

6

Plants in the Surrounding and Environment

We'll cover the following key points:

- Parts of a Plant
- The Root System
- The Shoot System
- Photosynthesis and Transpiration
- Uses of Plants



Hi, I'm EeeBee

Do you Remember:

Fundamental concept in previous class.

In class 3rd we learnt

- Parts of a Plant

In class 2nd we learnt

- Parts of a Plant
- Seeds

Still curious?
Talk to me by
scanning
the QR code.



Learning Outcomes

By the end of this chapter, students will be able to:

- Explain the structure and role of the root system in supporting plant growth and nutrient absorption.
- Understand the structure and functions of the shoot system, including stems, leaves, and flowers.
- Describe the processes of photosynthesis and transpiration and their importance in plant survival.
- Identify the various uses of plants in human life, including food, medicine, and other resources.

Guidelines for Teachers

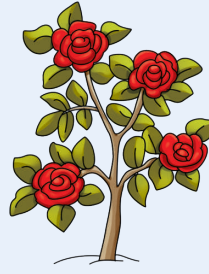
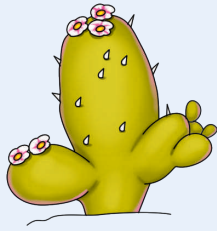
The teacher can start the chapter by explaining the importance of plants in the environment and their role in supporting life on Earth. Use diagrams or models to illustrate the different parts of a plant and their functions. Highlight the root and shoot systems, explaining their specific roles in plant growth and survival. Demonstrate the process of photosynthesis with simple experiments, like using a plant in a closed environment to show oxygen release. Discuss transpiration and its role in maintaining water balance in plants. Encourage students to explore the various uses of plants in daily life, such as in food, clothing, and medicine, with real-world examples.



Warm Up

Experiential Learning

Look at the pictures and name these plants



Fun Fact

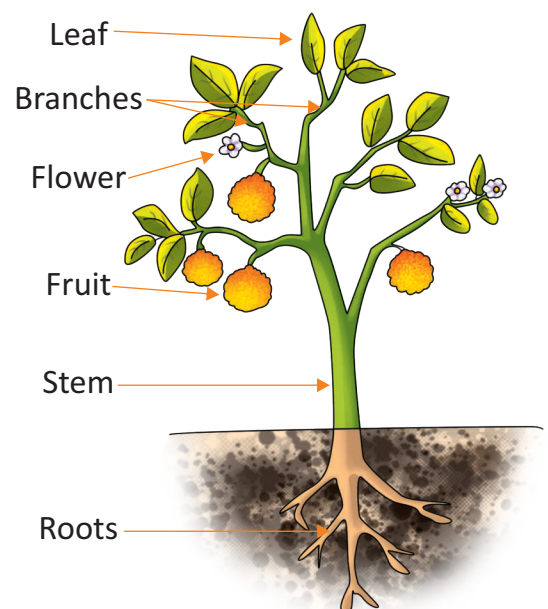
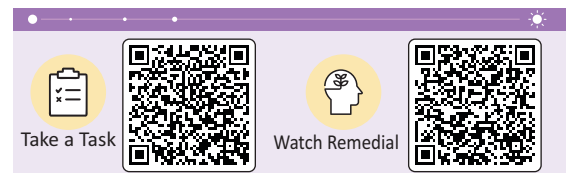


Bamboo is one of the fastest-growing plants in the world. Some species can grow up to 3 feet in just 24 hours! Bamboo is actually a type of grass, not a tree, and its fast growth makes it a renewable resource for building materials, clothing, and even food. It's nature's rapid builder!

Parts of a Plant

Plants play a very important role on earth. They provide food and oxygen to all other living things. Plants are seen almost everywhere. They grow on land, on mountains, in deserts and under the sea. We know plants grow mostly from seeds when they get enough water, sunlight and air.

