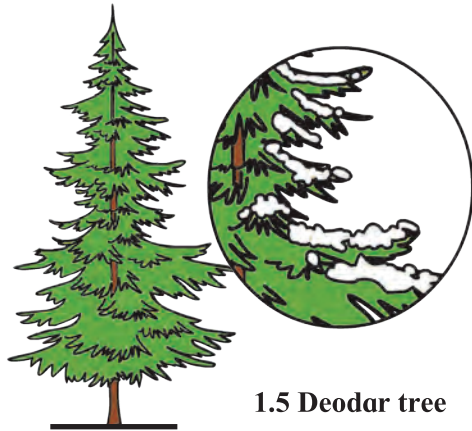
## Adaptation in plants of snowy regions



Can you tell ?

In what way are sloping branches useful to plants in a snowy region?

Plants of snowy regions mainly include conifers like deodar and pine. These trees are conical in shape due to their sloping branches. In the heavy snowfall and extreme cold in these regions, their conical shape prevents the snow from accumulating on the tree and the thick bark helps the tree to withstand the cold.



1.5 Deodar tree

## Adaptation in plants of forest regions

A variety of plants – trees, shrubs and herbs – are found in forests. These plants compete amongst themselves for sunlight. Hence, trees grow tall to get sunlight and climbers and vines grow to a great height with the support of trees. Spring-like tendrils on the stems of some climbers is an example of adaptation.



1.6 Forest

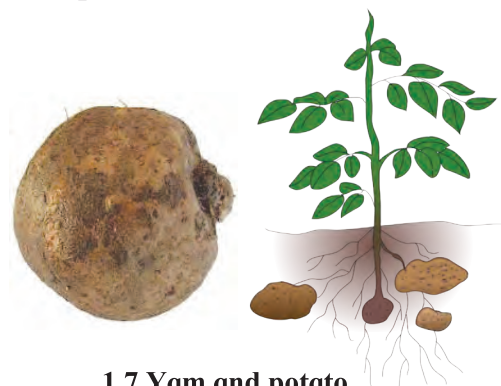
## Adaptation in grassland plants

Diverse types of bushes and grasses are found in the grasslands. Fibrous roots of grasses prevent soil erosion. Grasses in the equatorial region are very tall. Animals like tiger, elephants and deer can remain hidden in these grasses. However, grasses in cold regions are very short. Animals like the rabbit are found in such grasses. Vast meadows are found in hilly areas as well as plains.



Observe and discuss.

Observe and note down the adaptations in the parts of plants like potato, groundnut, yam, water hyacinth, aloe, acacia, carrot, onion, beet, bitter-gourd, grape vine, etc. and other plants in your surroundings.



1.7 Yam and potato

## Adaptation for ingestion of food in plants



1.8 Cuscuta

Most of the plants are anchored in the ground and are autotrophic. However, plants like dodder (*Cuscuta*) are parasitic. The plant body of dodder consists of yellow wire-like stems. It is leafless and cannot perform photosynthesis. However, it has haustorial (sucking) roots for absorbing nutrients from the host plant. These roots penetrate upto the conducting vessels of the host plant to absorb water and food.



1.9 Venus flytrap

Fungi do not have chlorophyll and cannot perform photosynthesis. They obtain food from starchy foodstuffs like *bhakri* and bread. They have root-like fibers for absorption of food.

Plants need nitrogen, phosphorus and potassium for growth. Plants that grow in soil which is deficient in nitrogen, like *Drosera* (sundew), Venus flytrap, pitcher plant, etc. fulfill their need for nitrogen by consuming insects. Adaptations are seen in these plants which serve to attract insects and hold them captive.

### My friend, the internet!

Collect information about plant adaptations from websites like – [www.mbgnet.net](http://www.mbgnet.net)

## Adaptation in animals

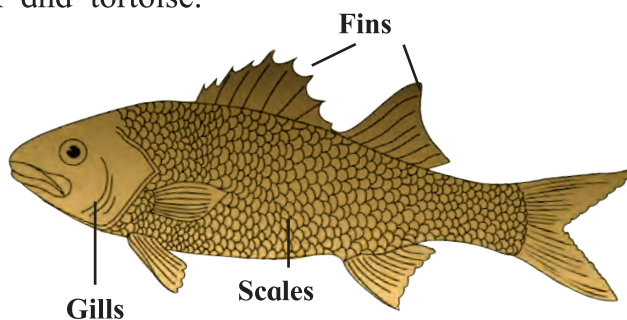
Make a list of animals in your surroundings. Compare the diversity of animals listed by your friends, with your list. Discuss the habitats, food-habits, characteristics of body structures like vertebral column, wings, gills, tails, etc. and prepare a chart.

What differences do you see between terrestrial and aquatic animals?

As compared to terrestrial animals, the skin and body shape of aquatic animals appear to have undergone changes. Fishes have scales on the skin and fins on the body. Their body tapers towards both its ends, like a spindle. Fish breathe with gills instead of a nose. Their eyes have transparent eyelids. They have air bladders within the body to help them to float.

Observe the bodies of the frog, duck and tortoise.

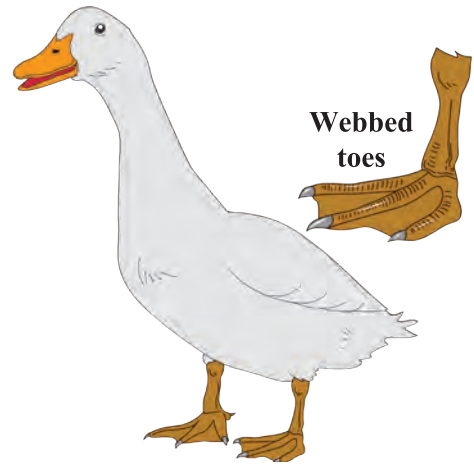
- (1) Of what use are their legs to these animals?
- (2) What helps frogs to breathe underwater?
- (3) Of what use are the long hind legs of a frog?
- (4) Why doesn't a duck get wet in water?



1.10 Fish

As the frog and duck have webbed toes, they can use their legs like oars. Water flows off the waxy feathers of birds like duck and waterhen. Webbed toes, slippery, smooth skin and a triangular head help frogs to swim easily through water. They can live on land as well as in water due to their ability to breathe through the skin in water and using the nose and lungs on land. The typical colours of a frog's back help it to hide among grasses.

Make a list of the names of some other amphibians you know and study their adaptations.



1.11 Duck

### Adaptation in forest and grassland animals



1.12 Lion

Carnivorous animals like the wild dog, fox, tiger and lion have strong legs to run fast and capture their prey. They have claws and their canine teeth are sharp and pointed. What is the function of such teeth?

Tigers have padded paws. This enables them to silently stalk their prey and capture it easily. The eyes of predatory carnivores are located in the front of their head. It helps them to spot their prey from a long distance.



1.13 Blackbuck

The eyes of herbivores are below the forehead, on either side of the head. This gives them wide-angle vision which helps to protect them from predators. Their legs are long and tapering with strong hooves, which enables them to run fast taking long leaps. Their long and freely moving ears can receive sounds from long distances and different directions. Deer and blackbucks have colours that merge with their surroundings. Their teeth are strong for chewing tough plant material.

