THEME: THE WORLD OF LIVING THINGS

TOPIC 1: PLANT LIFE

Living things are things in the environment which have lives in them
Living things are things with lives in them.

Living things are also divided into two groups namely:

a) Plants.
b) Animals.

Examples of living things according to their groups

Plants		**Animals**	
a	Mango plant	a	Insects like cockroaches, house flies
b	Banana plant	b	Cows, dogs, pigs, goats
c	Rose plant	c	Man
d	Pawpaw plant	d	Birds like hens, doves, pigeons

Characteristics of living things

1. Living things breathe.
2. Living things Move.
3. Living things grow.
4. Living things feed.
5. Living things reproduce.
6. Living things pass out waste.
7. Living things respond to stimuli.

Differences between plants and animals

Plants	**Animals**
They have chlorophyll	They do not have chlorophyll
They make their own food	They do not make their own food
They do not move from one place to another	They move freely from one place to another
They respond to stimulus slowly	They respond to stimulus quickly

ACTIVITY

1. What are living things?

   _____

   _____

2. State any **two** groups of living things found in the environment.
   (i) _____
   (ii) _____
3. Mention any **two** characteristics of living things.
   (i) _____
   (ii) _____
4. State any **two** common characteristics between plants and animals.
   (i) _____
   (ii) _____
5. Outline any **two** differences between plants and animals
   (i) _____
   (ii) _____

6. Why is a dog called a living thing?

_____

_____

LESSON

PLANT LIFE

Types of plants

1. Flowering plants
2. Non-flowering plants.

Non- flowering plants

These are plants, which do not produce or bear flowers.

Examples of non-flowering plants

1) Ferns
2) Mosses
3) Liverworts
4) A conifer e.g. pines, cedar, fir, cypress.

Habitats of plants

Habitats of plants refer to the places where plants are found or live.

Examples of plant habitats

1. Gardens
2. Water
3. On other trees
4. Wetlands
5. Dry areas
6. Rocky places

Characteristics of plants

1. They grow
2. They eat
3. They reproduce
4. They breathe
5. They excrete
6. They respond to stimuli

ACTIVITY

1. Mention any **two** types of plants.
   (i) _____
   (ii) _____
2. What are non- flowering plants?

   _____

   _____
3. Mention any **two** examples of non-flowering plants.
   (i) _____
   (ii) _____
4. State any **two** habitats of plants.
   (i) _____
   (ii) _____
5. Mention any **two** characteristics of plants.
   (i) _____
   (ii) _____
6. Mention any **two** examples of plants which grow in the garden.
   (i) _____
   (ii) _____

(b) Why is fern grouped under non-flowering plants?

_____

_____

(c) State any other **two** examples of plants in the same group with the fern.

(i) _____

(ii) _____

LESSON

Flowering plants

Flowering plants are plants that bear (produce) flowers.

Examples of flowering plants

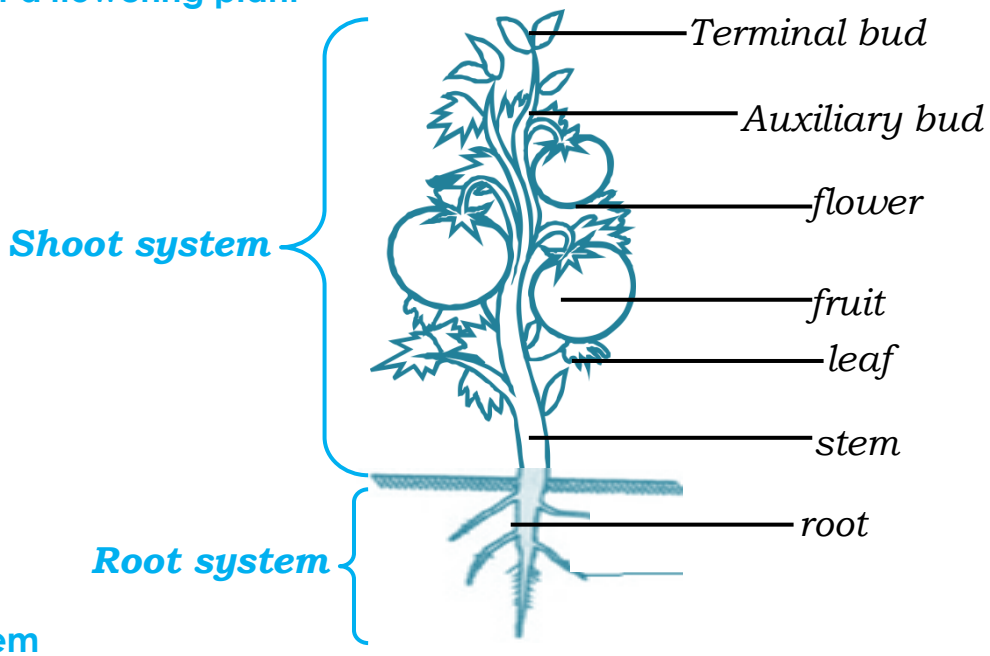
1. Maize
2. Paw paws
3. Peas
4. Coffee
5. Cotton
6. Mangoes
7. Oranges
8. Grapes
9. Jackfruit
10. Acacia

All the above plants are grouped under flowering plants because they bear flowers.

Systems of flowering plants

1. Shoot system
2. Root system

Structure of a flowering plant



Shoot system

- The shoot system is the system of the plant above the ground level.
- It develops from the plumule of the seed.

Parts of a shoot system

1. Stems
2. Flowers
3. Nodes
4. Internodes
5. Branches
6. Axillary bud
7. Fruits
8. Leaves

ACTIVITY

1. What are flowering plants?

_____

_____

2. Name **two** systems of a flowering plants shown in the diagram.

(i) _____

(ii) _____

(b) State any **two** parts of a shoot system shown in the diagram.

(i) _____

(ii) _____

3. Mention any **two** examples of flowering plants in your area.
   (i) _____
   (ii) _____
4. Suggest any **two** importance of plants to people.
   (i) _____
   (ii) _____
5. Why is a maize called a flowering plant?

   _____

   _____
6. Name the system of the plant above the ground level.

   _____

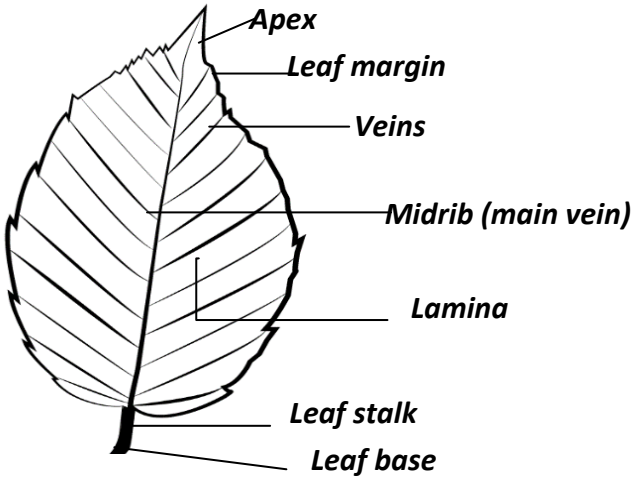
   _____
7. State any **two** places where plants can grow.
   (i) _____
   (ii) _____

LESSON

LEAVES

Leaves are the expanded part of plants that grow from the plumule.

Parts of a leaf



Functions of each part

1. **Leaf stalk (petiole):**
   Leaf stock/ petiole supplies water to the leaf from the branch/ stem.
   It attaches the leaf on the branch.
2. **Leaf base:**
   It fixes the leaf on the stem.
3. **Midrib ,Mid vein:**
   It transports water and nutrients from the leaf stalk to veins
4. **Veins:**
   - ✓ They supply water and minerals from the mid vein to all parts of the leaf.
   - ✓ Collect manufactured food from all parts of the leaf to the mid vein.
5. **Stomata:**
   Stomata are small openings (holes) found in the lamina of the leaves.
   They are used for breathing and transpiration.
6. **Lamina (leaf blade)**

For making food / photosynthesis

ACTIVITY

1) Name the expanded part of plants that grow from the plumule.

_____

_____

2) Which part of the plant fixes the leaf on the stem?

