PLANT SYSTEMS

NOTES

LEARNING OUTCOMES:

1. Identify the different parts of plants and state their functions.
   - Leaf
   - Stem
   - Root
   - Flower
   - Fruit
   - Seed

2. Understand the functions of the different plant systems.
   - Respiratory system
   - Reproductive system
   - Transport system

WHAT IS A SYSTEM?

1. A system is made up of more than one part.

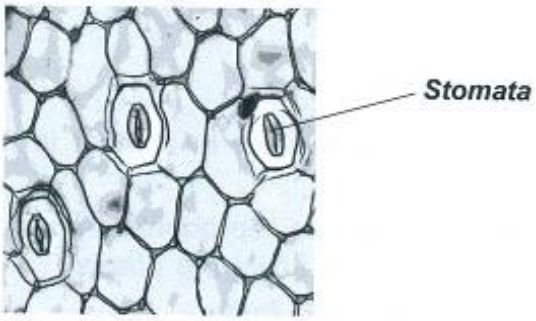
2. The parts of a system must work together to perform a certain function.

3. Plants have the following systems;
   - Respiratory system
   - Reproductive system
   - Transport system

SYSTEMS IN A PLANT

1. Respiratory system

- The respiratory system in a plant is made up of leaves.
- Tiny openings called stomata enable gaseous exchange to take place.
- Stomata are usually found on the underside of leaves.



- Gaseous exchange is needed during photosynthesis and respiration.
- Water vapour can also be released through the stomata during transpiration.
- Plants photosynthesise only in the presence of light but respire all the time.
- During photosynthesis, carbon dioxide is taken in while oxygen is given out.

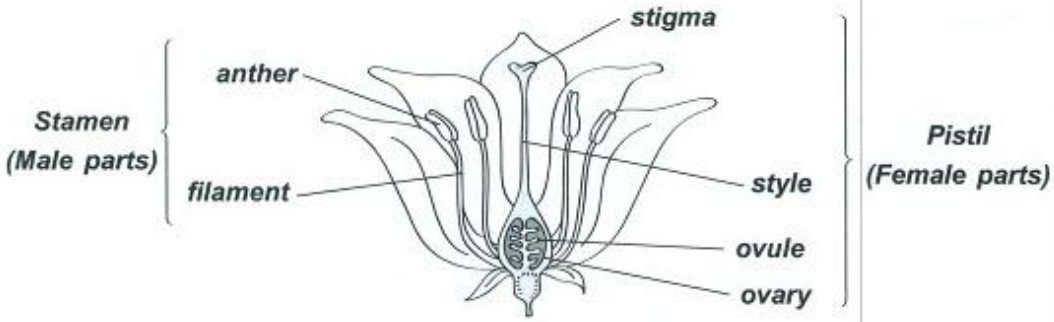
Water + Carbon dioxide ⟶ Sugar + Oxygen

(In the presence of light and chlorophyll)

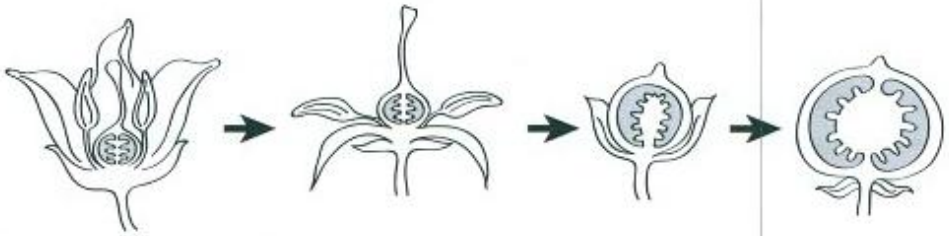
- During respiration, oxygen is taken in while carbon dioxide is given out.

