

The Leaf

Synopsis:

- Science is the study of nature.
- The three main branches of science are Biology— Study of living beings
 1. **Chemistry** — Study of composition and properties of the matter.
 2. **Physics** — Study of various physical phenomenon like gravitation, magnetism, electricity etc.
- Biology is called Life Sciences.
- Study of plants is called Botany.
- Study of animals is called Zoology.
- **The characteristics of the living things are:**
 1. body made up of cells
 2. movement
 3. growth
 4. fixed life – span
 5. respiration
 6. responsiveness
 7. nutrition
 8. excretion reproduction. The cell is the basic unit of life.
- The living being made of only one cell is called unicellular organisms and those made up of more than one cell is called **multicellular organisms**.
Examples of unicellular organisms: Amoeba, Paramecium etc
- **Autotrophs:** The living things which can make their own food. i.e. green plants.
- **Heterotrophs:** The living things which take their food directly or indirectly from other sources.
- The process used to release energy from the burning of food is called the respiration.
- **(i) Waste products in animals:**
 1. urea
 2. uric acid
 3. carbon – di- oxide
 4. salts
 5. water etc.
- **(ii) Waste products in plants:**
 1. gums
 2. resins
 3. tannins etc.
- The reaction which an individual shows to the stimulus is called response.
- All plants and animals reproduce.

Review Questions

1. Tick (✓) the appropriate answer:

(i) Identify the plant which has compound leaves:

- (a) Banana
- (b) Banyan
- (c) Mango
- (d) **Rose**

(ii) Which one of the following is not an insectivorous plant—

- (a) Pitcher plant
- (b) Venus flytrap
- (c) Bladderwort
- (d) **Cactus**

(iii) This leaf shows parallel venation:

- (a) **Banana**
- (b) Mango
- (c) Banyan
- (d) Guava

(iv) The point on the stem from where the leaf arises is:

- (a) Petiole
- (b) Lamina
- (c) **Node**
- (d) Trunk

(v) Which one of the following is essential for photosynthesis:

- (a) **Carbon dioxide**
- (b) Nitrogen
- (c) Oxygen
- (d) Soil

Question 2.

Name the following:

Answer :

1. The part of the plant which grows under the ground: **root**
2. The part of the plant which grows above the soil: **shoot**

Question 3.

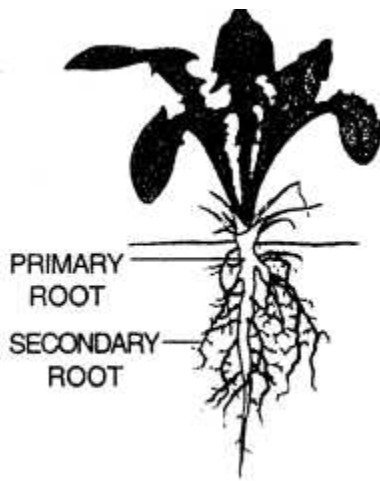
Differentiate between the following:

(i) Tap root and Fibrous root

Answer :

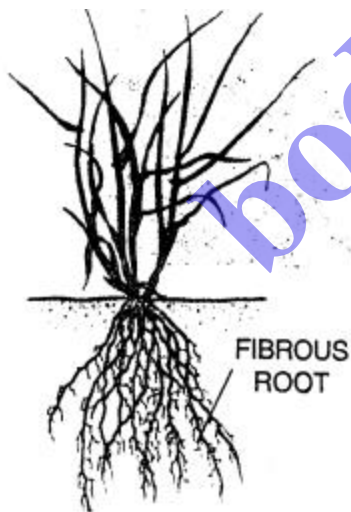
Tap root

1. This root has one main primary root with many side secondary roots.
2. It is found in dicot plants.
3. e.g. mango, pea



Fibrous root

1. These roots are clusters of same thickness and size, arising from the base of the stem.
2. It is found in monocot plants,
3. e.g. maize, wheat



(ii) Simple Leaf and compound leaf

Answer :

Simple Leaf

1. The Lamina is uni divided and is a single piece.
2. **Example** : mango, banana, banyan, etc.

Compound Leaf

1. The leaf blade or lamina is divided into small units called leaflets.
2. Example is rose.

(iii) Parallel venation and reticulate venation

Answer :

Parallel Venation

1. In this type of venation, veins and veinlets are irregularly distributed in the lamina, forming a network.
2. Examples are peepal, mango and guava leaves.

