

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?

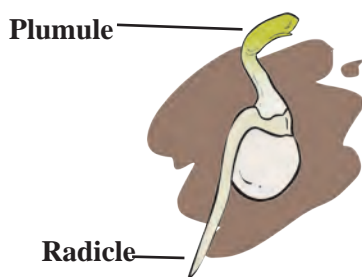
The root, stem, leaves, flowers, fruits, etc. of different plants are different. We can identify plants with the help of these different characteristics. Let us now acquaint ourselves with these plant organs in greater detail.

Root



Try this.

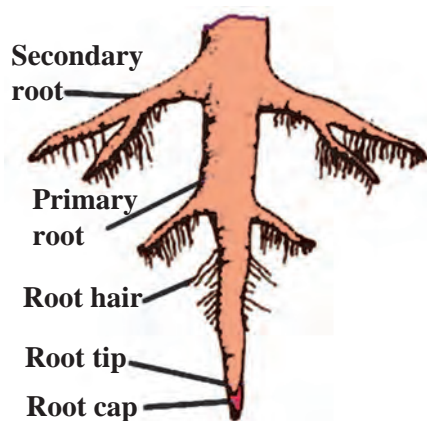
1. Keep a moistened ball of crumpled paper in a conical flask. Place some soaked *moth* beans/gram seeds in the flask between the paper and the glass wall. Observe and note the changes in the seeds in two or three days.



2.1 Formation of root

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**'.



2.2 Tap 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**.

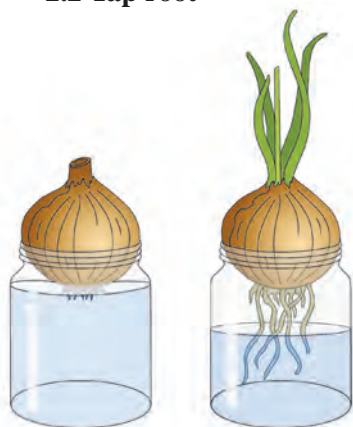
Roots bear hair-like processes near the root tips. These are **root hairs**. The root tip is delicate. This is the region of the growth of the root. The tip is covered by cap-like structure called the **root cap**. The root-cap protects the root-tip from injuries.

(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



2.3 Fibrous roots

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.



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.

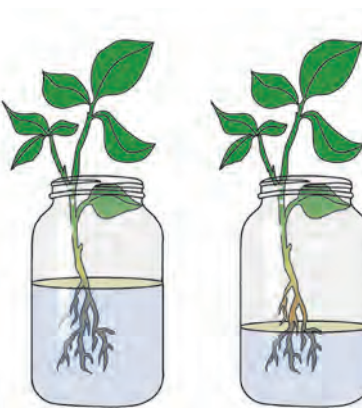
Techno-support

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.



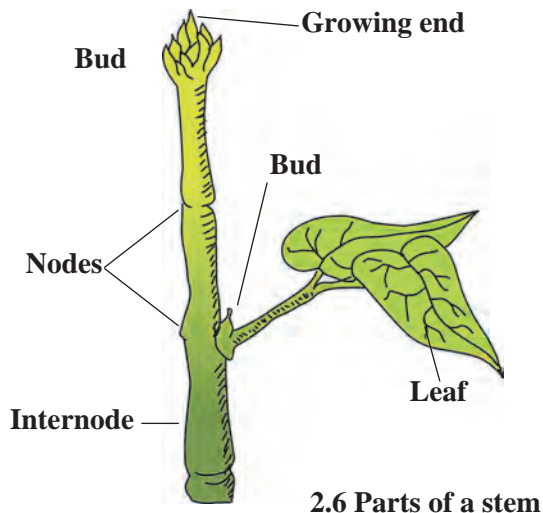
2.4 Maize stalk



2.5 Water level

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.



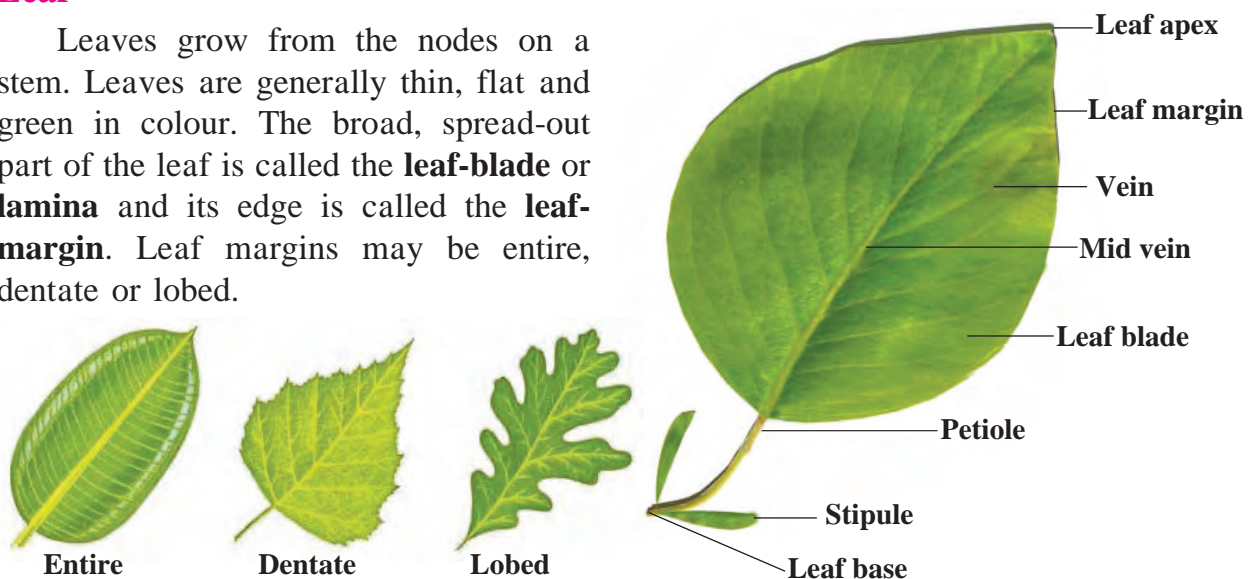
2.6 Parts of a stem

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**.