Plants have different parts just like we have. We have arms, legs, a heart and lungs to help us survive. Each of our body parts has a certain job to do. Plants too have different parts, each with its own job to do. They must have roots, stems, leaves and bear flowers and fruits. Each part of the plant must do its job so the plant can stay healthy and grow.



Parts of a plant

The portion of the plant that grows above the ground is the **shoot** and that grows below the soil is called the **root**.

The “Typical” Plant Body consists of 2 systems

The Root System
(usually underground)

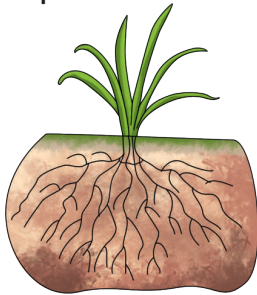
The Shoot System
(usually above the ground)

The Root System

Root is the underground part of the plant’s body and grows towards the force of gravity. It fixes the plant within the soil and absorbs water and mineral nutrients from the soil. It stores excess food.

There are two main kinds of roots:

Tap Roots : It consists of one main long thick root growing downwards from which many thinner roots develop. Tap root goes deep into the soil in search of water and minerals. Sugar beet or carrot, bean, tea, peepal etc. have tap roots.

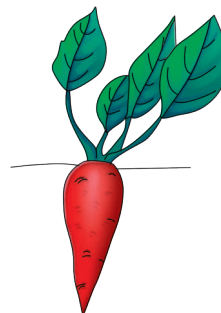


Fibrous Roots

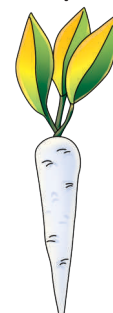
Fibrous Roots : In case of fibrous root there is no main root. It consists of a dense equal size roots that arise from the stem. The roots grow downward and outward from the stem, branching repeatedly to form a mass of fine roots. Fibrous root does go very deep in the soil. Lilies, grasses, wheat, rice, palm and onion etc. have fibrous root.

Functions of Roots

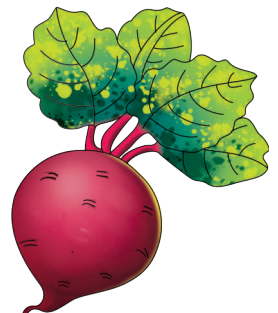
- ✦ Roots attach the plant body to the ground. It provides support to the plant and helps in holding the plant firmly in the ground.
- ✦ Root hairs of the plant absorb water and mineral from the soil and pass it to the stem.
- ✦ Some roots like carrot, radish and beetroot etc. store food prepared by the plant. We eat these roots.
- ✦ Roots bind the soil which otherwise may be blown away by wind or washed away by water. Roots prevent soil erosion.



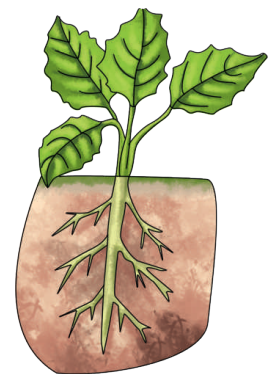
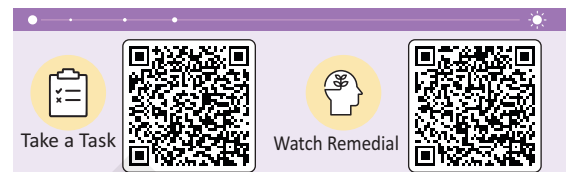
Carrot



Radish



Beetroot



Tap Roots

The Shoot System

It is the **aerial** part of the plant body and enables a plant to grow taller to get sunlight, and helps plant to prepare food. It is composed of erect stems on which are attached leaves, flowers, fruits, branches and buds. Leaves are attached to the stem at regions called **nodes**.