### Adaptation in desert animals

Deserts are characterized by severe scarcity of water. Hence, desert animals have a thick skin to prevent loss of water from the body. Their legs are long with flat and cushioned soles. The nostrils are protected by folds of skin. The eyelashes are long and thick. Rats, snakes, spiders, lizards in deserts live in deep burrows during daytime and are active at night.



1.14 Desert animals



## Adaptation in animals of snowy regions

From the internet, download images of animals like yak, polar bear, white fox, silver fox, mountain goat, Siberian husky dog and snow leopard. Compare these images with those of similar animals from tropical forests.

A white or silver body colour, long, thick hair on the skin are typical characteristics of animals of snowy region. How are these useful to them?



1.15 Animals of snowy regions



Can you tell ?

What is the main difference between vehicles on the road and aeroplanes?

The spindle-shaped body of birds also minimises the resistance of air while flying. With hollow bones, a body covering of feathers and modification of forelegs into wings, their body is light in weight and adapted for flying.

The body of insects also is light in weight and tapers at both ends. They can fly with two pairs of wings and also walk with six stick-like legs. Bats can fly with the help of the patagium, a thin fold of skin between their forelegs and hind legs.

Observe the various birds and insects in your area.



Tapering slender body



1.16 Adaptations in birds

## Adaptation in reptiles

Observe, from a distance, how snakes and earthworms creep. Which organs do they use for creeping? Are there any special changes for that purpose? Note any such changes. Animals like house lizard, garden lizard, crocodile use their muscles for creeping. Similarly, they show adaptations in skin, soles of feet, body colour, etc. For example, the house lizard and monitor lizards have clawed toes and thin soles, whereas snakes have a scaly skin.



1.17 Reptiles



## Adaptation for food in animals

We can categorize animals as herbivores and carnivores. Special adaptations are seen in each category to make the process of feeding easy. We will discuss this in greater detail in the chapter on Nutrition.

Watch the programmes on channels like National Geographic Wild, Discovery, etc. to learn about the feeding habits of animals like frogs, snakes, birds, mosquitoes, butterflies, etc.



1.18 Adaptation for food in animals

Complete the following chart from your own observations.

Adaptation	Animal	Use of adaptation
Sharp teeth	Lion, tiger	To tear the flesh
Long and pointed beak		
Short beak		
Long and sticky tongue		
Long neck		

## Adaptation for blending with the surroundings

We cannot easily spot colourful butterflies, lizards and grasshoppers. They get camouflaged amidst grasses, parts of plants like stem, leaves, flowers, etc. That is because their colours blend with those of their surroundings.

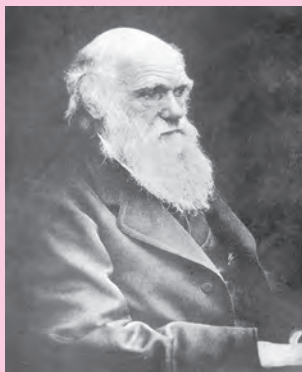
Changes that take place in the various organs and life-processes of organisms, that enable them to live, feed, reproduce to perpetuate themselves and protect themselves from their enemies in specific surroundings, depending upon the habitat and its geographical conditions, are called adaptations.



### Always remember –

Adaptation is not a sudden process. It is gradual and continuous. Differences in the structure and appearance of present-day animals and animals of thousands of years ago are the adaptations that occurred according to prevailing conditions. It is our duty to conserve this diversity.

## Great Scientists



## Darwin's theory of evolution

Charles Darwin, a biologist, studied numerous types of plants and animals and suggested that only those organisms are likely to survive which can best adapt themselves to a changing environment. This is called the theory of **survival of the fittest**. This is Darwin's first principle.

If an organism is born with a new beneficial characteristic and is able to survive, this change is preserved in the next generation. This is Darwin's second principle and is called the theory of '**natural selection**'.

## Classification of living organisms



### Let's recall.

Why are living things classified?

Which are the criteria used for classification of plants and animals?

It is difficult to study and remember all the organisms in this diverse living world at the same time. Classification helps in this respect.

Different scientists have used different criteria and independently classified plants and animals. A hierarchy is

Hierarchy	Mango	Human
Kingdom	Plantae	Animalia
Phylum	Anthophyla	Chordata
Class	Dicotyledonae	Mammalia
Order	Sapindales	Primates
Family	Anacardiaceae	Hominidae
Genus	<i>Mangifera</i>	<i>Homo</i>
Species	<i>indica</i>	<i>sapiens</i>

formed in the classification that starts with Kingdom Animalia or Kingdom Plantae; further groups and sub-groups are formed depending upon basic similarities and differences. This is called the '**hierarchy of classification**'.

## Binomial nomenclature by Carl Linnaeus

Imagine that there are four students with a name 'Kabir' or 'Kiran' in a classroom. If you are talking about any one of them, how would you ensure that others know which one of them you are talking about, without any confusion? We would tell the full name i.e., the first name and the last name. This is similar to binomial nomenclature.

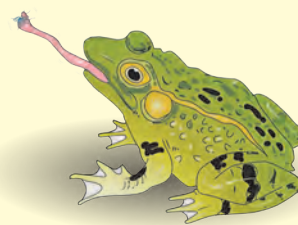
Binomial nomenclature is used to identify each organism. Accordingly, a scientific name has been assigned to each organism. It consists of two parts – the first part is 'genus' and second, 'species'. All identified organisms have been assigned a binomial name as per the guidelines of the International Code of Nomenclature.

All the organisms of a species are so similar that irrespective of differences in colour, height, habitats and habits, they can reproduce among themselves and form new individuals like themselves. For example, all domestic cats in the world belong to the same species. The same is true in the case of animals like hen, cow, dog, etc. and plants like mango, wheat, maize, etc.

Following are some examples of organisms from Kingdom Plantae and Animalia classified by the binomial method of nomenclature :

Living Things	Scientific Name
Dog	<i>Canis lupus familiaris</i>
Cow	<i>Bos taurus</i>
Hibiscus	<i>Hibiscus rosa-sinensis</i>
Jowar	<i>Sorghum bicolor</i>

Find out the scientific names of other animals and plants in your surroundings and discuss in class.



29<sup>th</sup> April is observed as 'World Frog Protection Day'.

Killing or harming frogs is prohibited by the Wild Life Protection Act.



### 1. Find my match !

#### 'A' Group

- (1) Lotus
- (2) Aloe
- (3) Cuscuta
- (4) Venus flytrap

#### 'B' Group

- (a) flower and leaves attract insects
- (b) Haustorial roots for absorption of food
- (c) Adapted to live in deserts
- (d) Adapted to live in water.

### 2. Read the paragraph and answer the following questions.

I am a penguin. I live in polar region covered by snow. My abdomen is white. My skin is thick with a layer of fat underneath. My body is spindle-shaped. My wings are small. My toes are webbed. We live in flocks.

- (a) Why is my skin white and thick and why is there a thick layer of fat underneath?
- (b) Why do we live in flocks sticking close to each other?
- (c) Which geographical region do I inhabit? Why?
- (d) Which adaptations should you have to enable you to live permanently in the polar region? Why?

### 3. Who is lying?

- (a) Cockroach – I have five legs.
- (b) Hen – My toes are webbed.
- (c) Cactus – My fleshy, green part is a leaf.