Reticulate Venation

1. In this type of venation, veins are parallel to each other.
2. Examples are banana, grass and wheat leaves.

Question 4.

What are the four functions of the roots?

Answer :

The root serves the following functions :

1. It fixes the plant in the soil.
2. Absorbs water and minerals from the soil for the entire plant.
3. It acts as a storage part for food materials for certain plants.
4. It binds the soil together so that it does not get washed away during rain or blown over by the wind.

Question 5.

Mention the functions of the following :

- (i) Spines
- (ii) Tendril
- (iii) Scale leaves

Answer :

- (i) **Spines**—The leaves may be modified to form spines to reduce water loss by transpiration in desert plants.
- (ii) **Tendril** — The stem may occur in the form of their thread – like leafless branch called tendril. It has the tendency to coil around any object and help the plant to climb it
- (iii) **Scale leaves** — Scale leaves are present in some plants like onion and ginger. They are thin and dry or thick and fleshy and their function is to protect buds.

Question 6.

Define venation. What are the different types of venation found in the leaves ?

Answer :

Venation: Arrangement of pattern of veins in a lamina is called venation.

It is mainly of two types :

1. **Reticulate venation :** Veins and veinlets are irregularly distributed in the lamina forming a network.
Example: mango, guava.
2. **Parallel venation:** Veins run parallel to each other
Example: Banana, grass, wheat

Question 7.

Describe the modifications of leaf in any one insectivorous plant.

Answer :

Modification of leaves in Venus flytrap (an insectivorous plant)

The leaves of Venus flytrap have long pointed hair. It is divided into two parts having midrib in between like a hinge. When an insect visits the leaf, it closes its two parts and traps the insect. The insect is then digested by secreting digestive juices.

Question 8.

Write the two main functions of leaves.

Answer :

The two main functions of leaves are –

1. **Photosynthesis** – Green leaves contain chlorophyll which, in presence of sunlight, manufacture food using carbon-dioxide and water.
2. **Transpiration** – Surface of leaves have minute pores which help in loss of water by evaporation. It has cooling effect making roots absorb more water due to suction.

Question 9.

What is the modification seen in the Bryophyllum. Explain.

Answer :

1. Bryophyllum is a plant whose leaves produce adventitious buds in their margin.
2. The adventitious buds grow into new plants when they fall off from the parent plant.

Question 10.

Define:

- (i) Photosynthesis
- (ii) Transpiration

Answer :

- (i) **Photosynthesis** — The process by which plant leaf prepares or synthesises food

from water and carbon dioxide in the presence of chlorophyll and sunlight is called photosynthesis.

(ii) **Tranpiration** — This is the process by which there is a loss of water in the form of vapour by evaporation from the surface of leaves. It has cooling effect, it causes suction force to make roots absorb more water with mineral ions.

Question 11.

Name the wide flat portion of the leaf

Answer :

The green, flat and broad part of the leaf is called 'lamina' or 'leaf blade'.

Question 12.

What purpose is served by the spines horned on the leaves of cactus.

Answer :

Leaves are modified into spines to reduce water loss, like cactus. In prickly poppy, leaves bear spines on the margin.

Question 13.

Explain why leaf survival is so important to the plant?

Answer :

Because they perform two main function of photosynthesis and transpiration.

Question 14.

Give an example of the following and draw generalized diagrams for the same:

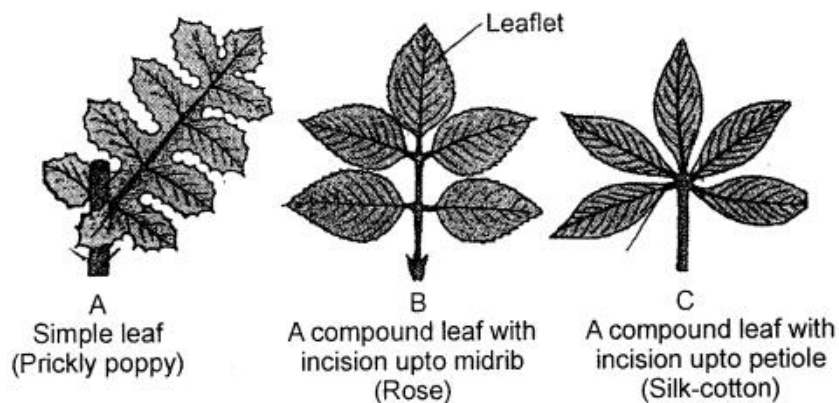
- (i) Simple leaf and compound leaf.
- (ii) Parallel venation and reticular venation.