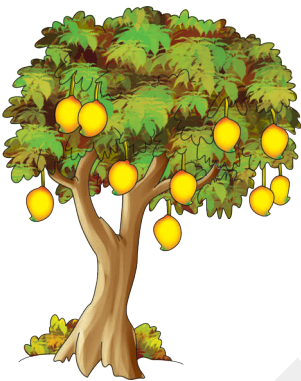
The Stem

It supports the upper parts of plants. It carries the water and nutrients from roots to leaves needed for plants to grow and food produced by the leaves to other part of plants. Big trees like neem, mango, peepal etc. have strong, thick and woody stem. Such stem is called **trunk**.

Did you know ?

The tallest tree ever was an Australian eucalyptus – In 1872 it was measured at 435 feet tall.

Bushes such as rose and hibiscus have thin and hard stem. Some plant have thick but soft stem, **example** : Banana. While herbs such as tomato and mint have soft, greens stem. Climbers and creepers have weak, soft and green stems and cannot hold the plant upright.



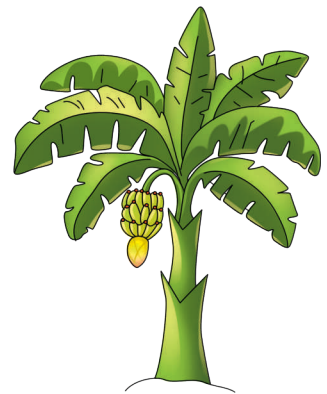
Mango tree



Peepal tree

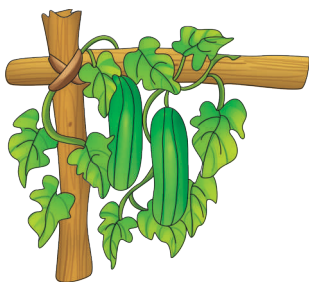


Neem tree



Banana tree

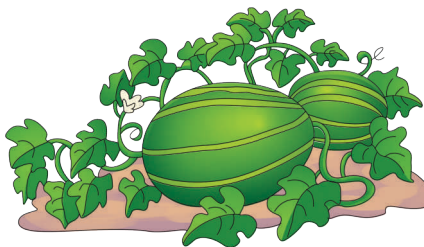
Creepers spread on the ground. Example: watermelon, strawberry, pumpkin etc. Climbers need support to climb. Examples: money plant, cucumber, pea plant etc.



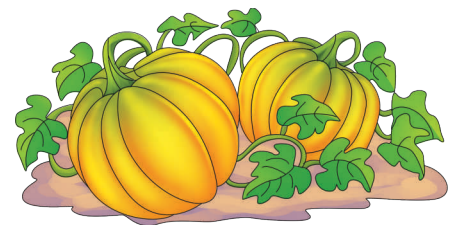
Cucumber plant



Grapevine



Watermelon plant



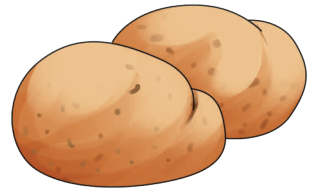
Pumpkin plant

Functions of Stem

- ✦ The stem provides support to a plant above the ground. It bears branches, leaves, buds, flowers and fruits.
- ✦ Stem transports water and minerals from root to other parts of the plants. It also transports food prepared by the leaves to different parts of the plants.
- ✦ Some underground stems store food such as sugarcane, potato, ginger etc.