### 4. Read each of the following statements. Write a paragraph about adaptation with reference to each statement.

- (a) There is extreme heat in deserts.
- (b) Grasslands are lush green.
- (c) Insects are found in large numbers.
- (d) We hide.
- (e) We have long ears.

### 5. Answer the following.

- (a) Why is the camel called the 'Ship of the desert'?
- (b) How can the plants like cactus and acacia live in deserts with scarce water?
- (c) What is the inter-relationship between adaptations of organisms and their surroundings?
- (d) How are organisms classified?

**Activity :** Find out how the gradual adaptation from primitive man to modern man must have taken place.



## 2. Plants : Structure and Function



### Let's recall.

1. What helps us to easily identify the plants around us?
2. Which are the various parts of plants?

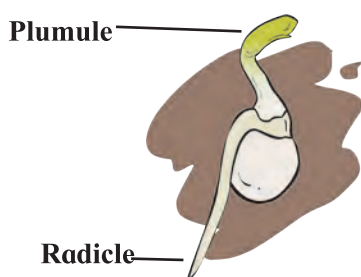
The root, stem, leaves, flowers, fruits, etc. of different plants are different. We can identify plants with the help of these different characteristics. Let us now acquaint ourselves with these plant organs in greater detail.

### Root

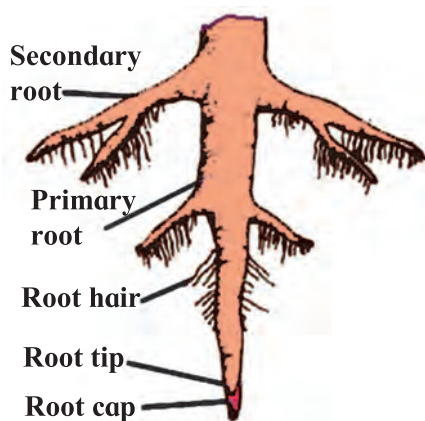


### Try this.

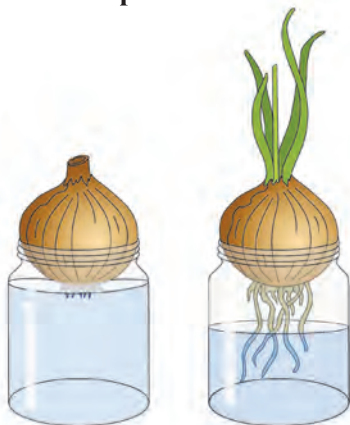
1. Keep a moistened ball of crumpled paper in a conical flask. Place some soaked *moth* beans/gram seeds in the flask between the paper and the glass wall. Observe and note the changes in the seeds in two or three days.



2.1 Formation of root



2.2 Tap root



2.3 Fibrous roots

The part that grows from inside the seed towards the soil is called the **radicle** and the part that grows above the soil is called the **plumule**.

The root that forms from the radicle, grows into the ground. The root is thick near the ground and gradually tapers to a pointed end. This part of the plant growing below the soil for support is called 'root'.

Roots of some plants produce secondary roots; that grow obliquely and spread far and wide in the soil. Roots support the plant. This type of root is called a **tap root**.

Roots bear hair-like processes near the root tips. These are **root hairs**. The root tip is delicate. This is the region of the growth of the root. The tip is covered by cap-like structure called the **root cap**. The root-cap protects the root-tip from injuries.

(2) Take a glass jar and fill three-quarters of it with water. Place an onion on the mouth of the jar in such a way that its roots are towards the water. Observe the growth of the roots for eight days.

Thread-like or fibre-like roots arising from the stem are called **fibrous roots**.

Thus, there are two main types of roots : tap roots and fibrous roots. Dicotyledonous plants have tap roots while monocotyledonous plants have fibrous roots.

(3) Sow the seeds of plants like mustard, sorghum (jowar), maize (corn), pea, coriander, etc. in an earthen pot. Cultivate the plant for eight days. Once the plants grow 15 to 20 cm high, uproot them

carefully while the soil is moist and put them gently in a large conical flask containing water. The soil will get washed off without any harm to the roots. Observe the roots carefully to see which plants have tap roots and which ones have fibrous roots.

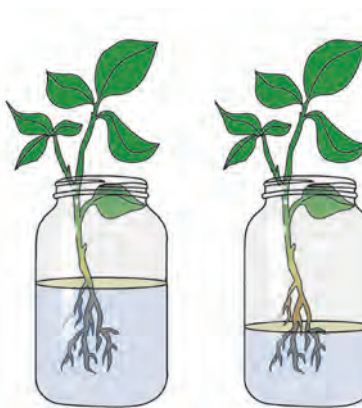
Plants like maize, sugarcane, sorghum have two types of roots. Some roots are underground whereas some grow from the stem just above the soil. The latter are called **adventitious roots**. Besides the normal functions like absorption of water and minerals, anchoring and supporting the plant, roots perform some other functions too. Roots show some modifications to perform these additional functions. Some examples of such **modified roots** are aerial roots, stilt-roots, runners, breathing roots (pneumatophores), etc.

(4) Take some water in a small glass jar. Put a plantlet in it in such a way that its roots are dipped in the water. Mark the water-level on the jar and add 5ml of oil to the water. Record the water-level on the next day.

Discuss your observations in the class.



2.4 Maize stalk



2.5 Water level



### Use your brain power!

- (1) What would have happened if plants like tamarind, banyan and mango had fibrous roots?
- (2) What will happen if the root-tip is injured?
- (3) Which types of roots do the fenugreek, spinach and onion plants have?



### Do you know?

Roots emerging from the trunk and branches of a banyan tree grow towards the soil. These roots are called prop roots. What could be the use of these prop roots? In the beginning, the banyan tree has very few prop roots. But later on, their number increases so much that it appears like a small forest.

In Kolkata, a 250 years old banyan tree in the Indian Botanical Garden covers a very large area. It is supported by thousands of prop-roots. Is there any such tree in your neighbourhood?



### Find out.

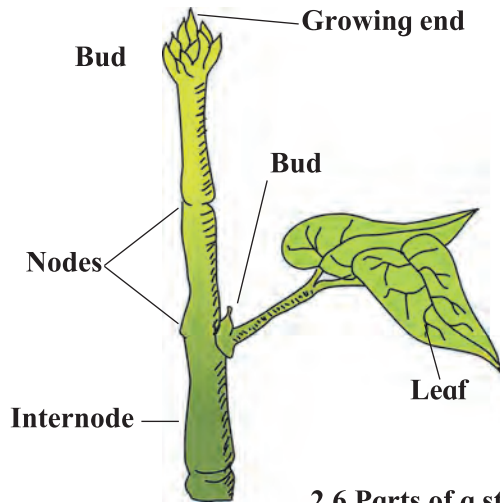
Why are the underground parts of plants like radish, carrot, beet and sweet potato thick, fleshy and swollen? Which part of the plant are they?

Collect images of different types of roots and send them to your friends via e-mail.

### Techno-support

## Stem

The stem grows above the soil from the plumule of the sprouting seed. As the sprout grows the length of stem gradually increases, too. There are nodes on the stem. Leaves come out at the nodes. The part of the stem between two nodes is called an internode. The tip or the apical end of the stem is called a bud. Observe a branch of any plant and identify its different parts as per the diagram.