Answer :

(i) Simple leaf and compound leaf.

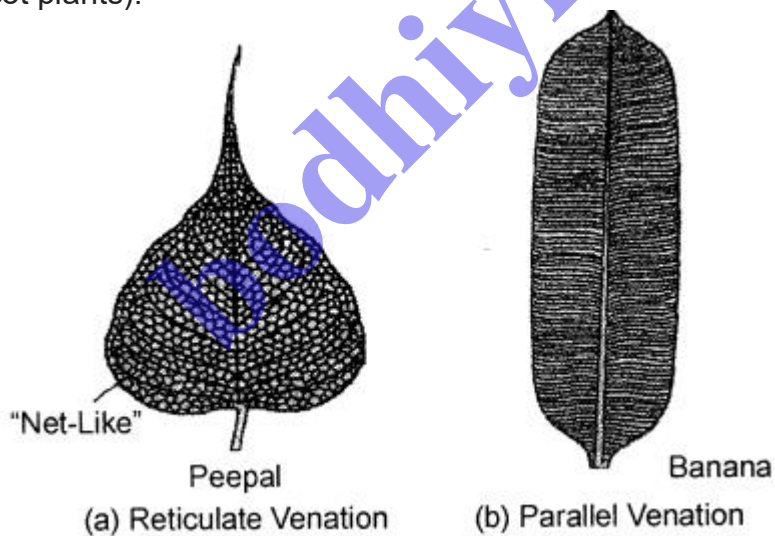
1. **Simple leaf:** In a simple leaf, the lamina is undivided and is a single piece, e.g., mango, banana, banyan, etc.

2. **Compound leaf:** In a compound leaf, the leaf blade or lamina is divided into smaller units called leaflets e.g., rose.



(ii) **Parallel venation and reticular venation.**

1. **Parallel venation:** In this type of venation, veins run parallel to each other, e.g., banana, grass, maize and wheat leaves (monocot plants).
2. **Reticulate venation:** In this type of venation, veins and veinlets are irregularly distributed in the lamina, forming a network, e.g. peepal, mango and guava leaves (dicot plants).



Question 15.

In list some of the advantages of transpiration to green plants.

Answer :

It helps to maintain the concentration of the sap inside the plant body:

The roots continue to absorb water from the soil. If excess water does not evaporate through transpiration, the sap will become dilute, preventing further absorption of water and minerals from the soil.

Cooling effect: In transpiration, water gets evaporated from the plant. The heat required for evaporation of water is obtained from the plant itself and thus, the plant cools itself when it is hot outside.

Question 16.

Why do some plants have to trap insects ?

Answer :

Insectivorous plants trap insect because they grow in a soil which is deficient in nitrogen and insects help in fulfilling the nitrogen requirement of plants.

Question 17.

Explain some of the modifications of leaves found in plants.

Answer :

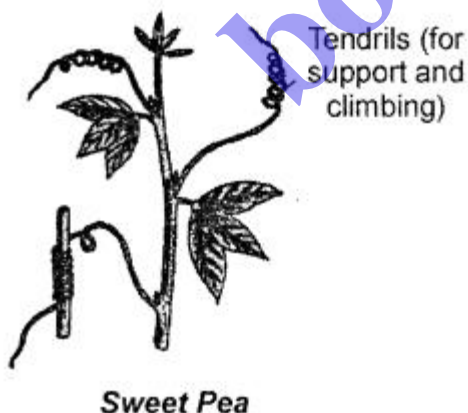
Sometimes, the complete leaf or a part of the leaf is modified to perform a special function.

Some of these modifications include:

1. **Leaf tendril:** In case of certain weak stemmed plants, leaves or leaflets are modified into wiry, coiled structures called tendrils. They are sensitive to touch. As they touch any object, they coil around it and support the plant to climb up. Eg., Sweet pea (upper leaflets are modified into tendrils).
2. **Spines:** Leaves are modified into spines to reduce water loss, like cactus. In prickly poppy, leaves bear spines on the margin.
3. **Scale leaves:** In some plants, like onion and ginger, thin and dry or thick and fleshy scale leaves are present. Their function is to protect buds.