Oxygen + Sugar ⟶ Carbon dioxide + Water + Energy

2. Reproductive system



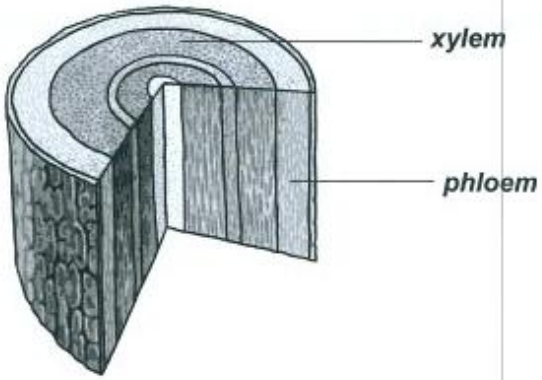
- The reproductive system in a plant is made up of flowers, fruits and seeds.
- The male and female reproductive parts of a flower are responsible for the reproduction of flowering plants.
- Flowers develop into fruits.



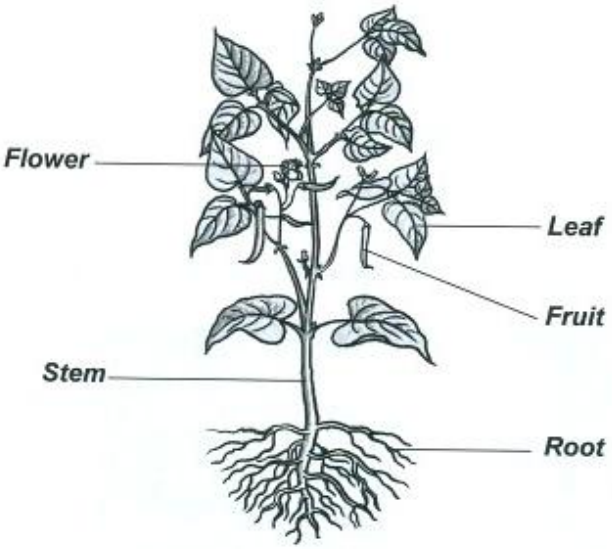
- Fruits contain seeds that are needed for reproduction.

3. Transport system

- The transport system in a plant is made up of stem and roots.
- They transport water, food and mineral salts around the plant.
- The xylem transports water and mineral salts while the phloem transports food.



FUNCTIONS OF PLANT PARTS



1. Roots

- Absorb water and mineral salts from the soil.
- Anchor the plant firmly to the ground.
- Some roots like carrot, tapioca, sweet potato and turnip also store the excess food made by the plant.

Examples of roots that store excess food

Carrot

Tapioca

Turnip

Sweet potato

2. Stem

- Transports water and mineral salts from the roots to the other plant parts.
- Transports food from the leaves to the other plant parts.
- Supports the leaves and the branches.
- Keeps the plant upright.
- Stems can be strong or weak.

Examples of plants with weak stem

Money plant

Morning glory

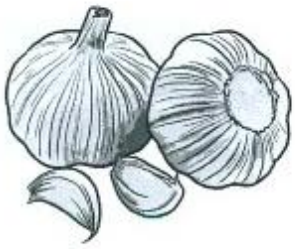
Cucumber plant

- Plants with weak stem cling onto other things to grow upwards.
- Some stems like potato, ginger, water chestnut and garlic also store the excess food made by the plant.

Examples of underground stems that store excess food

Potato

Ginger

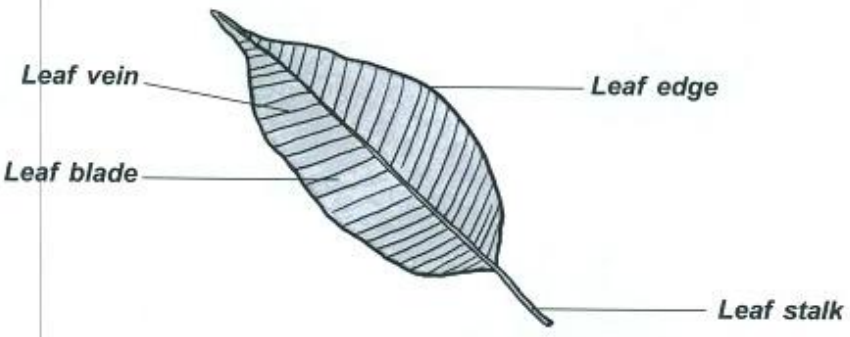


Garlic

Water chestnut

3. Leaves

- Tiny openings (stomata) found on the leaves enable the plant to carry out gaseous exchange.
- Release excess water in the form of water vapour through the stomata.
- Contain chlorophyll that traps light energy and makes food (glucose) for the plant.
- The process of making food is known as photosynthesis.
- Plants take in carbon dioxide and give out oxygen during photosynthesis.
- Plants carry our respiration all the time by taking in oxygen and giving out carbon dioxide.
- A leaf is made up of many parts;