_____

_____

3) What name is given to the tip of a leaf?

_____

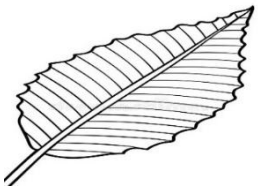
_____

4) Which part of a leaf is responsible for making food?

_____

_____

5) ***Below is a plant leaf. Use it to answer the questions that follow.***



By using arrows, show the following parts of a leaf: apex, veins, lamina, leaf base and leaf margin.

_____

_____

6) State any **two** uses of stomata in tomato leaves.

(i) _____

(ii) _____

7) Name the substance which makes a leaf to appear green.

_____

_____

8) Mention any **two** plants that we eat their leaves.

(i) _____

(ii) _____

LESSON

Leaf venation

Leaf venation is the arrangement of veins in the leaf.

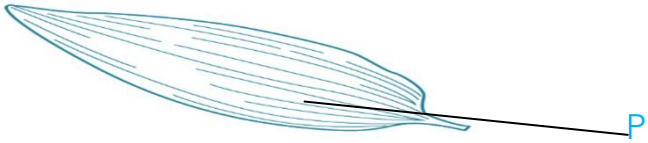
Types of leaf venation

There are two types of leaf vexation namely:

- Network leaf venation
- Parallel leaf venation.

Parallel leaf venation

Leaves with parallel venation have many veins which run from leaf stock to the apex and do not cross each other.



Parallel veins

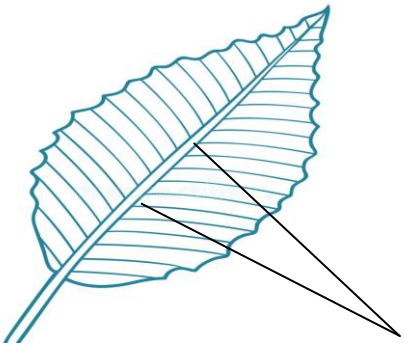
This kind of leaf venation is common in leaves of monocotyledonous plants.

Examples of plants which have leaves with parallel venation

- All cereals such as maize, millet, rice, sorghum
- Grass
- Sugar cane plants.

Network leaf venation

This is where veins make a net in a leaf as they cross each other.



Network veins

Network leaf venation is commonly found in leaves of dicotyledonous plants.

Examples of plants which have leaves with network venation

All legumes such as

1. Beans
2. Peas
3. Soya beans
4. Ground nuts
5. Jack fruits
6. Mango plants.
7. Coffee
8. Cotton
9. Lemon

ACTIVITY

1) What term is used to mean the arrangement of veins in the leaf?

   _____

2) Mention any **two** types of leaf venation.

   (i) _____

   (ii) _____

3) Define parallel leaf venation.

   _____

   _____

4) What kind of leaf venation is common in leaves of monocotyledonous plants?

   _____

5) Mention any **two** examples of cereal crops.

   (i) _____

   (ii) _____

6) Name any **two** examples of plants which have leaves with parallel venation.

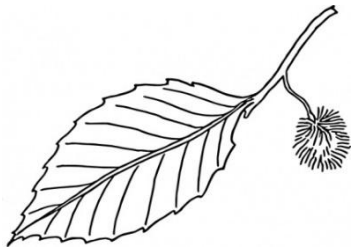
   (i) _____

   (ii) _____

7) What is network leaf venation?

   _____

Study the leaf below and answer the questions about it.



8) Name the type of leaf venation shown above.

_____

_____

9) Sate any **two** examples of plants which have leaves with venation named above.

(i) _____

(ii) _____

9) **In the space provided below, draw diagrams to show the following leaf venations.**

Network leaf venation	Parallel leaf venation

10) **Name the type of root system found in the plants with the following leaf venations.**

i) Parallel leaf venation……

ii) Network leaf venation……

LESSON

Types of leaves

Different plants have different types of leaves.

These types of leaves are grouped according to their sizes and shapes.

Types of leaves

- Simple leaves
- Compound leaves

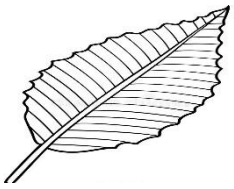
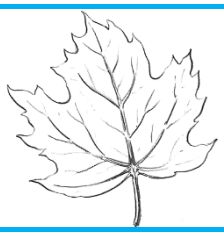
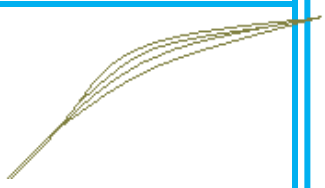
Simple leaves

A simple leaf is a leaf with one leaflet on the leaf stalk.

Characteristics of simple leaves

1. They have one leaflet on the stalk.
2. They have one leaf stalk
3. They have one margin

Kinds of simple leaves

Simple entire leaf **Examples** 1. Mango 2. Jackfruit 3. Avocados.		**Simple serrated leaves** **Example** Black jack.	
3. Simple palmate leaves Example Pawpaw		**4. Simple lanceolate leaf** **Examples** Maize , sorghum , wheat , grass	
5. Simple divided leaf			

ACTIVITY

1) Mention ant **two** types of leaves.
   (i) _____
   (ii) _____
2) What are simple leaves?
   _____
   _____
3) State any **two** characteristics of simple leaves.
   (i) _____
   (ii) _____
4) Mention any **two** examples of plants with simple entire leaves.
   (i) _____
   (ii) _____
5) Apart from maize, mention any **two** other plants with simple lanceolate leaf.
   (i) _____
   (ii) _____

LESSON

Compound leaves

These are leaves with more than one leaflet on the stalk.

Characteristics of compound leaves

1. They have many leaflets.
2. They have many leaf stalks.

Examples of compound leaves

Examples of compound leaf	Illustration	Plant with such leaf
Compound pinnate leaves They have their leaves branched into small leaf stalk where each bears a leaflet.		acacia. Jacaranda
Compound trifoliate leaves They have three leaf stalks branched into separate structures.		beans, soya
Compound bi-pinnate leaves Their petioles are divided into other small petioles similar to the compound pinnate leaves		
Compound digitate leaves They have leaf stalks branched into separate structures.		Cassava Silk cotton

ACTIVITY

1) Name the type of leaves with more than one leaflet on the stalk.

_____

_____

2) State any **two** characteristics of compound leaves

(i) _____

(ii) _____

3) State **two** plants with compound pinnate leaves

(i) _____

(ii) _____

4) Name the type of compound leaf drawn below.

_____

_____

a) Mention **one** other example of plant with the type of compound leaf above.

_____

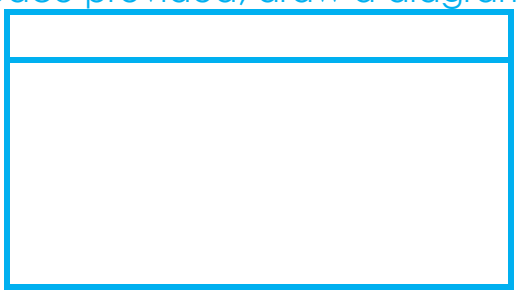
_____

b) Suggest any **two** processes which take place in the leaves.

(i) _____

(ii) _____

5) In the space provided, draw a diagram of a compound trifoliate leaf.



6) Mention any **two** crops with the above type of leaf.

(i) _____

(ii) _____

7) Mention any **two** importance of leaves to plants.

(i) _____

(ii) _____

LESSON

Uses of leaves to people and animals

1. Some leaves are eaten as food e.g. cabbage
2. Some leaves are grown for sale
3. Some leaves are used for making shelter for man.
4. Some leaves are used for decoration e.g. palm leaves.
5. Some leaves are used for beverage e.g. tea leaves.
6. Some leaves are used for herbal medicines e.g. mango, guavas etc.
7. Some leaves are used for feeding domestic animals.
8. Some leaves are used for making mats.
9. Some leaves are used for mulching garden

Uses of leaves to plants

1. Leaves help plants for making food (photosynthesis)

2. Leaves help plants for breathing
3. Leaves help plants for transpiration.
4. Some store food as the plants e.g. onions.
5. Some leaves are used for propagation e.g. bryophyllum

Processes that take place in leaves

1. Photosynthesis
2. Transpiration

ACTIVITY

1) State any **two** uses of leaves to people.
   (i) _____
   (ii) _____
2) Mention any **two** examples of leaves eaten by human beings.
   (i) _____
   (ii) _____
3) What term is used to mean the process by which green plant make this own food?