Question 18.

What is a tendril ? Explain its use to the plant.



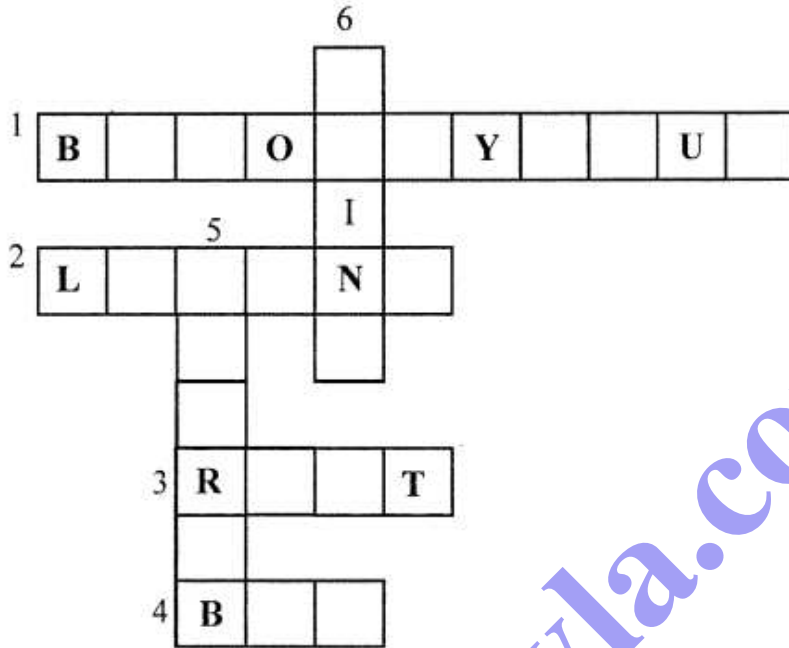
Answer :

A tendril is a specialized stem, leaf or petiole with a thread like shape. They are

sensitive to touch. As they touch any object, they coil around it and support the plant to climb up. Example : Sweet pea (upper leaflets are modified into tendrils).

Question 19.

Complete the cross word using the clues given below. Check your performance with the correct solutions given at the end of the chapter.



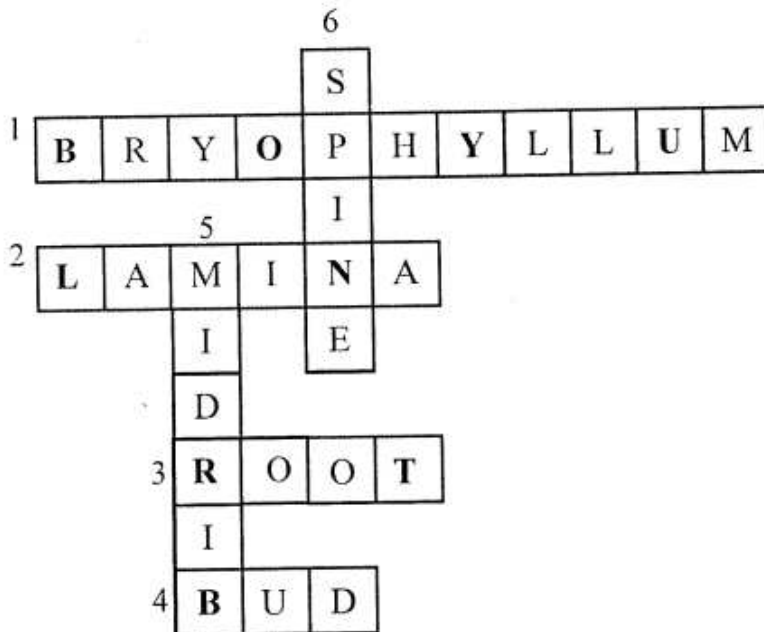
Answer :

Clues across:

1. Plant that bears buds in leaves for propogation.
2. The flattened green part of leaf.
3. Underground plant part.
4. Structure that develops into flower.