Sugarcane

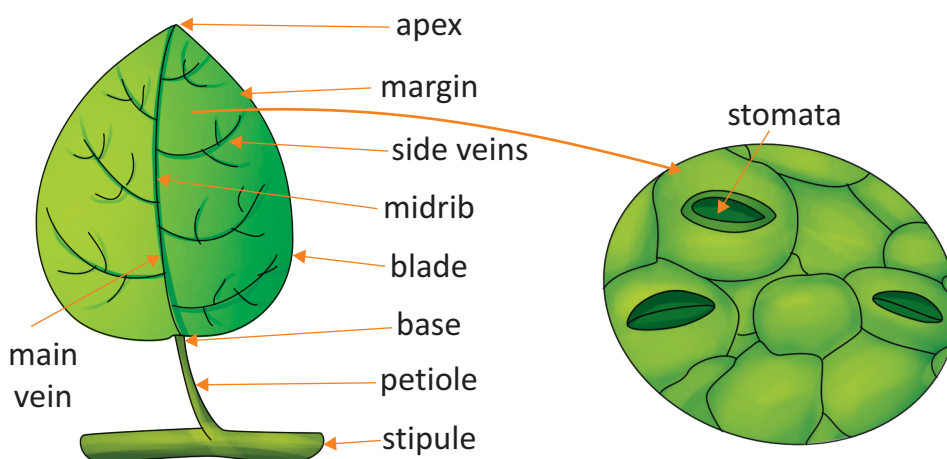


Potato

The Leaf

Leaves are of different shapes and sizes. They are an important part of plants as they manufacture food for the plants and are therefore known as the 'kitchen of the plant'. Leaves are mostly green in colour due to the presence of a green substance called **chlorophyll** that can absorb sunlight. The outer surface of the leaf has a waxy coating which protects the leaf. The different parts of a leaf are:

- ✦ The flat surface of the leaf is called leaf blade or lamina. It has veins running across within the leaf.
- ✦ The main vein or midrib runs through the middle of the leaf.
- ✦ The side veins are thinner tubes that come out of the midrib and spread throughout the leaf blade. It is through these veins that water is carried to the leaf. They also carry food from the leaf to all parts of the plant.
- ✦ The part that attaches the leaf to a branch or a stem is called the leaf stalk. It is also called the petiole.
- ✦ Tiny opening on the surface of the leaves called stomata (singular : stoma) helps in taking in and giving out air. Stomata can be seen only under a microscope.



Did you know ?

Plants also need minerals from the soil to grow. Nitrogen helps them grow and make leaves. Phosphorus helps to grow strong roots. Potassium helps the plant make fruit and it keeps them healthy.

Functions of the Leaf

- ✦ These are the parts of the plant where food is made by the process of **photosynthesis**. That's why leaves are called the food making factories of green plants.
- ✦ Leaves give out oxygen in the process of photosynthesis. All living beings need oxygen to live.
- ✦ Some leaves store food in them such as mint, cabbage etc.

Check 'N' Mate

Critical Thinking

Write 'T' for true and 'F' for false statements.

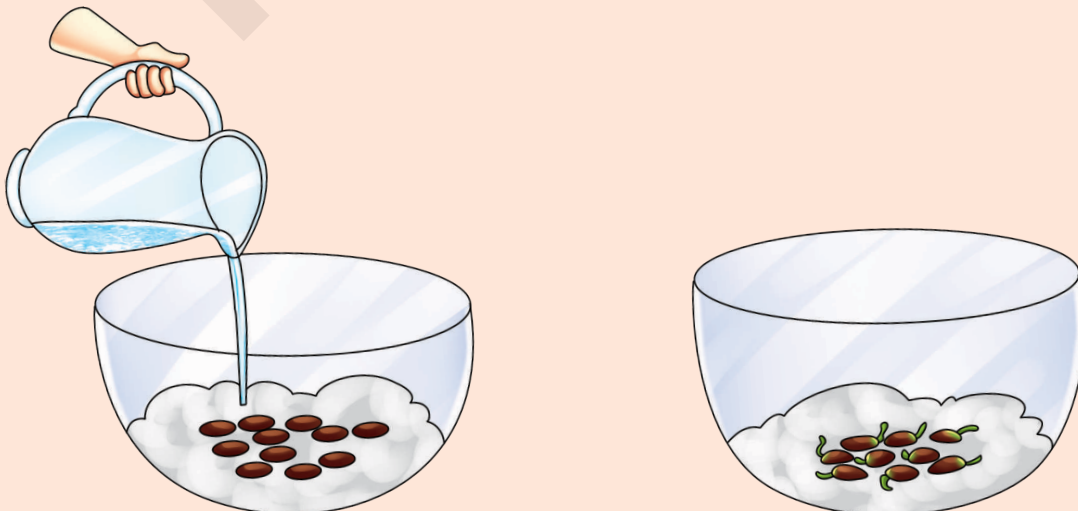
1. Plants have different parts, each with its own job to do. ☐
2. Taproot goes deep into the soil for searching water and minerals. ☐
3. Stem supports the lower part of a plant. ☐
4. Leaves manufacture food for plants and they are called kitchen of the plant. ☐