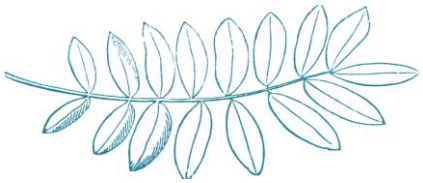
   _____

   _____
4) Mention **one** example of leaf that store food for the plant.

   _____

   _____

The diagram below shows a part of a plant. Use it to answer questions below.



(a) Name the part of plant shown above.

_____

_____

(b) To which system of plant does the above named part belong?

_____

_____

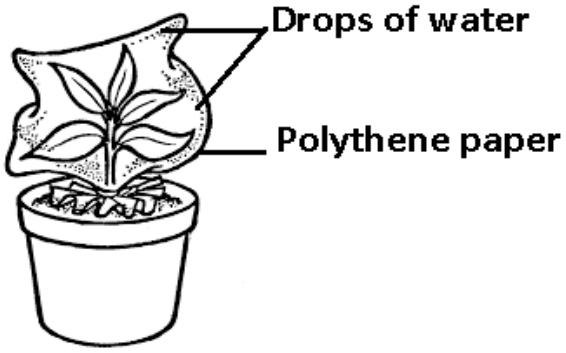
5) State any **two** processes that take place in the part of plant shown above.
   (i) _____
   (ii) _____
6) In which **two** ways are the above part important to plants?
   (i) _____
   (ii) _____

LESSON

TRANSPIRATION

Transpiration is the process through which plants lose water in form of water vapour to the atmosphere through leaves.

An experiment to prove that transpiration takes place in leaves.



How plants reduce the rate of transpiration

1. By shedding off the leaves in dry season. These plants are called **deciduous plants**.
2. Some plants develop needle like structured leaves
3. Some plants have wax on their leaves e.g. banana plants.
4. Some plants have small leaves.
5. Some plants have thick leaves with few stomata.
6. Some plants have thorns on stems and leaves e.g. cactus, aloe vera.

Ways in which plants increase the rate of transpiration

1. By developing many leaves
2. Developing broad leaves.

Factors affecting the rate of transpiration

1. Speed of wind
2. Number of leaves on a plant
3. Size of the leaves:
4. Temperature
5. Humidity
6. Light intensity

ACTIVITY

1. What is transpiration?

_____

_____

2. What are deciduous plants?

_____

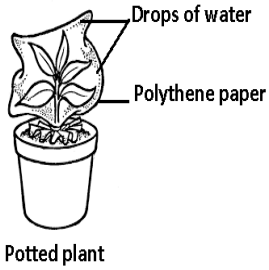
_____

3. State the process which takes place in human being similarly to transpiration in plants.

_____

_____

The diagram below shows a simple experiment. Use it to answer the questions that follow.



4. What is the experiment about?

_____

_____

5. In which group of living things do the processes above happen?

_____

_____

6. State any **two** factors affecting the rate of the process named in (a) above.

(i) _____
(ii) _____

7. How can the plants reduce the rate of transpiration?

_____

_____

8. Name the small holes found in the lamina which carry out transpiration.

_____

_____

9. How do bananas reduce the rate of transpiration?

_____

_____

10. Write **two** ways in which plants increase the rate of transpiration

(i) _____
(ii) _____

LESSON

How some of these factors affect the rate of transpiration

- ✓ **Size of the leaves:**
  This increases the rate at which water is lost by the number of stomata it may have.
  The bigger the leaves, the higher the rate of transpiration
- ✓ **Temperature**
  Plants lose a lot of water on a hot day than a cool day.
  The higher the temperature, the higher the rate of transpiration
- ✓ **Humidity**
  The higher the humidity, the lower the rate of transpiration
- ✓ **Light intensity**
  It increases the rate of water loss.
  The more the sunlight the higher the rate of transpiration

Temperature: Plants lose a lot of water on a hot day than a cool day.
Light intensity: It increases the rate of water loss.
The stomata are open during day and closed at night
Wind: The rate of transpiration is very high when it is windy because more water vapour is blown away from the leaf surface.

Importance of transpiration to plants

1. It cools the plants on hot days.
2. It helps the plants to absorb more water from the soil.
3. It helps to provide support to plants with weak stems.

Importance of transpiration to the environment

It helps in rain formation.

ACTIVITY

1. What is transpiration?

_____

_____

2. Mention **any two** factors affect that increase the rate of transpiration.
   (i) _____
   (ii) _____
3. State any **two** factors that affect the rate of transpiration.

(i) _____

(ii) _____

4. Mention **one** way in which the following factors affect the rate of transpiration.

(a) Size of the leaves

_____

(b) Temperature

_____

(c) Humidity

_____

(d) Light intensity

_____

(e) Temperature

_____

(f) Light intensity

_____

5. Mention any **two** importance of transpiration to plants.

(i) _____

(ii) _____

6. State any **one** value of transpiration to the environment.

_____

_____

LESSON

PHOTOSYNTHESIS

Photosynthesis is the process by which green plants make their own food.

Photosynthesis comes from two words;

Photo : means light.

Synthesis: means to make.

Plants have ability to make their own food known as starch because they have chlorophyll.

Plants cannot make their food at night because there is no sunlight.

Conditions for photosynthesis

❖ Chlorophyll: traps sunlight energy

Sunlight provides energy to the leaf.

The raw materials for photosynthesis

- ✓ Carbon dioxide
- ✓ Water

NB: The by– product of photosynthesis is **oxygen**

The product of photosynthesis is **starch**

Conditions affecting the rate of photosynthesis

1. Temperature
2. Sunlight
3. Light intensity
4. Carbon dioxide
5. Oxygen
6. Chlorophyll

ACTIVITY

1. What is photosynthesis?

_____

_____

2. What name is given to the food made by the plants?

3. State **one** reason why plants cannot make their food at night.

4. Write any **two** conditions necessary for photosynthesis to take place.
   (i) _____
   (ii) _____
5. What helps plants to traps sunlight energy?

6. State any **two** raw materials for photosynthesis.
   (i) _____
   (ii) _____
7. Name the product of photosynthesis.

8. Mention any **one** by– product of photosynthesis.

9. Write down any **two** conditions affecting the rate of photosynthesis.
   (i) _____
   (ii) _____

LESSON

Stems

A stem is a slender part of a plant that grows from the plumule.
A stem is a main long part of a plant above the ground from which leaves grow.

Uses of a stem to a plant

1. It transports water and mineral salts from the roots to the leaves.
2. A stem transports food from the leaves to other parts of the plant.
3. A stem supports the leaves and branches of a plant.
4. Some stems are used for breathing.
5. Some stems are used for propagation e.g. cassava and sugar cane.
6. Some stems store food for the plants e.g. Irish potatoes, sugar cane.

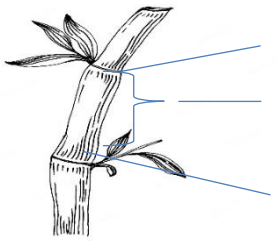
Uses of stems to people

1) Some stems are eaten. E.g. sugarcane, Irish etc.
2) Some stems are used for firewood.
3) For herbal medicine.
4) For making timber.
5) For building houses

Uses of stems to other animals

- Some stems are used as food.
- Some are habitats for some animals e.g. ants, birds.

Structure of a stem



- ✓ The axil is the angle between the leaf and the stem.
- ✓ The internode is the region between two nodes on the stem.
- ✓ The node is the point where the leaf is fixed on the stem.

ACTIVITY

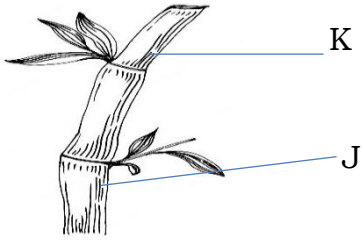
1. What name is given to the slender part of a plant that grows from the plumule?