Clues down:

5. The central big vein of a leaf.
6. A modification seen in of cactus.



ADDITIONAL QUESTIONS

A. Fill in the blanks.

1. The ends of primary or secondary roots have fine hair-like structures, called **root hair**.
2. Fibrous roots are found in **grass** and **wheat plant**.
3. **Roots** fix the plant firmly to the soil.
4. Banyan trees have **prop** roots which provide support to heavy branches.
5. **Sucking** roots help in absorbing nutrients from the body of the host.
6. **Tuber** is an enlarged, roughly spherical-shaped stem storing food.
7. The region between two successive nodes of a stem is called **internode**.

B. State if the following statements are true or false. Correct the statement if it is false.

1. The point on the stem from where leaves and branches arise is called Internode.
False. The point on the stem from where leaves and branches arise is called node.
2. A growth in a terminal bud leads to an increase in the length of the stem
True
3. Rhizome is an enlarged, roughly spherical-shaped stem that stores food
False. Tuber is an enlarged, roughly spherical-shaped stem that stores food.
4. The region between two successive nodes of a stem is called node
False. The region between two successive nodes of a stem is called internode.

C. State if the following statements are true or false. Correct the statement if it is false.

1. The lamina has a thickened vein along its centre called veinlet
False. The lamina has a thickened vein along its centre called midrib.
2. In reticulate venation, veins and veinlets are irregularly distributed over the entire lamina, forming a network
True
3. In a simple leaf, the leaf blade is clearly divided into many distinct parts called leaflets
False. In a compound leaf, the leaf blade is clearly divided into many distinct parts called leaflets.
4. In alternate arrangement, a set of three or more leaves grows from the same node
False. In whorled arrangement, a set of three or more leaves grows from the same node.
5. Leaf spines help to reduce the loss of water by transpiration.
True

EXERCISES

A. Tick the most appropriate answer.

1. Which of the following is not a function of the roots ?

- a. To absorb water and minerals
- b. To anchor the plant to the soil
- c. To store food
- d. To manufacture food**

2. The flower is borne on a short stalk called

- a. petiole.
- b. filament.
- c. pedicel.**
- d. plumule.

3. Which of the following roots give mechanical support the plant ?

- a. Prop roots**
- b. Epiphytic roots
- c. Nitrogen-fixing roots
- d. Breathing roots

4. The point on the stem where leaves arise is

- a. internode.
- b. node.**

- c. bark.
- d. trunk.

5. The wide flat part of the leaf is called the

- a. lamina.**
- b. petiole.
- c. vein.
- d. midrib.

6. The calyx consists of –

- a. sepals.**
- b. stamens.
- c. anthers.
- d. petals.

7. The gynoecium consists of

- a. stigma and anthers.
- b. anthers and filaments.
- c. stigma, pollen grains and ovary.
- d. stigma, style and ovary.**

8. Which part of the flower gives rise to the seeds ?

- a. Pollen grains
- b. Ovary
- c. Ovules**
- d. Stigma

9. Flowers with either male or female reproductive part are

- a. bisexual.
- b. hermaphrodite.
- c. unisexual.**
- d. none of these

10. The transfer of pollen grains from the anther to the stigma is termed as

- a. fertilization.
- b. reproduction,
- c. fusion.
- d. pollination.**

B.Fill in the blanks.

1. Primary root is **broad** at its origin and **thin** at the tip.
2. **Stilt** are the additional roots that arise from the lower part of the stem and fix the plant firmly.

3. Plants with brightly coloured flowers are usually pollinated by **insects**.
4. Cone shaped roots that grow vertically upwards and come out of the ground are known as **pneumatophores**.
5. **Tuber** is an enlarged, roughly spherical-shaped stem storing food.
6. In a **compound** leaf the leaf blade is clearly divided into many parts.
7. A flower usually has four parts—calyx, corolla **androecium** and **gynoecium**.
8. Reproduction is a two step process. The first step is called pollination and the second step is called **fertilisation**.
9. Fruit is nothing but a ripened **ovary**.
10. A fruit may have one seed, as in **mango** or many seeds, as in **apple**.