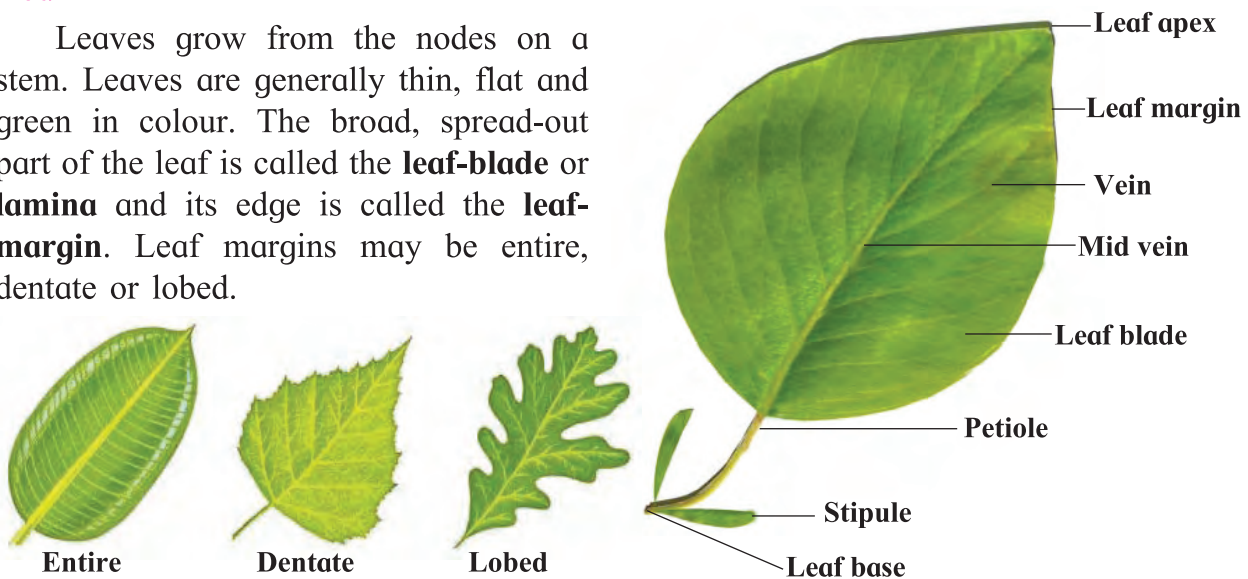
2.6 Parts of a stem

Complete the chart. (Collect information about other local plants, too.)

Name of Plant	Thickness (circumference) of node (mm)	Length of internode (mm)
1. Sugarcane		
2. Fenugreek		
3. ....		

## Leaf

Leaves grow from the nodes on a stem. Leaves are generally thin, flat and green in colour. The broad, spread-out part of the leaf is called the **leaf-blade** or **lamina** and its edge is called the **leaf-margin**. Leaf margins may be entire, dentate or lobed.



2.7 Parts of a leaf

The tip of the leaf is called the **leaf apex**. It may be tapering, pointed or rounded. Leaves of some plants have a stalk called a **petiole**. Leaves of some plants do not have a petiole. The portion of the leaf attached to the stem is called the **leaf-base**. Small leaf-like structures may be present near the leaf-base. These are called **stipules**. Do you see stipules in all plants?

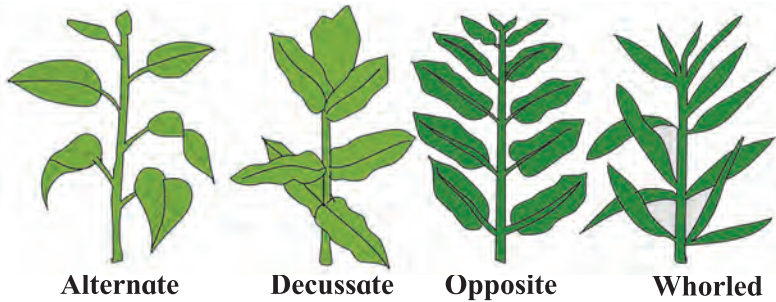
Leaves of some plants have a single undivided leaf blade and a single mid-rib. Such leaves are called **simple leaves**. However, the leaf-blade of leaves in some plants is divided into many small parts called leaflets. Such leaves are called **compound leaves**. Simple leaf and compound leaf are the two main types of leaves.



**Observe and discuss.**

Observe a branch of plants like rose, neem, coriander, hibiscus, etc.

In different plants the arrangement of leaves on the stem is different. It may be alternate, opposite, whorled, spiral, etc. According to shape, leaves are rounded (obovate), palmate, lanceolate, linear, etc.



Alternate

Decussate

Opposite

Whorled

2.8 Different types of leaves



In the box, draw a special leaf you may have found.



**Try this.**

Take a peepal leaf and a maize leaf and observe them carefully.

The peepal leaf is divided into two equal parts by a single mid-vein which lies along the mid-line of the leaf blade. Secondary veins arise from the mid-vein. They are branched and form a network or reticulum. On the other hand, in leaves of maize, all the veins are parallel, running from the leaf-base to the leaf apex. Thus, the peepal leaf-blade has **reticulate venation** and the maize leaf-blade has **parallel venation**.



2.9 Leaves

Observe the leaves of some other plants in your surroundings and identify the type of venation.

**A little fun !**

Take a fallen peepal leaf and soak it in water for 15-20 days. Dry it and make a greeting card of the lace-like leaf you get.

Complete the following chart by observing the plants around you.

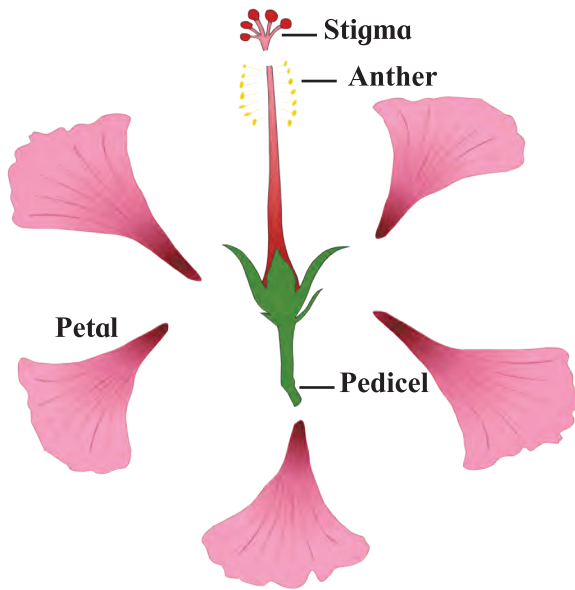
S. No.	Name of plant	Type of leaf	Shape of leaf-blade	Venation	Shape of leaf margin	Shape of leaf apex	Petiole Yes/no	Stipule Yes/no	Arrangement on stem
1.	Maize								
2.	Canna								
3.	Peepal								
4.									