   _____

   _____

2. State any **two** uses of stems to the plants.
   (i) _____
   (ii) _____
3. Give any **two** uses of stems to people.
   (i) _____
   (ii) _____
4. State any **two** importance of stems to birds.
   (i) _____
   (ii) _____
5. State any **two** parts of plant that develop from the part named in (8).
   (i) _____
   (ii) _____

Below is a part of a plant. Use it to answer questions 7, 8 and 9.



6. Which part of the plant is shown above?

   _____

   _____

7. Name the part marked with letter
   (a) J……
   (b) K……
8. Which system of plants contains the part shown above?

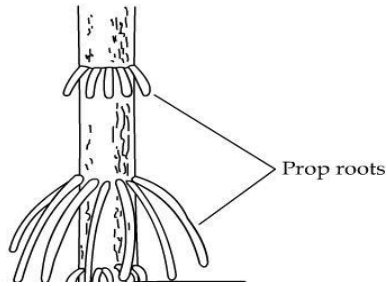
   _____

   _____

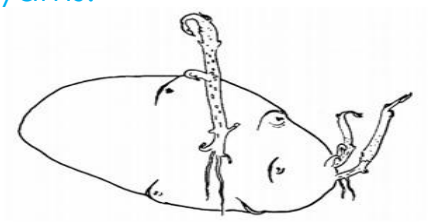
LESSON

Types of stems.

1. Upright stems (Erect stems) e.g. Mangoes, Oranges, Maize.



2. Climbing stems e.g. cucumber, yam, pea plants, morning glory
3. **Underground stems e.g. stem tubers:**
   They are swollen underground stems with stored food e.g. Irish potatoes, coco yams.



4. Creeping stems e.g. sweet potatoes.

5. Rhizomes e.g. ginger, curry, turmeric. Rhizomes are horizontal underground stems.

ACTIVITY

1. Mention any **two** examples of plants propagated by use of stems.
   (i) _____
   (ii) _____
2. Give another name for storage stems.
   _____
   _____
3. Mention any **two** examples of plants which store food in their stems.
   (i) _____
   (ii) _____
4. Mention any **two** types of stems.
   (i) _____
   (ii) _____
5. Mention any **two** examples of plants with erect stems.
   (i) _____
   (ii) _____
6. What are rhizomes?
   _____
   _____
7. State any **two** examples of rhizomes.
   (i) _____
   (ii) _____

LESSON

Underground stems

Underground stems are stems which grow in the soil.
These are stems which grow underground and only leaves come out of the grounds.
They are swollen with food stored for the plants.

Underground stems are also called storage stems.

Kinds of underground stems

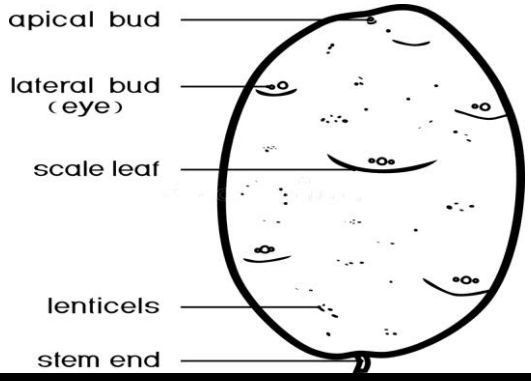
1. Stem tubers
2. Rhizomes
3. Corms
4. Bulbs

Stem tubers

Stem tubers are swollen underground stems with stored food.

Examples of stem tubers are: Irish potatoes and white yams

Parts of an Irish potato



ACTIVITY

1) What name is given to the stems which grow underground and only leaves come out of the grounds?

_____

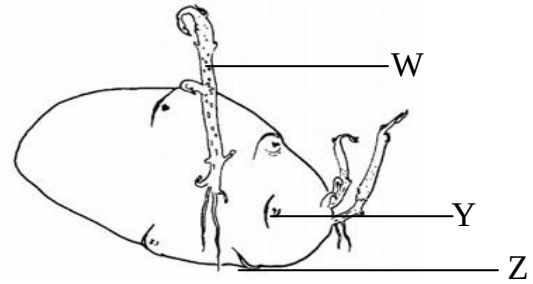
2) Why are underground stems called storage stems?

_____

3) Mention any **two** groups of underground stems.
   (i) _____
   (ii) _____

4) Mention any **two** examples of stem tubers.
   (i) _____
   (ii) _____

5) **The diagram below shows the external parts of the Irish potato. Study it carefully and answer the questions that follow.**



a) Name the type of stem shown above.

_____

b) Name the part marked with letter Wand Y.
   i) W……..
   ii) Y……..

6) Which part of Irish potatoes is eaten by us?

_____

7) State the food value we get from eating Irish potatoes.

_____

_____

Bulb

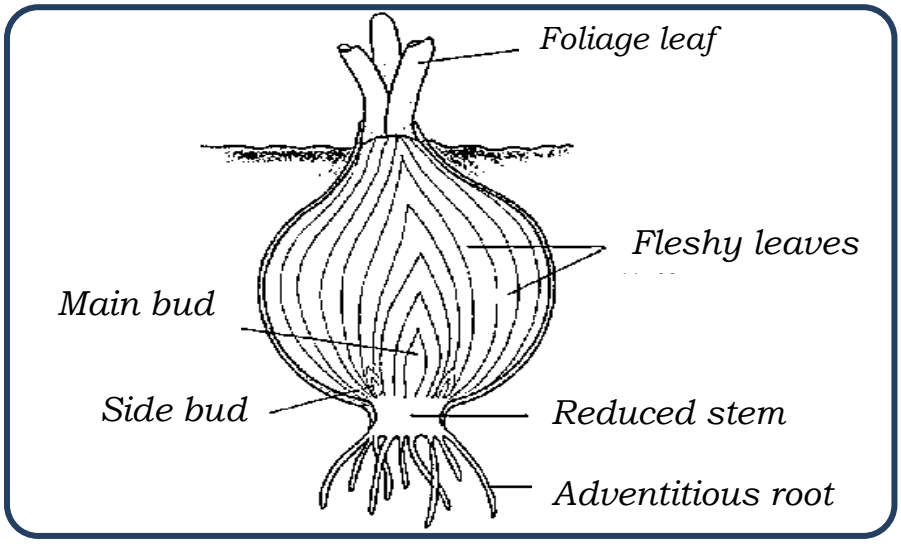
Bulbs have foliage which store food.

They have very many small roots which store food.

Examples of bulb

onion , garlic

Internal structure of a bulb



Function of each part

a) Foliage leaves make food
b) Scale leaf protects inner parts
c) Flesh leaves store food for a plant
d) Stem is the attachment of leaves and roots
e) Roots: Absorb water and minerals/support the plant

Rhizomes

Rhizomes have swollen stems which store food for the plants

A rhizome is a horizontal underground stem with adventitious roots

Examples of rhizomes

Ginger, turmeric, canal Lilly, Zoymeric

1) **Corms** are short stems with adventitious stems which store food for the plants

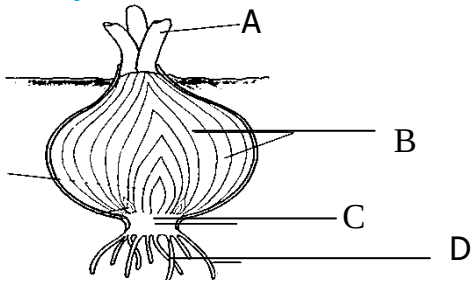
Examples of corms

Coco yams

ACTIVITY

1. What name is given to the swollen underground stems with stored food?

The diagram below shows the parts of the onion. Study it carefully and answer the questions that follow.



2. Name the type of stem shown above.

_____

_____

3. Name the part marked with letters A,B, C, D.

_____ _____

_____ _____

4. Which part of the above plant store food?

_____

_____

5. Name the type of root system found in the onion.

_____

_____

6. Mention any **two** examples of stem tubers
   (i) _____
   (ii) _____
7. Apart from onion, mention any **one** other example of bulb.