C. Match the definitions with the terms. All the terms will not be used.

Definition	Terms
1. part of the flower that produces pollen grains	a. petiole
2. green leaf-like structure protecting the inner parts of flower	b. anther
3. root system where side roots develop from a main primary root	c. ovules
4. fusion of the male reproductive cell with the egg cell	d. calyx
5. parts of a flower that develops into seeds	e. tap root
6. points on the stem at which leaves arise	f. internodes
7. ripened ovules	g. fertilization
	h. seeds
	i. nodes

Answer :

Ans. Definition

1. part of the flower that produces pollen grains
2. green leaf-like structure protecting the inner parts of flower
3. root system where side roots develop from a main primary root
4. fusion of the male reproductive cell with the egg cell
5. parts of a flower that develops into seeds
6. points on the stem at which leaves arise
7. ripened ovules

Terms

- b. anther
- d. calyx
- e. tap root
- g. fertilization
- c. ovules
- i. nodes
- h. seeds

D. State if the following statements are true or false. Correct the statement if it is false.

1. The node is the part of the stem between two internodes.

False: The internode is the portion of the stem between two nodes.

2. Anther, style and stigma are the parts of a pistil.

False: Ovary, style and stigma are the parts of a pistil.

3. A stamen has a long stalk called style.

False: A stamen has a long stalk called filament.

4. The transfer of the pollen grains from the anthers to the stigma of a flower is called fertilization.

False: The transfer of the pollen grains from the anthers to the stigma of a flower is called pollination.

5. The leaves of Opuntia are modified into thorns.

True.

6. Ovules develop into fruits.

False: Ovules develop into seeds.

7. The stem helps in absorbing water from the soil.

False: The root helps in absorbing water from the soil.

8. The flat green portion of the leaf is called the leaf blade.

True.

9. Mango and orange are fruits whereas cucumber and tomato are vegetables.

False: Mango and orange are fruits whereas cucumber and tomato are also fruits.

10. Cluster of roots of about the same size are present in the fibrous root system.

True.

E. Find the odd one out. Give reasons.

1. stem, leaves, root, flowers

Ans. root: stem, leaves and flowers are a part of shoot system whereas root forms the root system of a plant.

2. calyx, corolla, stamen, stem

Ans. stem : stem is a part of a plant whereas calyx, corolla and stamen are parts of a flower.

3. ovules, lamina, midrib, petiole

Ans. ovules : ovules are a part of gynoecium whereas the other three are parts of a leaf.

4. leaf, stigma, style, ovary

Ans. leaf: leaf is a part of plant whereas stigma, style and ovary are parts of female reproductive part of a plant (carpel).

F. Name the type of stem present in the following.

1. Potato
2. Onion
3. Ginger
4. Cactus .

Answer :

1. Potato — Tuber
2. Onion — Bulb
3. Ginger — Rhizome
4. Cactus — Phylloclade

G. State the functions of the following.

1. Leaf spines
2. Stem tendril
3. Phylloclade
4. Stilt roots

Answer :

The functions of:

1. **Leaf spines:** They help to reduce the loss of water by transpiration. They also help to protect the plant from the grazing animals, e.g. Cactus, mexican poppy.
2. **Stem tendril:** These stems provide support to the plant by coiling around some wall, tree etc. and helping the plant to climb, e.g. Passion flower, grapevine.
3. **Phylloclade:** These modified stems in desert plants carry out the function of preparation and storage of food. They fleshy stems also store water to be used in long dry periods, e.g. Opuntia.
4. **Stilt roots:** They fix the plant firmly to the soil in plants where the stem is weak and tall. They arise from the lower part of the stem

H. We eat different parts of various plants. For each plant, write the part of the plant that we eat.

- | | | | |
|-------------|-------|------------------|-------|
| 1. carrot | _____ | 8. sugar can | _____ |
| 2. cucumber | _____ | 9. lady's finger | _____ |
| 3. radish | _____ | 10. mint | _____ |
| 4. tomato | _____ | 11. fenugreek | _____ |
| 5. onion | _____ | 12. pea | _____ |
| 6. potato | _____ | 13. apple | _____ |
| 7. ginger | _____ | 14. groundnut | _____ |

Answer :

- | | | | |
|-------------|--------------|------------------|---------------|
| 1. carrot | <i>roots</i> | 8. sugar can | <i>stem</i> |
| 2. cucumber | <i>fruit</i> | 9. lady's finger | <i>fruit</i> |
| 3. radish | <i>roots</i> | 10. mint | <i>leaves</i> |
| 4. tomato | <i>fruit</i> | 11. fenugreek | <i>leaves</i> |
| 5. onion | <i>stem</i> | 12. pea | <i>seed</i> |
| 6. potato | <i>stem</i> | 13. apple | <i>fruit</i> |
| 7. ginger | <i>stem</i> | 14. groundnut | <i>seed</i> |