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



2.9 Leaves

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.									

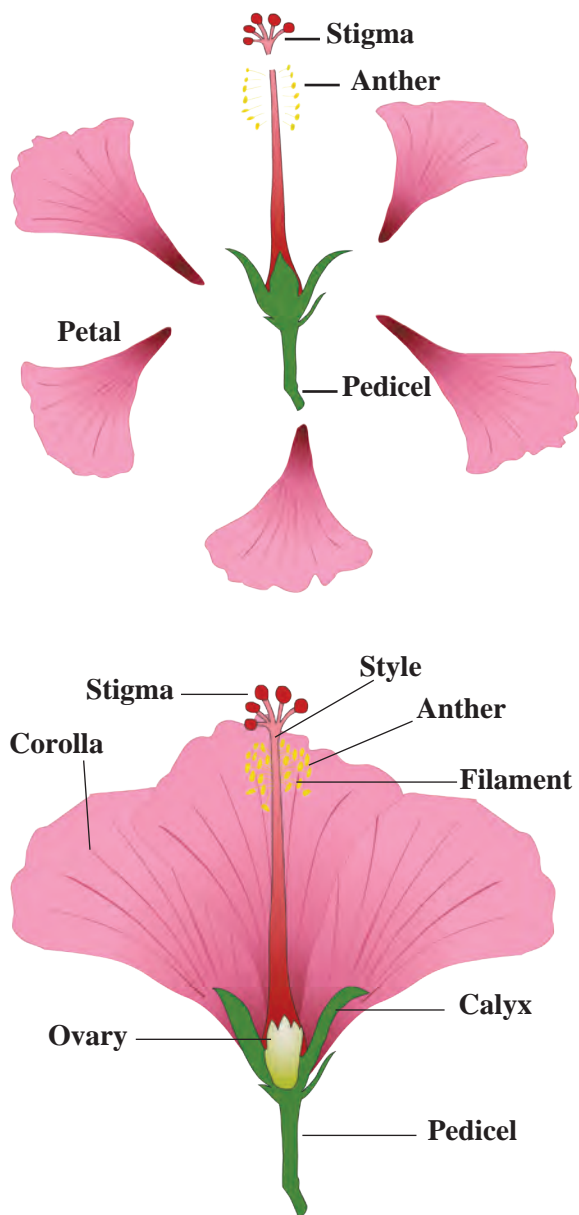


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Try this.

Flower



2.10 Vertical section of a hibiscus flower

1. Carefully observe a fully opened hibiscus 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.



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.

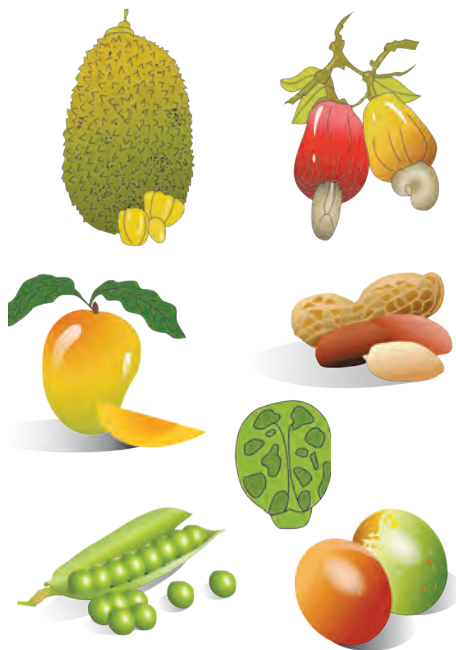
Name of flower	Number of Sepals	Sepals – free/united	Number of petals	Petals free/united	Form of androecium and gynaecium

Fruit

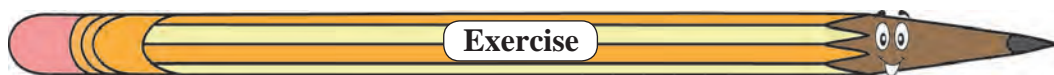
We eat many different types of fruits. Each type of fruit has its own characteristics. There are variations in their shape, colour, taste, etc. Mango contains only one seed where as jackfruit consists of many small fruitlets, each with its own seed.

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 :

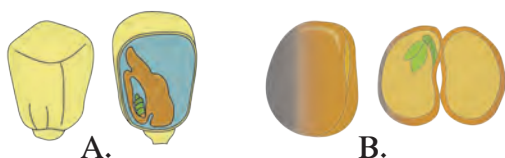
- spiny fruits
- spiny stem
- red flowers
- yellow flowers
- leaves which close at night
- single-seeded fruits
- many-seeded fruits

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

3. What are the similarities and differences between?

- jowar and moong
- onion and coriander
- leaves of banana and mango
- 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.