4. Flowers

- They produce sweet smell, bright colour or sweet nectar to attract insects and animals for pollination.
- They develop into fruits after they get fertilised
- Excess food can be stored in the flowers of a plant

Examples of flowers that store excess food

Broccoli

Cauliflower

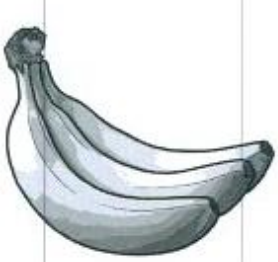
5. Fruit

- Contains seeds needed for reproduction.
- Protects the seeds.
- Helps to disperse the seeds.
- Excess food can also be stored in fruits in the form of sugars, making them sweet and tasty.

Examples of fruits that store excess food

Durian

Apple



Banana

Grape

Kiwifruit

6. Seeds

- They grow into new plants.
- They contain stored food that is needed for the baby plant (seedling) when it first begins to grow.
- They need air (oxygen), water and warmth to germinate.
- Excess food can be stored in the seeds of a plant.

Examples of seeds that store excess food

Rice

Corn

Peanut

IMPORTANCE OF PLANTS

1. Plants provide us with food.
2. Plants replenish the air with oxygen.
3. Plants provide shelter.
4. Plants provide protection for some animals.
5. Plants beautify the surrounding.
6. Plants produce materials that are used for furniture.
7. Plants have roots that hold the soil together to prevent soil erosion.
8. Different plant parts store excess food for the plant.

EXPERIMENTS

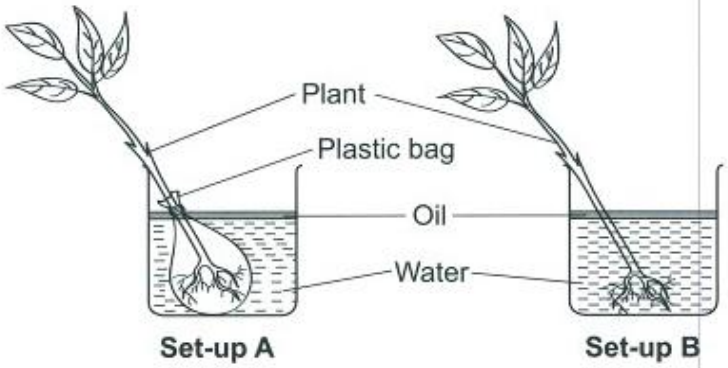
Experiment 1

Materials needed:

- Some oil
- 2 beakers
- Some water
- 1 plastic bag
- 2 identical plants

Steps:

1. Fill both beakers with the same amount of water.
2. Wrap the roots of one of the plants with the plastic bag.
3. Put the plant with the roots wrapped with plastic bag in a beaker of water and label it as Set-up A.
4. Put the other plant with the roots not wrapped in plastic bag in the other beaker of water and label it as Set-up B.
5. Pour the same amount of oil onto the water in both beakers.
6. Observe the plants over one week.



- What can be observed about the plants after one week?

  The plant in Set-up A died while the plant in Set-up B remained alive.

- Explain your observation.

  The roots of the plant in Set-up A were unable to absorb water to survive while the roots of the plant in Set-up B were able to absorb water to survive.

- What can be concluded from this experiment?

  Plants need roots to absorb water.