**Try this.**

1. Carefully observe a fully opened hibiscus flower.

**Flower**



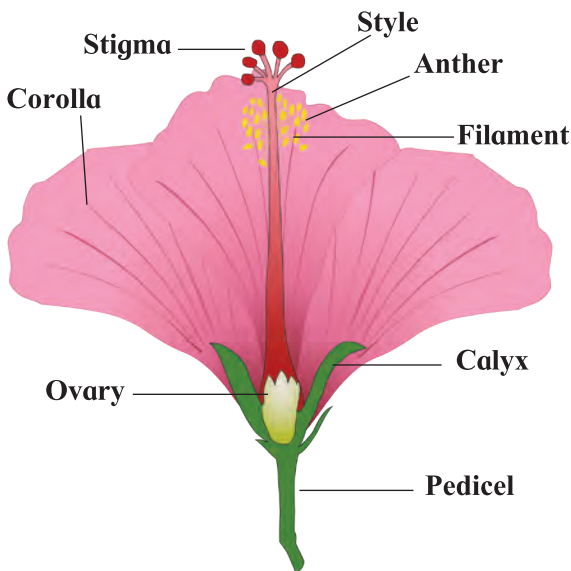
Flowers may have a long or a short stalk called pedicel. One end of the pedicel is attached to the stem. The other end of the pedicel is expanded and swollen. It is called the receptacle. Petals and other parts of the flower are supported on the receptacle. Calyx, corolla, androecium, gynoecium are different parts of a flower.

**Calyx :** In the bud condition the petals are covered by leaf-like parts called sepals which are green in colour. They form the calyx.

**Corolla :** This is made up of colourful parts called petals. Observe the shape, colour and smell of the corolla of various flowers like the rose, chrysanthemum, hibiscus, *mogara*, *kanher*, *tagar*, etc.

**Androecium :** This is the male reproductive part of the flower. It consists of stamens. Each stamen is made up of anther and filament.

**Gynoecium :** This is the female reproductive part of the flower. This is made up of carpels. A carpel consists of stigma, style and ovary.



2. Take a vertical section of a hibiscus flower with the help of a sharp blade, by cutting the flower vertically from stigma to pedicel. Both sections of the flower will be seen to have the same structure.

After maturity, anthers burst and the pollen grains which are released fall on the stigma. This process is called pollination. Due to pollination, ovules (egg cells) in the ovary get fertilized. Fertilized ovules form the seeds and the ovary develops into a fruit.

2.10 Vertical section of a hibiscus flower



**Use your brain power !**

Of what use to a plant are the insects flitting about around its flowers?

Observe the various flowers and complete following chart.

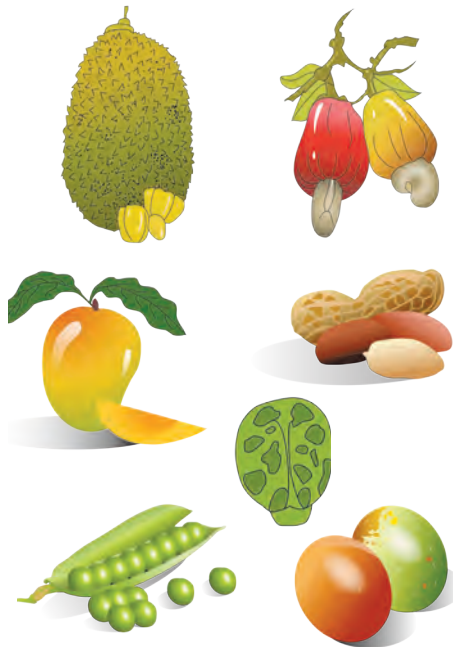
Name of flower	Number of Sepals	Sepals – free/united	Number of petals	Petals free/united	Form of androecium and gynaecium

## Fruit

We eat many different types of fruits. Each type of fruit has its own characteristics. There are variations in their shape, colour, taste, etc. Mango contains only one seed where as jackfruit consists of many small fruitlets, each with its own seed.

Observe the fruits of *ber* (ziziphus), mango, chikoo, apple, etc. What do you observe? Each fruit has a different skin or shell, fleshy part and seed. In case of fruits like cashew, its seed is outside the fruit.

Soak the seeds of, pea, wheat, rice, jowar, groundnut in water for 3-4 hrs. Press the seeds with your fingers and observe them. Which seeds get divided into two equal parts? Seeds which get divided into two equal parts are called dicotyledonous seeds. Seeds which do not divide into two equal parts are called monocotyledonous seeds.



2.11 Various fruits and seeds



### 1. Give examples of 3 plants that have :

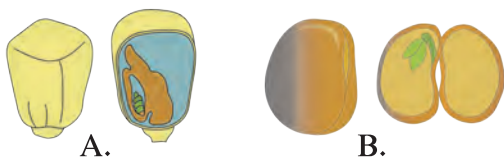
- (a) spiny fruits
- (b) spiny stem
- (c) red flowers
- (d) yellow flowers
- (e) leaves which close at night
- (f) single-seeded fruits
- (g) many-seeded fruits

### 2. Observe any one flower and its various parts and describe it in your own words.

### 3. What are the similarities and differences between?

- (a) jowar and moong
- (b) onion and coriander
- (c) leaves of banana and mango
- (d) coconut tree and jowar stalk plant

### 4. Explain the following images in your own words.



### 5. Describe the functions of various parts of a plant.

### 6. Certain properties are mentioned below. Find a leaf corresponding to each property and describe those plants.

leaves with smooth surface, leaves with rough surface, fleshy leaf, spines on leaf.

### 7. Find the plant parts.

r	b	u	d	x	s	r	f
o	w	p	y	e	t	a	l
o	l	l	d	n	e	d	o
t	a	o	i	l	m	i	w
c	n	e	t	a	l	c	e
a	v	o	v	u	m	l	r
p	e	t	a	l	s	e	o
r	o	o	t	h	a	i	r

**Activity :** Sketch various types of leaves in Paintbrush on the computer and save the sketches in a folder of your own name.



### 3. Properties of Natural Resources



Let's recall.

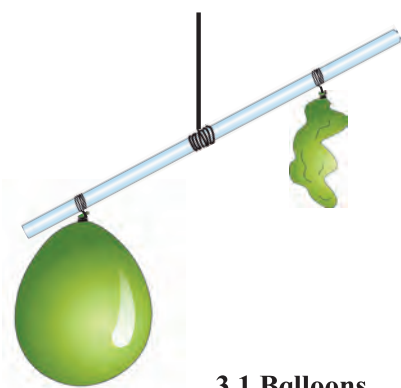
1. Which are the gases present in air? Why is air called a homogeneous mixture?
2. What are the uses of the various gases in air?

#### Properties of air

Air is all around us. We cannot see it, yet we feel the presence of air. When we inhale, air is taken in through the nose. If we blow on our hand through our lips, we can feel the air.



Try this.



3.1 Balloons

1. Take a stick from a broom or a paper or plastic straw. Tie a thread at its centre and hang it so that it remains horizontal.

Tie two rubber balloons of the same size at the two ends of the stick. See to it that the stick remains horizontal. Now remove one balloon, inflate it and tie it again at its original position. Does the stick remain horizontal? The stick goes down on the side of the inflated balloon. This means that air has weight. Air is a mixture of gases. Therefore, like all other matter, it has **mass** and **weight**.

2. Take an injection syringe without the needle. Pull its piston and observe it as you do so.

The piston can be pulled out easily. The piston then remains in that position even if you let it go. Now, close the inlet hole of the syringe tightly with your thumb, pull the piston and let it go. Is the force required to pull out the piston more or less than before? Does the piston remain as it is after you let it go.

The molecules of the gases in the air are in constant motion. When these molecules strike a body, they create pressure on that body. This is the pressure of air that we call '**atmospheric pressure**'.