Activity

Creative Learning

Try out this activity, take a small plastic bowl and place some wet cotton in it. Put some moong on it. Keep the cotton wet but don't add much water. Place the bowl in warm place. Leave it for a few days. What do you observe? Do you see something coming out of the seeds?

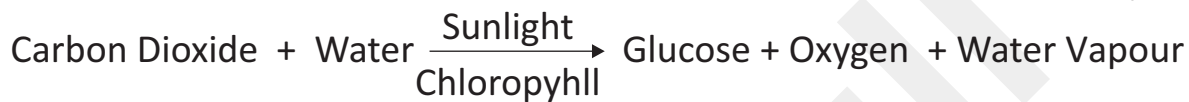
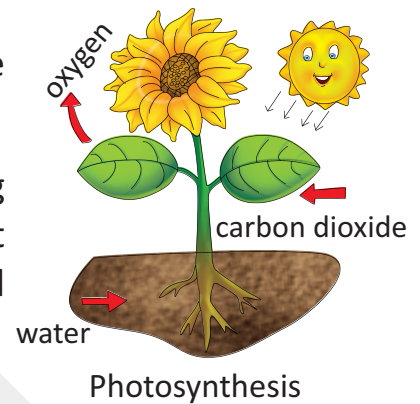
We can see a tiny plant coming out from a seed. This young plant developing out from the seed is called **seedling**. A typical seedling has 3 main parts: root, shoot and leaves. Sprouting of seedling from a seed is called **germination**.



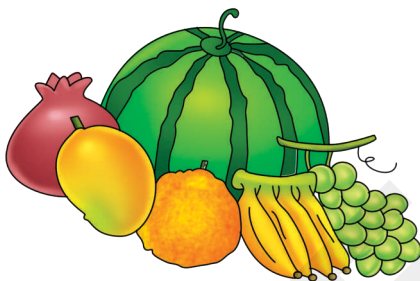
Photosynthesis: The Process of Making Food

Plants are called **autotrophs** because they can make their own food. By taking in water (H₂O) through the roots, carbon dioxide (CO₂) from the air, and light energy from the Sun, plants can perform photosynthesis to make glucose (sugars) and oxygen (O₂).

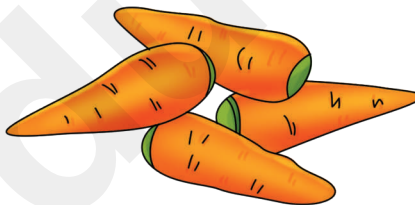
This process by which green plants prepare their own food using carbon dioxide, water and minerals in the presence of sunlight and chlorophyll is called **photosynthesis**. 'Photo' means light and 'synthesis' means putting together.



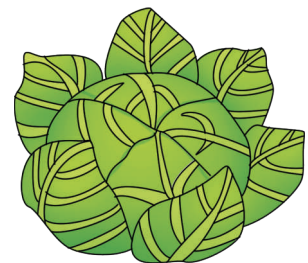
During the process of photosynthesis, the food that the leaf prepares is a kind of sugar called **glucose**. The glucose may further change to **starch** before the plant stores it in fruits, stems, roots or leaves.