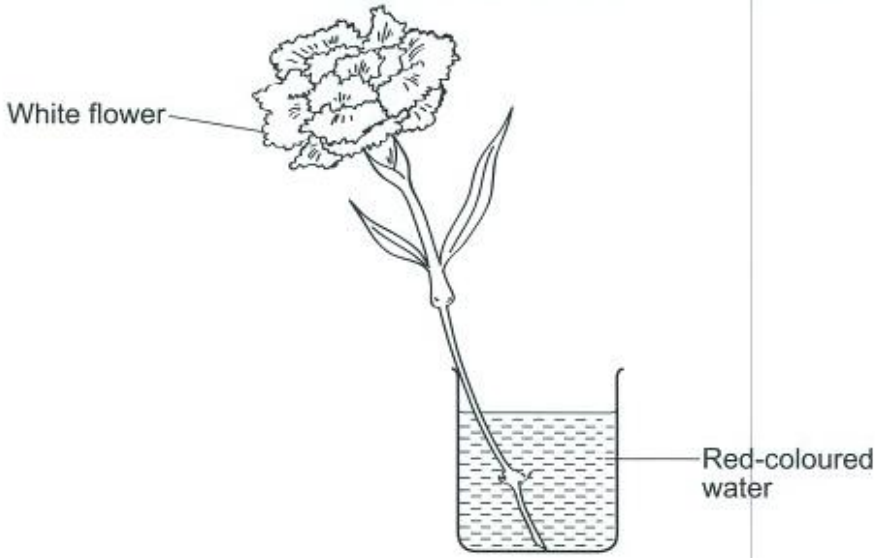
Experiment 2

Materials needed:

- 1 stalk of white flower
- A beaker of water
- Red food colouring

Steps:

1. Add some food colouring to the beaker of water.
2. Put the stalk of flower into the beaker of water.
3. Observe the flower for the next few days.



- What can be observed about the flower after a few days?

  The flower was stained red.

- Explain your observation.

  The stem transported the red-coloured water to the flower, causing it to be stained red.

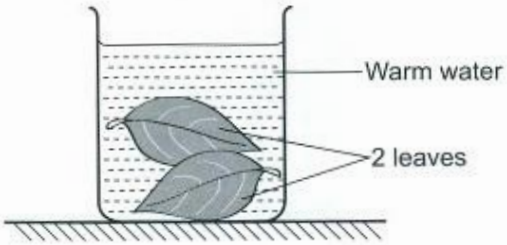
Experiment 3

Materials needed:

- 2 similar leaves
- 1 beaker of warm water

Steps:

1. Put the 2 leaves into the beaker of warm water.
2. Observed the leaves over the next few minutes.



- What can be observed on the leaves?

  Air bubbles can be seen on the leaves.

- Explain your observation.

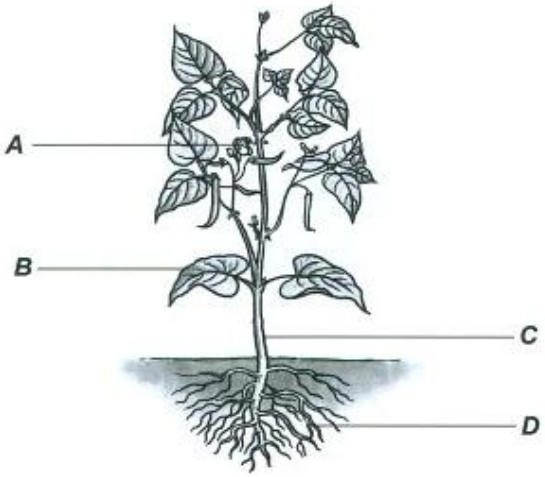
  The leaves released air through the stomata, which is seen as air bubbles.

WORKED EXAMPLES

Worked Example 1

Study the plant shown below.

(a) Name the parts, A, B, C and D, of the plant shown below. (2m)



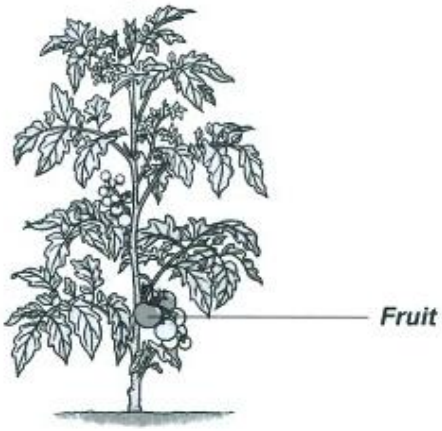
A: _____

B: _____

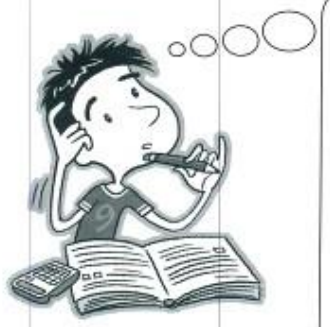
C: _____

D: _____

Study the diagram below carefully.