_____

_____

8. Mention any **two** importance of roots to the bulbs.
   (i) _____
   (ii) _____

LESSON

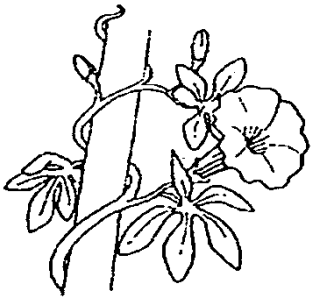
Climbing stems

Climbing stems are plants with weak stem e.g. cucumber, white yam, pea plants, morning glory,

Why do some plants climb others?

1. For support
2. To get enough sunlight energy.

Ways plants climb others

Methods of climbing	illustration	Example of plants
i) Using tendrils  passion fruits cucumber peas pumpkins	iii) By twinning (clasping)  morning glory sponge plants some beans, tomatoes	By using hooks  Rose flower

ACTIVITY

1. How are thorns important to the rose flowers?

_____

_____

2. What are climbing stems?

_____

3. State any **two** reasons why some plants climb others.
   (i) _____
   (ii) _____
4. Write any **two** methods plants use to climb others.
   (i) _____
   (ii) _____
5. In which way are tendrils important to the pumpkins?
   _____
   _____
6. Apart from pumpkins, mention any **two** other examples plants which climb others using tendrils.
   (i) _____
   (ii) _____
7. To which group of stems do tomatoes belong?
   _____

LESSON

Root system

Root system is the part of a plant below the ground level.

Types of roots

1. Primary roots
2. Secondary roots

Primary roots

These are the roots, which develop from the radicle.

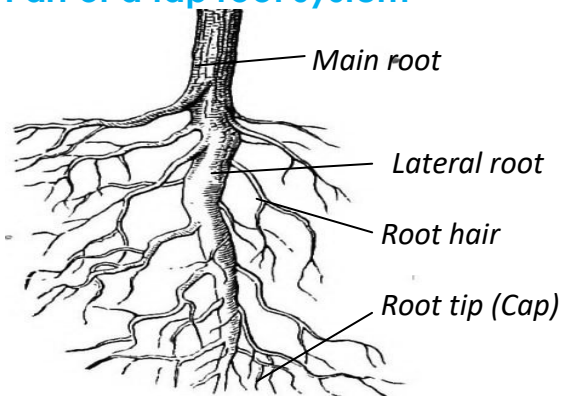
Examples of primary roots

1. Tap root systems.
2. Fibrous root systems.

Examples of plants with tap root system.

1) Guava plant
2) Pea plant
3) Lemon plant
4) Coffee plant

Part of a tap root system



Function of each part

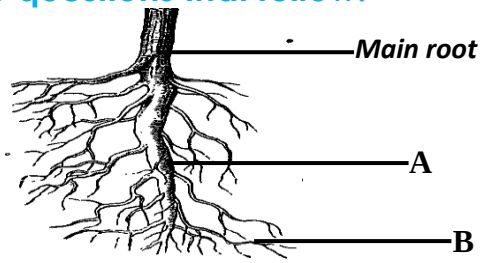
- Main root: supports the plant firmly in the ground.
- Lateral roots: supports the plant firmly in the ground.
- Root hairs: suck water and mineral salts from the soil through osmosis
- Root cap: Protects the tip of the roots
  Helps the root to penetrate through the soil.

❖ Root tip: It is growing part of the root.

ACTIVITY

1. State any **two** types of roots.
   (i) _____
   (ii) _____
2. Which part of the plant develops from the radicle?
   _____
3. State any **two** examples of primary roots
   (i) _____
   (ii) _____
4. Name any **two** examples of plants with tap root system.
   (i) _____
   (ii) _____

The diagram below shows the parts of the plant. Study it carefully and answer the questions that follow.



5. Name the part marked with letter A and B.
   _____
   _____
6. How important is the part marked with letter B to the root?
   _____
   _____
7. Name the plant system which grows below the ground level.
   _____
   _____
8. Mention any **two** importance of root caps.
   (i) _____
   (ii) _____
9. Name the growing part of the plant roots.
   _____
   _____
10. State the main importance of the main root.
    _____
    _____

LESSON

Secondary roots/adventitious roots

These are the roots which develop from other parts of the plant rather than the radicle.

Examples of secondary roots/ adventitious roots

1. Prop roots
2. Breathing roots
3. Clasping roots
4. Stilt roots
5. Buttress roots

Buttress roots appear on the shoot system of some plants to strengthen the base of trees.
It is found in plants like Jackfruits, silk cotton and Mvule trees.

Clasping roots

Clasping roots are roots which enable plants to climb by growing round and clasping for support.

Breathing roots

These are aerial roots which grow upwards and acts as bathing organs. Plants with such roots grow in water logged areas.

Stilt roots

These are roots on plants which grow in muddy areas in swamps.
They give support to the plants.

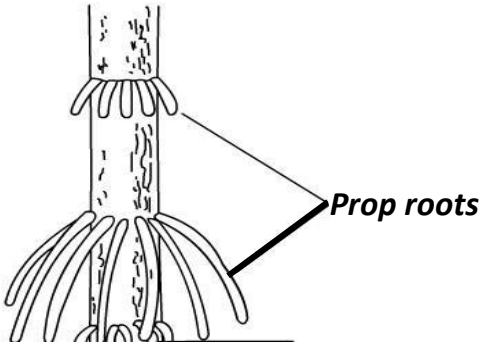
Plants with secondary roots

The plants below develop secondary roots at their nodes or base of stem

1. Onion plant
2. Banana plant
3. Pumpkin plant
4. Pineapple plant

Prop roots:

Prop roots develop from the nodes near the ground level during flowering.



They are commonly found on monocotyledonous plants.
Their main purpose of prop root is to give extra support to the plant.

Examples of plants with prop roots

1. Barley
2. Sorghum
3. Maize
4. Sugar cane
5. Millet
6. Wheat

ACTIVITY

1. Which type of roots develops from other parts of the plant rather than the radicle?

   _____

   _____

2. State any **two** examples of adventitious roots.
   (i) _____
   (ii) _____
3. State the main purpose of the prop roots.

   _____

   _____

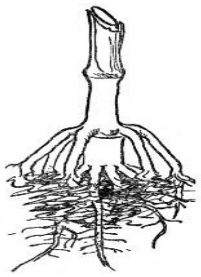
4. State any **two** parts of the plants where secondary roots can grow from.
   (i) _____
   (ii) _____
5. Which type of root system is in banana plant?

_____

_____

6. Which part of a maize gives extra support to the plant?

The diagram below shows the parts of the plant. Study it carefully and answer the questions that follow.



a) Name the type of root shown above.

_____

_____

b) Mention any **two** examples of plants with prop roots shown above.

(i) _____

(ii) _____

c) State the main purpose of the structure showed above.

LESSON

Root tubers

These are swollen underground roots with stored food.

Examples of root tubers

1. Sweet potatoes
2. Cassava
3. Carrots
4. Turnips
5. Beetroots

Uses of root to people

1. Some roots are eaten.
2. Some roots are used for making herbal medicine.
3. Some roots are source of income

Uses of roots to plants

1. They hold the plant firmly in the soil.
2. They suck water and mineral salts from the soil.
3. Some roots are used for breathing.
4. Some roots store food for the plant e.g. cassava, sweet potatoes
5. Some roots have nodules which store nitrogen fixing bacteria that adds nitrates in the soil

ACTIVITY

1. What name is given to the swollen underground roots with stored food?

_____

_____

2. Mention any **two** examples of root tubers

(i) _____

(ii) _____

3. In which way is a root tuber similar to the stem tuber?

_____

4. In the space provided below, draw and name any **two** root tuber crops.

5. State any **two** uses of root to people
   (i) _____
   (ii) _____
6. Mention any **two** uses of roots to plants.
   (i) _____
   (ii) _____
7. Mention **two** plants that we eat their roots.
   (i) _____
   (ii) _____

LESSON

Processes which take place in the roots

Osmosis

Osmosis is the movement of soluble molecules from the region of high concentration to a region of a high concentration across a semi permeable membrane.

Osmosis enables plant roots to absorb water and dissolved mineral salts from the soil by capillary attraction.