Fruits



Carrots



Cabbage

The oxygen that is given off into the atmosphere through the stomata during photosynthesis is necessary for animals and human beings to breathe in. Plants in turn use the carbon dioxide that we give out and purify the air.

At night, when there is no sunlight, plants do not make food. They then breathe in oxygen and give out carbon dioxide as animals and human beings do.

Transpiration: Releasing Water Vapour

Transpiration is the process of water movement through a plant and its evaporation from aerial parts, such as leaves, stems and flowers in the form of water vapour. Water is necessary for plants but only a small amount of water taken up by the roots is used for growth and metabolism. The remaining water is released by the plant through transpiration. This provides a cooling effect to the plants. Also, as the water is released, the

roots pull more water from the soil which also brings with it nutrients from the soil which are required by the plant.

To study transpiration you can do this simple experiment:

- ✦ On a warm sunny day put a clean dry plastic bag over a branch with leaves on it.
- ✦ Seal the bag closely to the branch.
- ✦ Observe for an hour. Water droplets can be seen in the plastic bag.



Transpiration in a plant

Uses of Plants

- 1. Food:** Plants are the main source of our food. We use different parts of different plants as food. Many food items such as cereals, pulses, vegetables, fruits, nuts, oils and spices are obtained from plants. We also get tea, coffee, sugar and cocoa beans from plants.
- 2. Medicines:** Many medicines are made from plants and these plants are called **medicinal plants**. Neem, tulsi, brahmi, surpagamdhya, banafsa, bail etc. are known as medicinal plants. We use these plants to cure patients suffering from various diseases.
- 3. Paper:** Bamboo, eucalyptus etc. are used to make paper for writing and printing purposes. Rags of cotton are also used to make paper.
- 4. Rubber:** Some plants give us gum like acacia, etc. We get rubber from rubber-plants. This rubber is used for making tyres for many vehicles. We erase pencil marks with the help of a rubber or eraser.
- 5. Wood:** We get timber and firewood from trees. Our chairs, tables, doors, windows, etc. are made of wood. The wood of trees like teak, shisham, sal etc. is essentially used to make different furnitures.
- 6. Cotton:** We get cotton from cotton plants. It is used to make all types of cotton clothes such as bed-sheets, towels etc.
- 7. Fibres:** There are some plants that give us fibre for making ropes, gunny-bags, etc. Hemp, jute etc. are such plants.
- 8. Perfumes:** Flowers of certain plants are used to make perfumes. The flowers of rose, jasmine etc. are good for making perfumes. Flowers are also used for different purposes like to make garlands and for other decorative purposes.
- 9. Pollution-remover:** Plants and trees save us from air-pollution. Green plants take the carbon dioxide from the air in the process of photosynthesis and give back oxygen to



the air. We breathe in oxygen from the air and give out carbon dioxide. Thus, we give carbon dioxide to the plants and they return us oxygen. Hence, air is saved from being polluted by carbon dioxide.

- 10. Manure:** Plant wastes are used to make manure. This manure is utilized for the growth of other plants and crops.

Check 'N' Mate



Critical Thinking

Fill in the blanks with correct words.

1. Glucose change into _____ (starch/fruit).
2. _____ (Roots/Stem) pull more water from the soil.
3. Bamboo, eucalyptus, etc. are used to make _____ (paper/clothes).

Activity

Creative Learning

Aim: To test the presence of starch in potato.

Materials required: A slice of potato, a dropper and iodine solution.

Procedure: Add a few drops of iodine solution over a slice of potato using the dropper.

Observation: The slice of potato turns blue-black.

Conclusion: This shows that potato contains starch.

This test can be performed using other food samples too. If the colour of iodine turns blue black that means it has starch and if it remains orange or yellow that means starch is not present.



In a Nutshell

- Roots fix the plant to the soil and provide water and minerals to the plant.
- The stem supports the plant and carries the water and nutrients from roots to leaves needed for plants to grow and food produced by the leaves to other part of plants.
- The green leaves contain chlorophyll and helps the plant to prepare food by the process of photosynthesis.
- Plants use some of the food for growth and metabolism and store the extra food in fruits, stems, roots, leaves and seeds.