On pulling the piston with the inlet hole of the syringe closed, more space becomes available to the air in the syringe, and it becomes rarified. As a result, the pressure of the air in the syringe is lowered. Comparatively the pressure of the outside air is very high. That is why, when the pulled out piston is released, it is immediately pushed in. If this experiment is repeated, holding the syringe in different positions like vertical, horizontal or inclined, the piston is found to go in to the same extent in all the cases. From this, we can infer that **atmospheric pressure is the same in all the directions**.



3.2 Air pressure



### Find out.

Is there any atmospheric pressure on the moon?



### Do you know?

Under ordinary conditions, atmospheric pressure at sea level is about 1,01,400 Newtons per square metre. It can be measured with the help of a barometer. As we go higher above sea level atmospheric pressure decreases.

### A Little Fun!

Place a piece of cardboard on the mouth of a glass filled completely with water. Holding the cardboard firmly in place with one hand, invert the glass quickly. Take your hand away from the card board. What do you see?

### Great Scientists

In 1726, the Swedish scientist Daniel Bernoulli put forth the important principle that the pressure of air decreases when its velocity increases while the pressure of air increases when its velocity decreases. If a body is moving through air, the air pressure decreases perpendicular to the direction of the motion and then the air in its surroundings flows rapidly from higher pressure to the lower pressure.

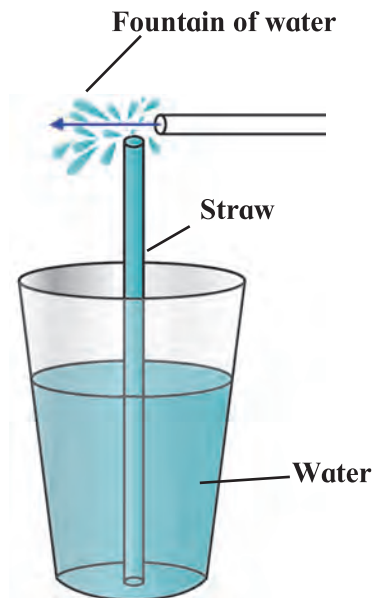
Download a photograph of Daniel Bernoulli from the internet, print and paste it here. What commands did you give the computer to do this?



### Observe and discuss.

Take some water in a plastic cup and hold a straw upright in it. Hold a small piece of another straw near the upper end of the first straw and perpendicular to that straw. Blow hard through the small piece of straw. You will see a fountain of water. Why did this happen?

On blowing through the straw, the air at its open end is pushed away and hence the pressure of the air at the opening goes down. As the pressure of the air near the upper end of the erect straw becomes less than atmospheric pressure, the water in the cup is pushed from where the pressure is higher to where it is lower, that is, in the upward direction, and the water comes out in the form of a fountain. The more forcefully you blow the higher will be the fountain. This straw fountain works on Bernoulli's principle.



3.3 Effect of air pressure



### Use your brain power!

What is the effect of increased temperature on the pressure of air?

When there exists a difference in the air pressure at two different places, the air starts flowing from the place of higher pressure to the place of lower pressure. At such times, we feel a breeze or a wind blowing. Thus, winds are an effect of the difference in air pressure. You will learn more about this in the lesson called 'Winds', in Geography.



**Try this.**



Take ice-cubes in a glass upto three-fourths of its height. Now observe what happens. How did the water droplets appear on the outside of the glass?

Due to the ice cubes in the glass, the air surrounding the glass cools down. As the water vapour in this air cools down, it condenses and gets transformed into water. It is this water that collects on the outer surface of the glass.

The level of humidity is different in different places. Similarly, the humidity levels also change from time to time during the period of a single day.

The level of humidity of the air is determined by its capacity to hold water vapour. During the night or at dawn, when the temperature of air is low, its capacity to hold the vapour is less. At such times, the excess vapour is transformed

### 3.4 Water droplets collected outside the glass

into water droplets. This is what we call dew.

In the afternoon, when the temperature of the air is high, the capacity of the air to hold the moisture also increases. Then, compared to its full capacity to hold water, the proportion of moisture in the air is less and we feel that the air is dry.

The proportion of water vapour in the air is high during the monsoons and in coastal areas. As a result, we feel the dampness or humidity.

In summer, wet clothes dry quickly, but in the rains, they do not. Why is this so?



**Use your brain power!**

1. Dip an uncorked inverted empty bottle in a slanting position into the water in a wide container. What do you observe?



**Try this.**

2. What change takes place in a balloon on filling air in it?



We come to know from the activities above, that air has properties like occupying space, having a certain volume, having mass and weight.

Air is a mixture of very fine particles of some gases, dust, smoke and moisture. When rays of light fall on these minute particles, the particles spread the light in all the directions. This natural phenomenon is called **scattering of light**.

### 3.5 Properties of air

## Temperature regulation

The earth receives energy from the sun. This energy is reflected by the earth in the form of heat. The constituents of air surrounding the earth, such as water vapour, carbon dioxide, absorb a part of this heat and give it to the other constituents of air. As a result, the earth's surface remains warm and thereby becomes suitable for the living world on the earth. If there were no air on the earth, the average temperature of the earth's surface would have been very low.



### Use your brain power!

1. What would happen if all the air surrounding us is removed?
2. Will sound be heard in space?

## Transmission of sound

All the sounds that we hear reach us through the surrounding air. The density of air also changes due to change in its temperature. In winter, the density of the air increases. We can hear the whistle of a distant train clearly early in the morning in winter. Air is useful as a medium for the transmission of sound.

## Properties of water



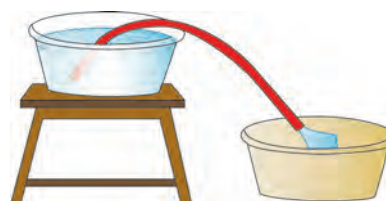
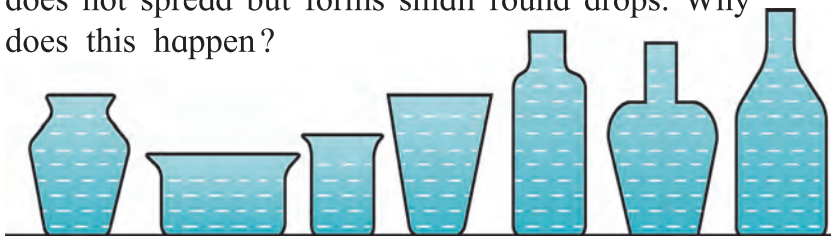
### Let's recall.

1. What are the states in which water is found?

What inference will you draw from the pictures alongside?

Water occurs in liquid state under ordinary conditions. Water is a fluid substance. Water does not have its own shape, but has a volume. It can pass through small holes or seep through very small gaps or cracks.

On pouring water in an oil-cladded dish, water does not spread but forms small round drops. Why does this happen?



### 3.6 Properties of water



### Try this.

1. Take a plastic bottle, more than half full of water. Mark the water level on the bottle. Keep this bottle upright in the freezer for making ice. Open the freezer after a couple of hours and observe. You will see that the water has changed into ice. Note the level of the ice. You will find that the ice-level is higher than the water-level before freezing. What can you infer from this?

As water freezes to form ice, it expands and its volume increases. On freezing, how much was the increase in the volume of the water? In what proportion did it increase?