Experiments to demonstrate osmosis in plants

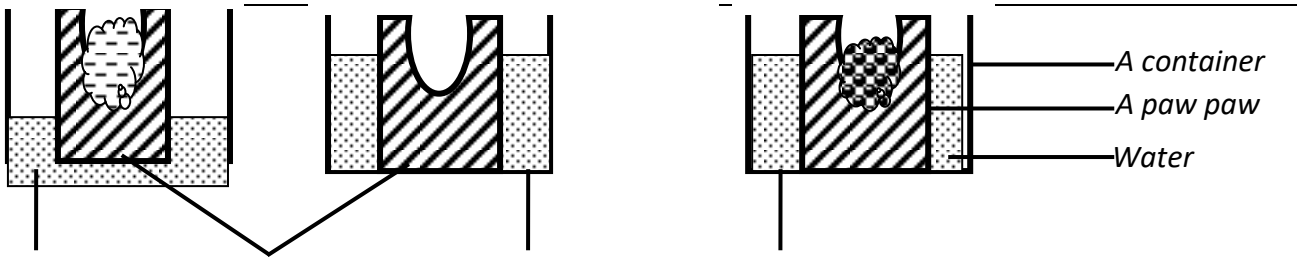
Steps

- ✓ *Cut a young green pawpaw, yam or Irish potato*
- ✓ *Peel one side and scoop out the inside in case of an Irish potato.*
- ✓ *If it's a pawpaw, remove the seeds from its centre.*
- ✓ *Place them in a container of water.*
- ✓ *Put a spoonful of sugar in 1 and 3 but not in 2 as shown below.*

Observation

A spoonful of sugar

After several hours, the central hole of 1 will be found of water and overflowing. There will be no change in 2 and 3 as shown below.



Conclusion

On 1, the Irish potato containing living cells and the sugar pulled water.

The water moved from the container to the Irish potato just in the same way water moves from the soil to the roots of the plants

Flowers

A flower is a reproductive part of a flowering plant.

It is a part of a shoot system where the reproductive cells are produced.

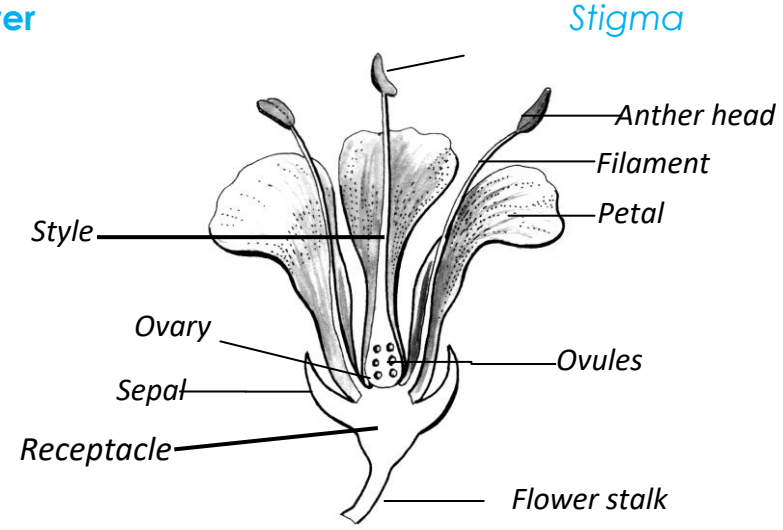
The main reproductive cells produced are ovules and pollen grains.

Main importance of flowers to plants

For reproduction

Flowers majorly produce seeds and fruits.

Structure of a flower



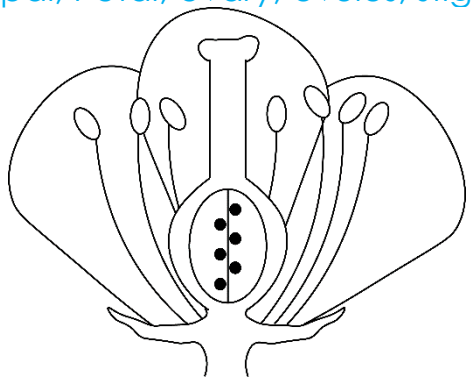
Importance of each part of a flower

1. **Flower stalk**	Holds the flower on the stem
2. **Sepals**:	a) They protect other inner parts of a flower. b) They make food for the flower. c) They cover and protect the flower in early flowering stage.
3. **Anthers**:	Produce pollen grains.
4. **Filament**:	Hold the anthers in a suitable position.
5. **Stigma**:	Attracts and receives pollen grains during pollination.
6. **Style**:	a) Holds the stigma up right. b) Allows pollen tubes to pass through to the ovary.
7. **Petals**:	Brightly colored petals attract pollinators e.g. birds, insects.
8. **Ovary**:	Develops into a fruit after fertilization.
9. **Ovules**:	Develops in to seeds after fertilization.
10. **Stamen**:	Stamen is the male part of a flower
Pistil	Pistil is a female part of a flower

ACTIVITY

1. **Complete the diagram below by showing the following parts**

Sepal, Petal, ovary, ovules, stigma, anther and stamen



2. Name the reproductive part of a flowering plant.

3. State the main importance of flowers to plants.

4. Which part of the flower hold the stigma?

5. In which **two** ways are sepals important to the flowers?
   (i) _____
   (ii) _____
6. State the reason why some flowers have bright colored petals.

7. State the importance of the following parts of a flower.
   a) Stigma:_____
   b) Anther:_____
   c) flower stalk: _____
8. What name is given to the female part of a flower?

9. Which part of a flower develops into a fruit after fertilization?

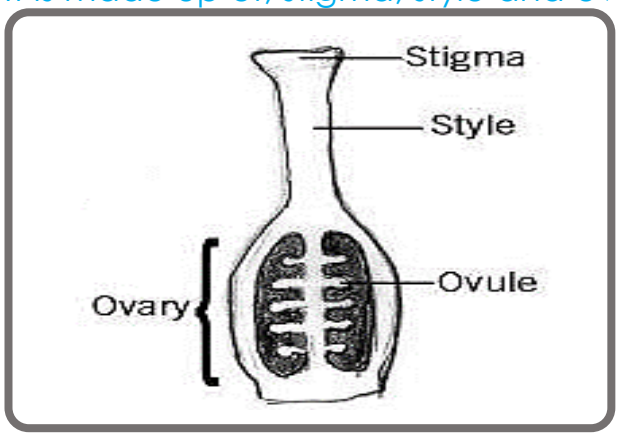
10. Name the part of a flower which develops into seeds after fertilization?

LESSON

THE MALE AND THE FEMALE REPRODUCTIVE SYSTEM OF A FLOWER

Pistil

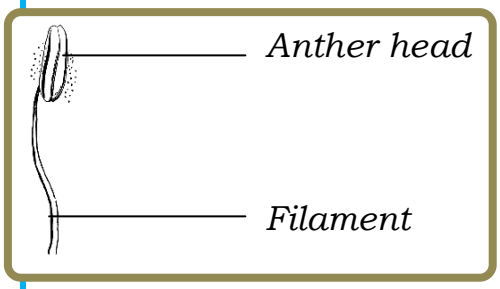
Pistil is the female part of a flower. It is also called carpel.
It is made up of; stigma, style and ovary.



Functions of the parts of a pistil

Ovary: It contains undeveloped seeds called ovules.
An ovule is a female gamete
Stigma: It receives pollen grains from the anthers.
Style: It holds the stigma in position.

Stamen:
This is the male part of a flower.
It is made up of the anther head and the filament.



Functions of the parts
The anther produces and stores pollen grains.
The filament holds the anther head in one position

NB: - A general name given to a group of sepals is called **calyx**.
A general name given to a group of petals is called **corolla**.

ACTIVITY

1. What is a pistil?

_____

2. Mention any **two** components of a carpel.
   (i) _____
   (ii) _____
3. What name is given to the female part of a flower?

_____

_____

4. Which part of a flower receives pollen grains from the anthers.

_____

_____

5. Name the male part of a flower.

_____

_____

6. Mention any **two** parts of a flower which makes up a stamen.
   (i) _____
   (ii) _____
7. State any **two** uses of anthers to the plants.
   (i) _____
   (ii) _____
8. On which part of flower does fertilization take place?