I. Differentiate between:

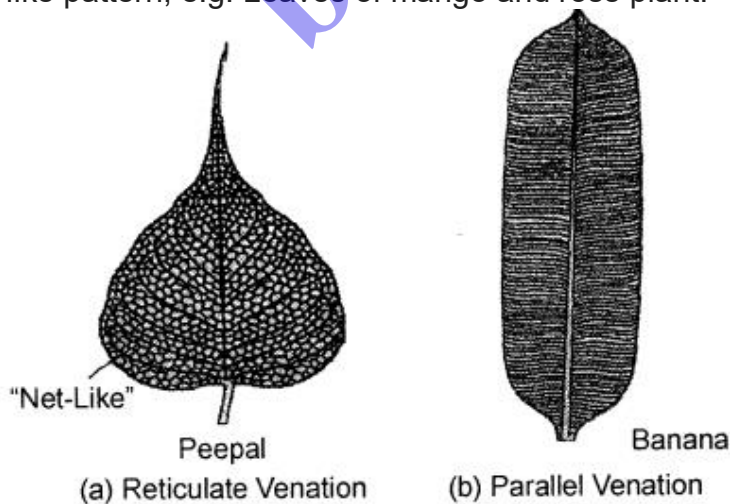
Question 1.

1. reticulate venation and parallel venation
2. terminal bud and axillary bud
3. simple leaf and compound leaf

Answer :

1. Reticulate venation and parallel venation

Reticulate venation: In this type of venation, veins on the leaf lamina are arranged in a net like pattern, e.g. Leaves of mango and rose plant.



Parallel venation: In parallel venation, veins on the leaf lamina run parallel to each other in a leaf. e.g. Leaves of banana plant, coconut leaf.

Question 2.

Terminal bud and axillary bud

Answer :

Terminal bud

1. The buds that grow at the tips of the stems or its branches are called terminal or apical buds.
2. They lead to an increase in the length of the stem.

Axillary bud

1. These buds are present in the axil of a leaf i.e.-between a leaf and a stem.
2. They give rise to new branches.
3. Simple leaf and compound leaf

Question 3.

Simple leaf and Compound leaf:

Answer :

Simple leaf:

1. A leaf with single undivided leaf blade is called a simple leaf. e.g. Peepal, mango.

Compound leaf :

1. The leaf blade of a compound leaf is divided into many leaflets, e.g. Neem, palm trees.

K. Answer the following in short.

1. Give one example of modification of roots.

Ans. Roots of some plants get modified to store food and look swollen, e.g. Roots of radish and carrot.

2. What are prop roots ?

Ans. Prop roots are modified aerial roots that grow vertically downward from the branches in plants like banyan tree. These roots reach deep into the soil and provide additional support to the heavy branches.

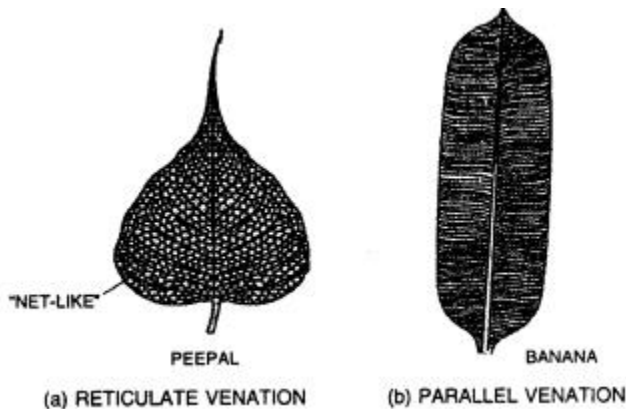
3. What is a rhizome.

Ans. Rhizomes are modified swollen stems that grow horizontally under the ground. They store food for the plant, e.g. ginger, turmeric.

4. What is venation ? State its various types.

Ans. The arrangement of veins and veinlets on the lamina of a leaf is called venation. The venation is of two types :

1. **Parallel venation:** Veins run parallel to each other. e.g. Leaves of banana, grass.
2. **Reticulate venation:** Veins are arranged like a network, e.g. Leaves of mango, guava.



L. Answer the following in detail.

Question 1.

State any three functions of the root ?