2. Take a bucket of water. Drop many different kinds of articles in it. Make separate lists of the articles which sink in the water and those that float on it.

3. Take some water in a pot and add a few pieces of ice to it. Observe what happens.

Why do we see the ice float on water?

Ice is lighter than water. When water freezes to form ice, it becomes lighter than the original liquid. When water freezes, that is, when it transforms into the solid state, its volume increases. Therefore, the density of ice is less than that of water. That is why the ice floats on water.



3.7 Density of water

### Density of water

The inter-relation between the volume and mass of a substance : the space occupied by a substance is its volume. The store of matter in a substance is its mass.

$$\text{Density} = \frac{\text{mass}}{\text{volume}}$$

Mass is measured in grams and volume in cubic centimetres. Hence,

$$\text{density} = \frac{\text{gm}}{\text{cc}}$$

Hence, g/cc is the unit of density. If the mass of 1 litre of water is 1 kilogram, then what is the density of water?

**Think :** Will the mass of water change when its state changes during the transformation of liquid water into ice?

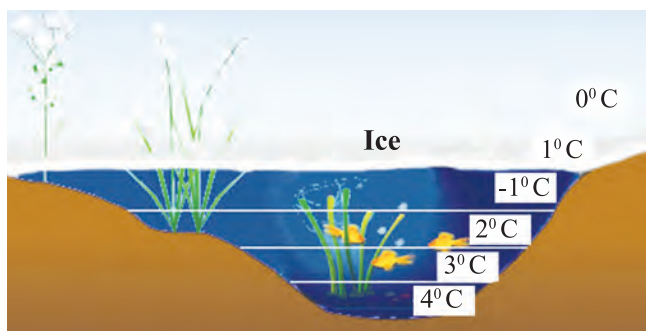
### Anomalous behaviour of water

Usually, when the temperature of a substance is lowered, its density increases as the volume decreases; but water is an exception to this rule.

4. Keep a glass full of water in the freezer for five to ten minutes. Then take it out and observe it carefully.

From which part in the glass does the water first start freezing?

The density of water is peculiar. When water at normal temperature starts cooling, its density increases like that of most liquids. However, if its temperature falls below 4<sup>0</sup> C its density starts decreasing. This means that the density of water is maximum at 4<sup>0</sup> C. If the temperature of water is lowered below 4<sup>0</sup> C, its density decreases and volume increases. It means that water expands when the temperature falls below 4<sup>0</sup> C. This is called the **anomalous behaviour** of water.



3.8 Anomalous behaviour

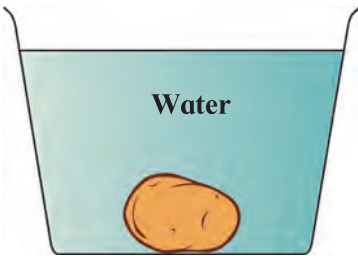


### Use your brain power!

In cold countries, how do aquatic animals remain alive even after the rivers or lakes freeze in winter?



### Try this.



A



B

### 3.9 Effect of density

Take two big glasses of water. Add 4-5 spoonfuls of salt to the water in one glass and dissolve it completely. Now place a potato in the water in the second glass. The potato will sink.

Take out the potato from that glass and put it in the salt water and observe. The density of water in that glass is greater due to the dissolved salt. The potato floats in that water because of the increased density.

Why is it easier to swim in the sea than in a well or a lake?

In the above activity the salt dissolves in the water in the glass, that is, it disappears. What happens when it disappears like this?

When the salt dissolves in water, its particles spread in water. Slowly they become smaller and smaller. Ultimately they become so small that they cannot be seen, that is, they mix completely with water. This is what is called dissolving.

**Solute** : the substance that dissolves - **Salt**

**Solvent** : the substance in which the solute dissolves - **Water**

**Solution** : what we get when the solute dissolves in the solvent.

### Uses of water according to its properties

1. Water is useful for water transport due to its fluidity. Water falling down from a height is used to generate electricity with the help of a generator.
2. Water is a good coolant and is used in motor vehicles to control the temperature of the engine.
3. Many substances are soluble in water. Water is a universal solvent. Water is used as a solvent in factories, laboratories, foodstuffs and in various types of biological processes occurring in the body such as digestion, excretion, etc.
4. Water is useful for cleaning purposes such as for bathing, washing clothes.

### Soil



### Let's recall.

1. What is meant by soil? How is soil formed?
2. What are the ingredients of soil?

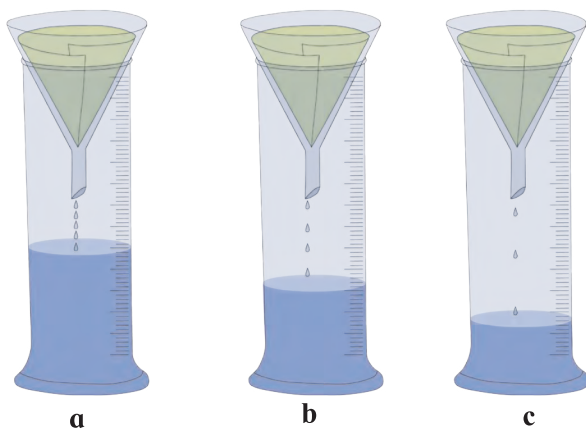
## Properties of soil

Colour is an important property of soil. The soil gets its colour as a result of several processes. The colour of soil near land surface is darker than the colour of the lower layers. Soil may be of different colours, such as black, red, copper, yellow, gray.

The colours of soil are useful for its classification. Besides, they are indirectly useful in indicating several properties of the land. In this way, the properties of the soil such as its fertility, drainage of water, capacity to hold water become clear from its colour. The colour of the soil depends upon its texture and its organic ingredients as well as on chemical ingredients like iron, lime.



**Try this.**



3.11 Collected water

**Apparatus :** Three measuring cylinders, three glass funnels, filter paper, water, fine sand, coarse sand, soil from an earthen pot used for growing plants, etc.

**Procedure :** Fit cones of the filter paper in the three glass funnels. Fill the cones with equal quantities of (a) sand (b), sandy soil and (c) clay respectively. Place the funnels on the measuring cylinders. Pour one test tube of water into each of the funnels and observe how much water is collected in each measuring cylinder. What inference will you draw from this?

## Soil texture

Soil contains particles of different sizes. The texture of the soil is determined by the proportion of particles of the various sizes in it. Following are the types of soil on the basis of its texture.

**Sandy soil :** The proportion of sand, i.e., large particles is high in sandy soil. Water drains rapidly through sandy soil. **It is easy to plough this soil.** But it is less fertile. This is because the particles of sandy soil are made of the mineral called silicon dioxide (quartz). These particles do not dissolve in water and, therefore, the soil has very little capacity to supply nutrients.

**Silt soil :** The particles of silt soil are of medium size. Silt soil is not as ploughable as sandy soil. However, it is much more ploughable than clay soil. This soil contains a large proportion of organic materials. Its capacity to supply nutrients is much greater. Silt soil is also called sedimentary soil.

**Clay soil :** In this soil, the proportion of small particles is maximum. The particles of clay soil feel smooth to touch. Clay soil has a high water holding capacity.



3.12 Types of soil



### Use your brain power!

1. Why is it difficult to plough clay soil?
2. Why is it easy to plough sandy soil?
3. What is the water holding capacity of silt soil?
4. Which soil is suitable for cultivation? Why?