_____

_____

9. What general name is given to a group of sepals?

_____

_____

10. What do you understand by the word **corolla**?

_____

_____

11. What name is given to the fertilized ovary?

12. Which part of the flowers turns into seeds after fertilization?

LESSON

POLLINATION

Pollination is the transfer of pollen grains from the anther to the stigma of a flower on a plant.

Pollen grains can be transferred from the anthers to the stigma by the pollination agents.

Types of pollination

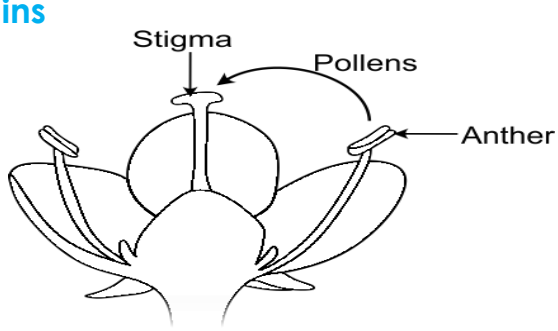
1. Self-pollination.
2. Cross pollination.

Self-pollination

Self-pollination is the transfer of pollen grains from the anther to the stigma of the same flower or another flower of the same plant.

In self-pollination, the anther heads are taller than the style.

Movement of pollen grains



Plants which carry out self-pollination

- Tomatoes
- Wild marigold.

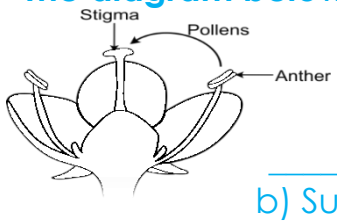
Adaptations for self-pollinated flowers

- The anthers and stigma mature at the same time e.g. the conifers, in tomatoes
- The flower remains closed until self-pollination has taken place e.g. the conifers
- The flower is hermaphrodite i.e. it has both male and female reproductive parts e.g in maize and coconut plants.
- Some flowers are buried in the ground

ACTIVITY

1. What is pollination?
2. State any **two** types of pollination
   (i) _____
   (ii) _____
3. Define self-pollination.

4. Mention any **two** plants which carry out self-pollination.
   (i) _____
   (ii) _____
5. **The diagram below shows the parts of the plant. Study it carefully and answer the questions that follow.**



a) Name the type of pollination above.
_____
b) Suggest any **two** examples of flower pollinating agents.
   (i) _____
   (ii) _____

LESSON

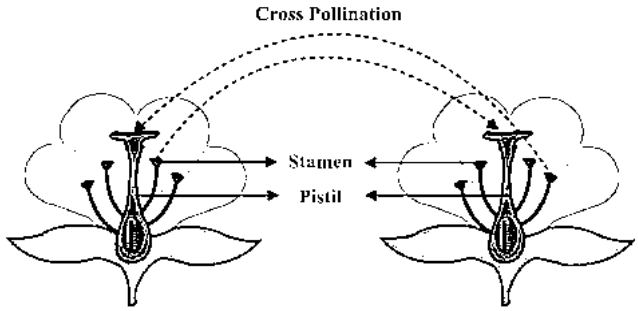
Cross pollination

Cross pollination is the transfer of pollen grains from the anthers of one flower to the stigma of another flower of different plants of the same kind.
In cross pollination, the filament is shorter than the style. Cross pollination is brought about by insect and wind.

Plants which carry out cross pollination

1. Maize
2. Coconut
3. Paw paws
4. Cow peas
5. Passion fruits

Movement of pollen grains



Adaptations for cross pollinated flowers.

- The male and female flowers occur on separate plants e.g. in papaws.
- The male and female parts mature at different times i.e. the stamen may mature first or the pistil.
- The pollen grains cannot germinate on the stigma of the same flower e.g. in passion fruits.

Difference between self-pollinated flower and cross pollinated flowers.

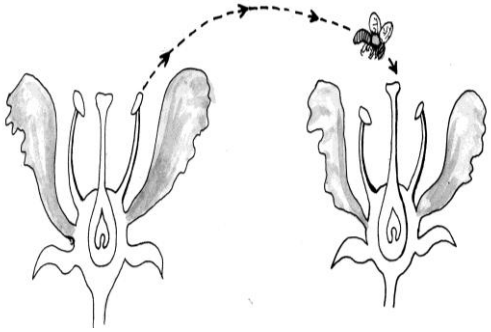
Self-pollinated flowers	Cross pollinated flowers
1. Pistils and stamen are on the same flower. 2. Large amounts of pollen grains produced. 3. Anthers are raised higher than the stigmas.	1. Pistils and stamen are on different flowers. 2. Small amounts of pollen grains produced. 3. Stigmas are raised higher than anthers.

ACTIVITY

1. What is cross pollination?
   _____

2. State any **two** characteristics of self-pollinated flowers.
   (i) _____
   (ii) _____
3. Give any **two** characteristics of cross pollinated flowers.
   (i) _____
   (ii) _____

The diagram below shows the type of pollination. Study it carefully and answer the questions that follow.



4. Name the type of pollination shown above.
   _____
   _____
5. Mention any **two** agents of cross pollination.
   (i) _____
   (ii) _____
6. Name the type of pollination where filament is shorter than the style.
   _____
   _____
7. State any **two** examples of pollinators which carry out the type of pollination named above.
   (i) _____
   (ii) _____
8. Mention any **two** plants which carry out cross pollination.
   (i) _____
   (ii) _____

LESSON

AGENTS OF POLLINATION

An agent of pollination is anything that carries pollen grains from the anthers to the stigma.
Agents of pollination are things responsible for the transfer of pollen grains from anther heads to the stigma of a flower.

Examples of agents of pollination

1. Insects
2. Birds like sun birds, humming birds.
3. Animals like man, bats.
4. Wind
5. Water

Insect pollinated flowers.
These are flowers pollinated by the insects.

Examples of insect pollinators

Bees, beetles, butterflies, moths, Mosquitoes

- Moths pollinate flowers at night.

Note: Moths are attracted by the scent of flowers.

Diagram of a moth

Characteristics of insect pollinated flowers

1. They have brightly colored petals.
2. They produce a lot of nectar.
3. They are well scented at night.
4. They are large and seen easily
5. They have broad sticky stigma.
6. They have large, rough and heavy pollen grains
7. The anthers produce few pollen grains.
8. The stamen has short filaments.

ACTIVITY

1. What do you understand by agents of pollination?

_____

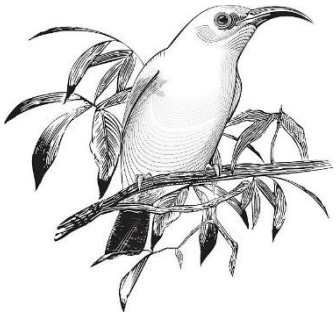
_____

2. Mention any **two** examples of agents of pollination

_____

_____

The diagram below is of a pollinator. Study it carefully and answer the questions that follow.



3. Name the pollinator shown below.

_____

4. Besides the pollinator named above, mention other **one** example of bird which pollinate flowers.

_____

5. Mention any **one** way in which the above bird benefit from the plants.

_____

_____

6. How is the bird above able to suck nectars from the flowers?

_____

_____

7. State any **two** characteristics of insect pollinated flowers.

(i) _____

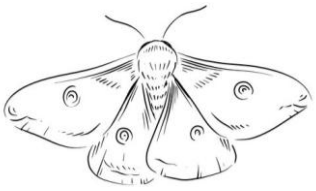
(ii) _____

8. Suggest any **two** examples of insect pollinated flowers.

(i) _____

(ii) _____

9. **Below is a structure of a pollinator. Use it to answer questions that follow.**



(a) Name the pollinator drawn above.

_____

_____

(b) Why is the above pollinator able to pollinate flowers at night?

_____

_____

(c) Mention other insect pollinator apart from the above named one.

_____

_____

LESSON

Wind pollinated flowers

These are flowers which undergo pollination as a result of wind action.

Characteristics of wind pollinated flowers.