- The extra water is released by the aerial parts of the plant in the form of water vapour through the process called transpiration.
- Plants are very useful for us as we get many useful products from plants.

Key Words

Improving Vocabulary

Aerial	:	Operating in the air
Autotrophs	:	Are organisms that can produce their own food
Trunk	:	Hard, woody and strong stem of trees
Transpiration	:	Release of water vapour from stomata in leaves



Gap Analyzer™



EXERCISE

That turn curiosity into confidence—let's begin!



A. Objective Type Questions.

- The primary task of leaves is to absorb sunlight and make food by the process of:
 - Photosynthesis ☐
 - Fertilization ☐
 - Germination ☐
- Plants use carbon dioxide, water, and sunlight to produce glucose, water, and _____.
 - Carbon dioxide ☐
 - Oxygen ☐
 - Nitrogen ☐
- This green pigment captures the Sun's energy in photosynthesis.
 - Leaf ☐
 - Chlorophyll ☐
 - Chlorine ☐
- Which of these is not required for photosynthesis?
 - Sunlight ☐
 - Oxygen ☐
 - Carbon dioxide ☐
- The sugarcane plant stores food in its:
 - Stem ☐
 - Roots ☐
 - Leaves ☐

B. Very Short Answer Questions.

Name the following :

- The type of root found in onion and grass _____
- In carrot, radish and beetroot food is stored in the _____
- Plants with soft, green stems _____
- Tiny openings on the underside of the leaf _____

5. Potato and ginger are actually the _____ of the plant.
6. The raw materials for photosynthesis _____
7. The end products of photosynthesis _____
8. Two types of oils that is obtained from plants _____
9. Paper is made from this plant _____

C. Short Answer Questions.

1. Why are the plants called autotrophs?
2. Why do leaves appear green in colour?
3. Why leaf is called the kitchen of the plant?
4. What are the different raw materials required for photosynthesis? From where do the plants obtain them?
5. What is starch?



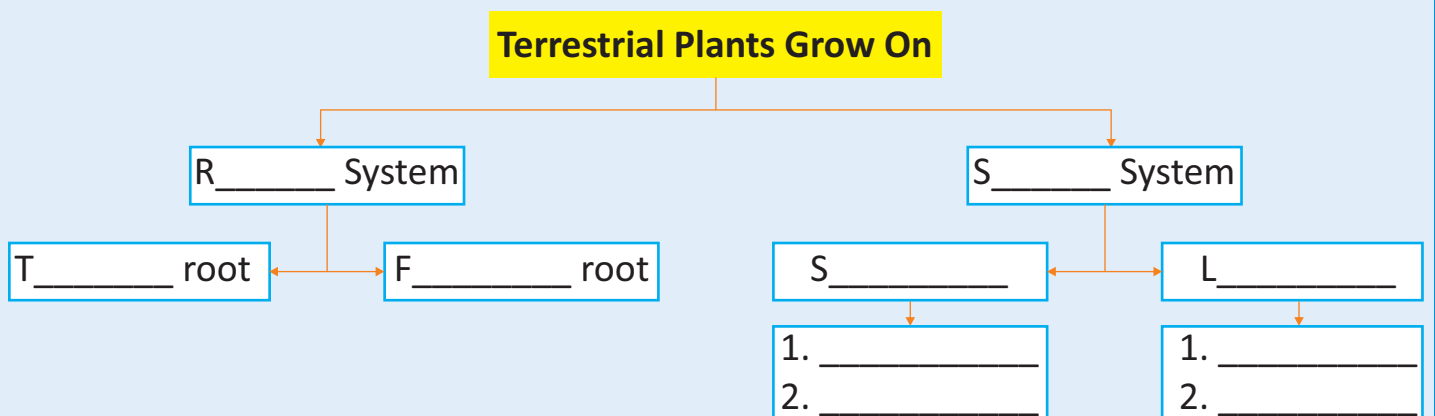
D. Long Answer Questions.