### Soil structure

The structure of soil depends upon the different shapes of the particles in it. Soil occurs in the form of columnar, laminar, granular as well as block-shaped structures.

#### Importance of soil structure

The fertility of soil depends upon soil structure. The advantages of good soil structure are as follows :

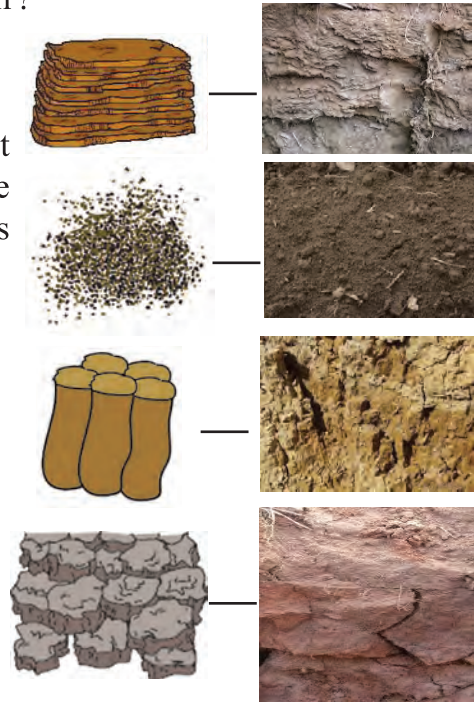
1. Roots get a sufficient supply of oxygen.
2. Water drainage is good. Therefore, the roots of plants grow well.

### Uses of soil

1. **Plant conservation** : To help plants grow.
2. **Water conservation** : Soil holds water. As a result, by means of bunds and lakes, we can get water for use throughout the year.
3. **Plasticity** : Soil can be given any required shape. This property of soil is called plasticity. Because of its plasticity, we can use it to make articles of a variety of shapes. These articles can be baked to make them hard. Water storage earthen pots, earthen lamps, idols, bricks, etc. are articles made from soil.

#### Some useful types of soil

1. **China clay : (Kaolin)** It is white in colour. It is used to make crockery, bathroom tiles, tanks, laboratory apparatus, masks, jars, etc.
2. **Shadu soil** : It is whitish in colour. It is used for making statues and idols.
3. **Terracotta soil** : This soil is red in colour. Decorative articles and pots used for growing plants are made from this soil.
4. **Multani soil** : This soil is used in cosmetics.



3.13 Soil structure



3.14 Uses of soil



### Do you know?

China clay is an industrial mineral of the type 'Kaolinite'. It is found in China and hence called China clay. Upon heating, this soil acquires a glaze and hardness and, therefore, is used for making crockery.

### Soil testing

The proportions of the various ingredients of soil can be determined by 'soil testing'. During soil testing, the soil is examined for colour, texture and the proportion of organic matter in it. Soil is tested to find out if there is a deficiency of any ingredients and to decide what measures should be taken to remove the deficiency.

The soil sample collected for testing is dried in an open space in the shade for eight to ten days. It is then sifted through a sieve.

Two tests, namely, the pH and the electrical conductivity tests, are particularly useful in finding out the characteristics of soil. You can determine the fertility of the soil in your fields with the help of different tests.

### Causes of diminished soil fertility:

1. Soil pH less than 6 or higher than 8.
2. Low proportion of organic matter.
3. No proper drainage of water.
4. Repeated cultivation of the same crop.
5. Continuous use of saline water.
6. Excessive use of chemical fertilizers and pesticides.

**World Soil Day : 5<sup>th</sup> December**  
**To make efforts for**  
**conservation of soil**

### Great Scientists

The Danish Scientist Sorensen put forth the concept of pH, based on the concentration of hydrogen ions. To determine the pH of soil, a mixture of water and soil in the proportion 1:2 is taken and tested using several indicators. Accordingly, soil may be found to be one of the following three types.

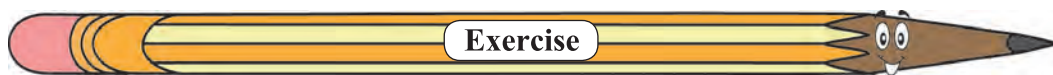
1. Acidic soil - pH less than 6.5
2. Neutral soil - pH 6.5-7.5
3. Alkaline soil - pH higher than 7.5



### Always remember –

Soil texture is disturbed if chemical fertilizers are used excessively and that land becomes unsuitable for sowing. Crops should be rotated in order to maintain the fertility of the land.

For example, the fertility of land decreases after a harvesting of wheat. Hence, leguminous crops like peanut, *moong*, *moth bean*, *pea*, lentil, Bengal gram, soyabean should be cultivated to restore the fertility of the soil.



**1. Fill in the blanks with the appropriate term.**

(Temperature, volume, mass, density, humidity, acidic, weight, neutral, shape.)

- (a) The capacity of air to hold moisture depends upon the ..... of the air.
- (b) Water does not have a ..... but has definite ..... and .....
- (c) While freezing, the ..... of water is lowered.
- (d) ..... soil has pH 7.

**2. Why is it said that –**

- (a) Air is a homogeneous mixture of various gases.
- (b) Water is a universal solvent.
- (c) There is no alternative to water for cleaning purposes.

**3. What will happen if....**

- (a) The amount of water vapour in the air increases.
- (b) Only one crop is grown repeatedly in the soil.

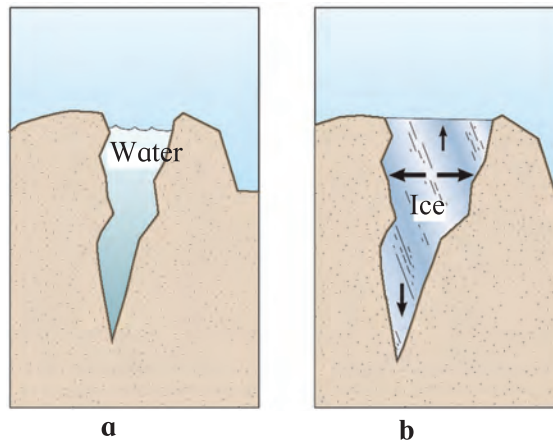
**4. With whom should I pair up?**

- | Group 'A' | Group 'B'                |
|-----------|--------------------------|
| (1) Air   | (a) Excretion            |
| (2) Water | (b) Scattering of light. |
| (3) Soil  | (c) Plasticity           |

**5. State whether the following statements are true or false.**

- (a) Sandy soil has low capacity for holding water.
- (b) Sea water is a bad conductor of electricity.
- (c) The substance in which a solute dissolves is called a solvent.
- (d) The pressure exerted by air is called atmospheric pressure.

**6. Explain the picture in your own words.**



**7. Write answers to the following questions in your own words.**

- (a) How is light scattered by the air?
- (b) Explain the various properties of water.
- (c) Why is the density of seawater more than that of rain water?
- (d) What is the importance of good soil structure?
- (e) What are the various uses of soil?
- (f) What is the need and importance of soil testing from the point of view of farmers?
- (g) What is the importance of air in transmission of sound?
- (h) Why should a glass bottle completely filled with water never be kept in a freezer?

**Project :**

Visit a soil testing laboratory. Learn the process of soil testing and share it with others.