Answer :

Functions of the roots are:

1. They fix the plant firmly to the soil.
2. They absorb water and minerals from the soil and transport it to the leaves through stem for manufacturing of food.
3. Roots help in holding the soil together and prevent soil erosion.
4. In some modified roots, they perform the function of storing food. e.g. Radish, carrot.
5. Roots can also help in respiration in certain plants like mangroves.

Question 2.

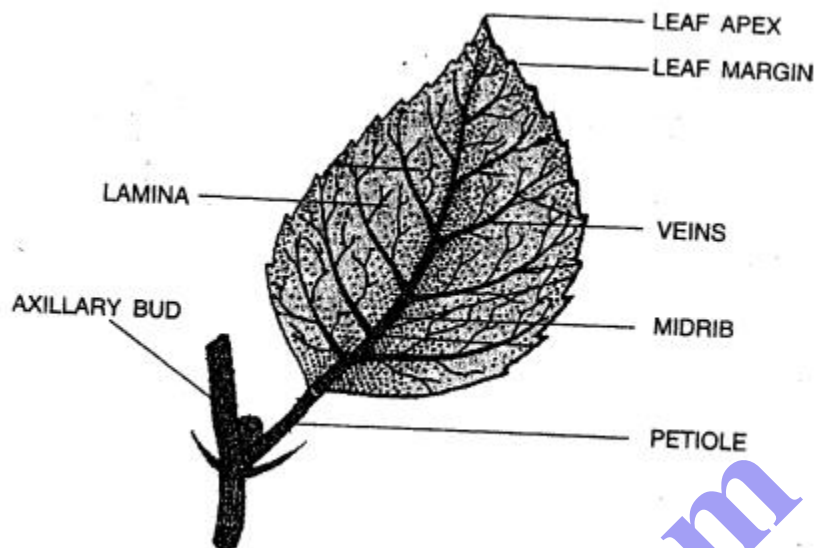
What are the main parts of a leaf ?

Answer :

A leaf has following main parts:

1. **Leaf stalk or petiole** — It joins the leaf with the stem of the
2. **Leaf base** — The point where leaf is attached to the stem.
3. **Lamina or leaf blade** — Flat, green, expanded portion of the leaf.

4. **Midrib** — Petiole extends into the leaf along its centre as the midrib. Many veins arise from it.



Question 3.

What are the various adaptations in seeds dispersed by animals ?

Answer :

The various adaptation in seeds dispersed by animals are:

1. Some projections like hooks, barbs, spines, bristles and stiff hair are present on the surface of seeds which get attached to the skin of animals and carried to distant places and hence dispersed.
2. Seeds are embedded in fleshy and edible fruits in some plants that attract animals to eat them.
3. The seed itself can also become an attractive food for animals like squirrels and acorns.

Question 4.

Write two important functions of the stem.

Answer :

Two important functions of the stem are:

1. Stem bears all the aerial parts like leaves, flowers and fruits.
2. It conducts water and minerals upwards i.e. from roots to the leaves and transports food from leaves to all parts of the plant.

Question 5.

Why are seed produced in large quantity ?

Answer :

Seeds are produced in large quantity because not all of them grow into plants. So to ensure that at least a few of them end in a favourable place for growth, plants produce

more seeds than will ever become adult plants. If they don't overproduce, the species would die out.

Question 6.

What are the different agents of seed dispersal ?

Answer :

The different agents of seed dispersal are:

1. **Wind:** e.g. Cotton plant disperses its pollens into the air.
2. **Insects:** e.g. Lavender plant attracts bees to transmit their pollens from one flower to the next.
3. **Water:** e.g. Coconut fruit floats and gets carried away by water.
4. **Animals:** e.g. Hibiscus plant is pollinated by humming birds.

Question 7.

State various adaptations in the seeds dispersed by wind.

Answer :

The seeds dispersed by wind have fluff or tufts of hair or wings to be easily dispersed by wind. Seeds of some plants are so light that they get easily carried away by the slightest wind to long distances.

M. Give reasons for the following.

Question 1.

The leaves of prickly pear are reduced to spines.

Answer :

Leaves reduced to spines in prickly pear reduce the loss of water by transpiration. Spines also protect the plant from the grazing animals.

Question 2.

A tomato and an orange are both fruits.

Answer :

Tomato and orange are both fruits as they are ripened ovaries, (whereas a vegetable can be any part of a plant)