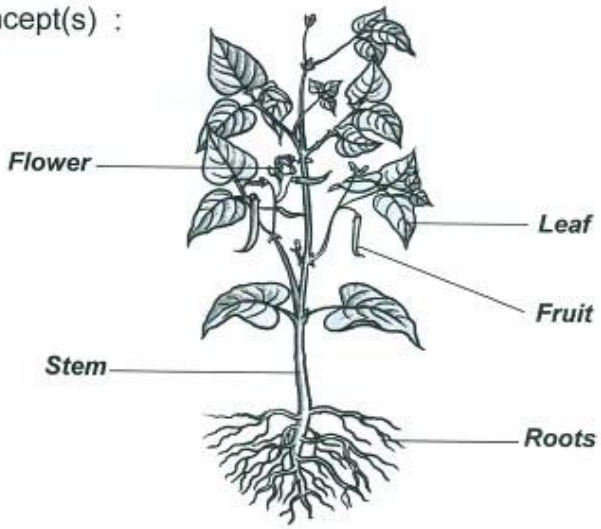
(b) Is the plant shown above a flowering or a non-flowering plant? Explain your answer. (1m)



Thought Process:

Topic : Plant systems

Key Concept(s) :



Flowers develop into fruits.

Key Words / : (a) flower, leaf, stem, roots
(b) flowering plant, fruits developed from flowers.

Process Skills : Observing, Inferring

Answers:

(a) A: **Flower** (½m)
B: **Leaf** (½m)
C: **Stem** (½m)
D: **Root** (½m)

(b) **Flowering** plant. The plant has **fruits which developed from flowers**. (1m)

Worked Example 2

The diagram below shows a plant.

(a) State one function of the part labelled X. (1m)

(b) What will happen to the plant if the roots were removed? Explain why. (2m)

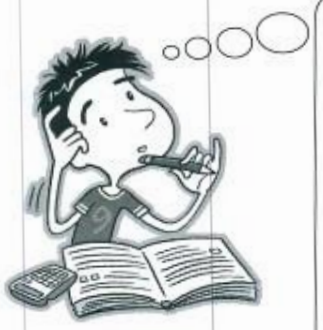
(c) State another function of roots. (1m)

Answers:

(a) Part X **makes food for the plant**. / Part X carry out photosynthesis for the plant. (1m)

(b) The plant will **die**. It **has no roots to absorb water and mineral salts to survive**. (2m)

(c) The roots anchor the plant firmly to the ground. (1m)

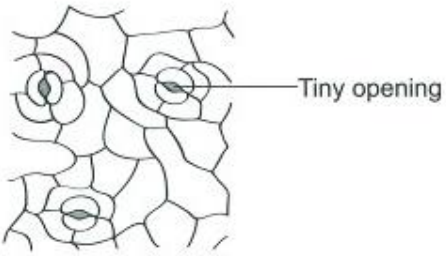


Thought Process:

Topic	:	Plant systems
Key Concept(s)	:	Roots absorb water and mineral salts from the soil. Roots anchor the plant firmly to the ground. Some roots like carrot, sweet potato and turnip store excess food made by the plant. Leaves contain chlorophyll that traps light energy and make food for the plant. (Photosynthesis)
Key Words /	:	(a) makes food for the plant / carry out photosynthesis (b) die, no roots to absorb water and mineral salts to survive (c) anchor the plant firmly to the ground
Process Skills	:	Observing, Predicting, Inferring, Analysing

Worked Example 3

Penny learnt that plants have tiny openings like the ones shown in the diagram below.



(a) Which part of the plant are these tiny openings mostly found in? (1m)

(b) Name one function of these tiny openings. (1m)

Thought Process:

Topic	:	Plant systems
Key Concept(s)	:	The tiny openings called stomata enable gaseous exchange to take place. Stomata are usually found on the underside of leaves.
Key Words /	:	(a) leaves (b) gaseous exchange
Process Skills	:	Observing, Inferring

Answers:

(a) They are mostly found on the **leaves**. (1m)

(b) They enable the plant to carry out **gaseous exchange**. (1m)