1. Differentiate between tap root and fibrous root with example.
2. What are the different functions of the root?
3. What are the different functions of a stem?
4. What are the different functions of the leaf of a plant?
5. Describe the process of photosynthesis with the help of a neat labelled diagram.

Time to Recall

Remembering and Analysing

Recall and complete the concept map given below.



Time to Apply

Applying and Creating

1. If a few leaves of a potted plant are coated with a thin layer of Vaseline or oil, what effect would it have on the leaves?
2. In case of artificial light will the plants carry out the process of photosynthesis?



Time to Discuss

Pondering and Communicating

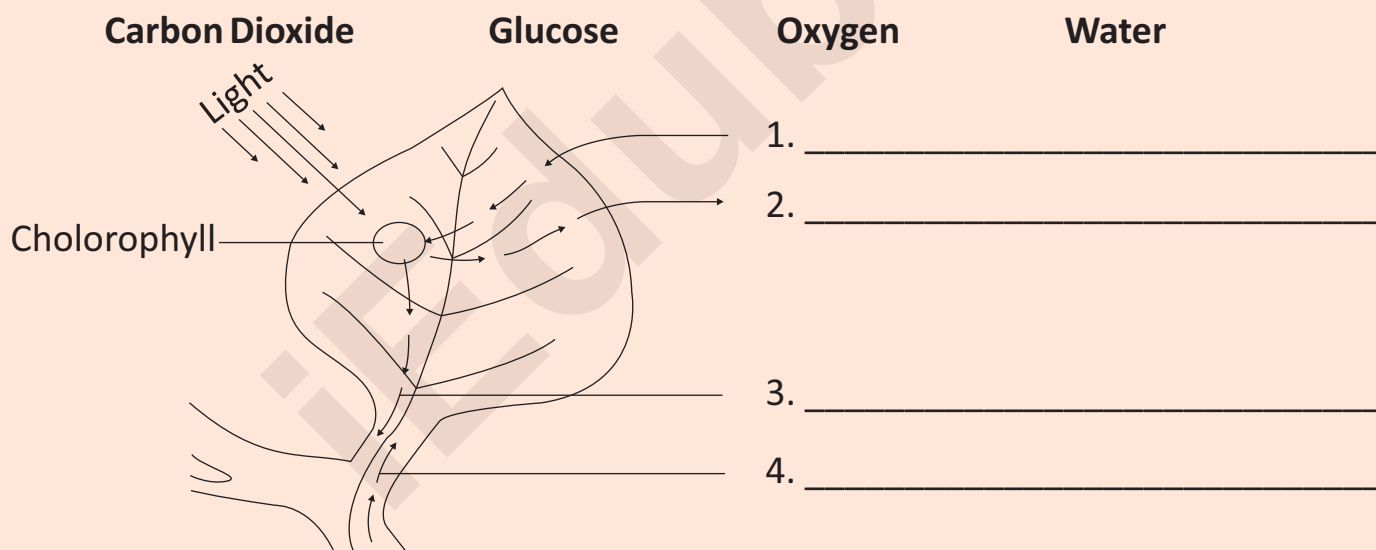
1. What would happen if there are no plants on the Earth?
2. If all plants stop the process of photosynthesis, then what would happen to the living beings on Earth? Explain.



Time to Observe

Observing, Critical Thinking, Analysing

1. After it is labelled the diagram below will illustrate photosynthesis. Write each of the following terms on the correct numbered line. Then answer the questions that follow.



- a. In photosynthesis, what substances come in from the outside?
- b. What substances are produced ?



Time to Create

Creating and Collaborating

Draw a diagram of different parts of a plant in your scrapbook. Also label its parts.