1. The flowers are small and not easily seen.
2. The petals have dull colours.
3. The flowers do not produce nectar.
4. They produce a lot of pollen grains.
5. They have small, smooth and light pollen grains
6. They have long feathery stigma.
7. The flowers don't have scent

Different between wind pollinated flowers and insect pollinated flowers

Insect pollinated flowers	Wind pollinated flowers
1. Have brightly colored petals.	1. Have dull colored petals
2. Have large petals.	2. Have small petals.
3. Produce scent.	3. Produce no scent.
4. Produce nectar.	4. Produce no nectar.
5. Produce few pollen grains.	5. Produce a lot of pollen grains.
6. Have sticky stigma	6. Have hairy stigma.
7. Have heavier pollen grain	7. Have lighter pollen grains

Examples of wind pollinated flowers.

Maize, most grasses, wheat

Importance of pollination in plants

- ✓ It allows fertilizations to take place in plants
- ✓ It increases the yields of crops if the pollination is evenly done.

Fertilization happens after pollination

Fertilization:

Fertilization is the union of a male and a female gamete to form a zygote.

In flowering plants, the male reproductive cells are the pollen grains and the female reproductive cells are the ovules

Events after fertilization

- ❖ Ovules develop into seeds
- ❖ Ovary develops into fruit.
- ❖ The calyx, corolla, stamen and style wither slowly and fall off.

❖ In some flowers, the calyx may remain.

Importance of pollination to the farmers

- ✓ Pollination allows fertilization to take place in farmers' crops.
- ✓ Pollination allows high yield in farmers' harvest

ACTIVITY

1. What is pollination?

   _____

   _____

2. State any **two** characteristics of insect pollinated flowers.
   (i) _____
   (ii) _____
3. Mention any **two** characteristics wind pollinated flowers.
   (i) _____
   (ii) _____
4. Give any **two** importance of pollination in flowering plants.
   (i) _____
   (ii) _____
5. Define the term fertilization.

   _____

   _____

6. Mention any **two** events which take place after fertilization in flowering plants.
   (i) _____
   (ii) _____
7. Name the part of a flowering plants where fertilization take place.

   _____

   _____

8. Name the scientific name use to mean the:
   (a) male reproductive cells of a plant: _____
   (b) Female reproductive cells of a plant_____
9. What do the following parts develop into after fertilization?
   (a) Ovary: _____
   (b) Ovules: _____

LESSON

Uses of flowers to people

1. They are used for decoration on various functions.
2. Flowers are used to get insecticides.
3. They serve as a source of income.
4. They are used to get dye.
5. For making perfume.
6. They are used as wreaths.
7. Some flowers are eaten. e.g. Cauliflower
8. Some are used as a sign of welcome (bouquet)

Uses of flowers to other animals

1. Bees collect nectar and pollen from flowers.
2. Humming birds, sun birds collect nectar from flowers
3. Mosquitoes feed on nectar from flower

Uses of leaves to a plant

1. For making food (photosynthesis)
2. For breathing
3. For transpiration.
4. Some store food as the plants e.g. onions.

ACTIVITY

1. State any **two** uses of flowers to people.
   (i) _____
   (ii) _____
2. State any **two** functions where flowers are used for decoration.
   (i) _____
   (ii) _____
3. What are insecticides?
   _____
   _____
4. State any **one** use of insecticides to the farmers.
   (i) _____
   (ii) _____
5. Name any **two** animals which benefit from the flowers.
   (i) _____
   (ii) _____
6. Mention any **two** importance of flowers to other animals.
   (i) _____
   (ii) _____
7. What do sunbirds collect from the flowers?
   _____
   _____

LESSON

Tropism

Tropism is the growth movement of plants in response to the stimulus
Tropism is the plant response towards stimulus.
A stimulus is any change in the environment to which the plant is sensitive.

Types of tropism

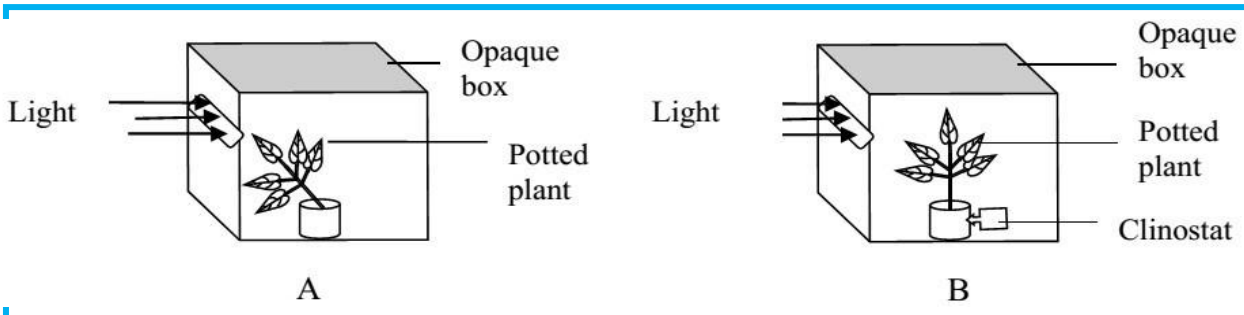
Each type of tropism is named according to the type of stimulus involved.

Tropism	**Stimuli**
Phototropism	Light
Geotropism	Gravity force
Hydrotropism	Water / moisture
Thigmotropism / haptotropism	Touch
Chemotropism	Chemicals

Phototropism

Phototropism is the growth movement of plant shoots towards the source of light.
The word **photo** means **light**.

Illustration of phototropism

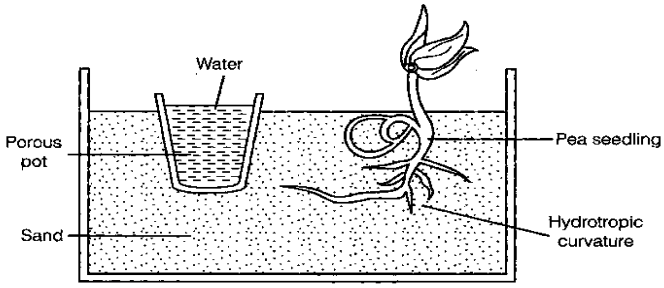


Geotropism

Geotropism is the growth movement of plant roots towards the gravity.

Hydrotropism is the growth movement of plant roots towards the source of water.

Hydrotropism



Thigmotropism

Thigmotropism/haptotropism is the growth of the aerial plant organ in response to localized physical contacts.

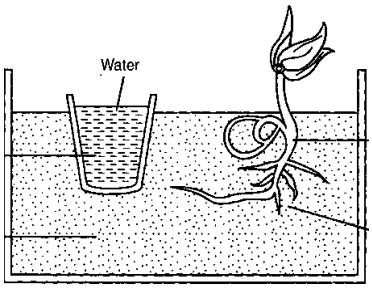
Chemotropism

Chemotropism is the growth movement of plant or parts of a plant in response to chemical stimulus.

ACTIVITY

1) What is tropism?

.....
.....
.....
.....



2) State the type of tropism illustrated below.

_____

3) Name the stimulus for the above tropism.

_____

4) Why do plant roots grow downwards?

_____

5) What term is used to mean any change in the environment to which the plant is sensitive?

_____

Tropism	**Stimuli**
_____	Light
_____	force of gravity
Hydrotropism	_____
Thigmotropism / _____	Touch

6) What term is used to mean the growth movement of plant shoots towards the source of light?

_____

_____

7) Which part of plants grow towards the source of
   (a) light: _____
   (b) Water: _____

8) Define the following terms:
   (a) Geotropism

_____

_____

   (b) Chemotropism

_____

_____

9) Name the stimulus for the following tropism
   Hydrotropism:

_____

_____

   Thigmotropism:

_____

_____

LESSON

Seeds

A seed is a fertilized ovule.

After fertilization, ovules develop into seeds and ovaries develop in to fruits.

Groups of seeds

Seeds are classified into two categories:

- Monocotyledonous / monocot seeds
- Dicotyledonous / Dicot seeds.

Monocotyledonous seeds

Monocotyledonous seeds are seeds with have only one cotyledon.

Examples of monocotyledonous seeds

1. Maize
2. Wheat
3. Rice
4. Millet
5. Sorghum
6. Oats

NB: These seeds are also called **cereals or grains**.

Characteristics of monocotyledonous seeds

1) They have one cotyledon.

2) They store food in the endosperm.
3) They undergo hypogeal germination.
4) They have parallel leaf venation.

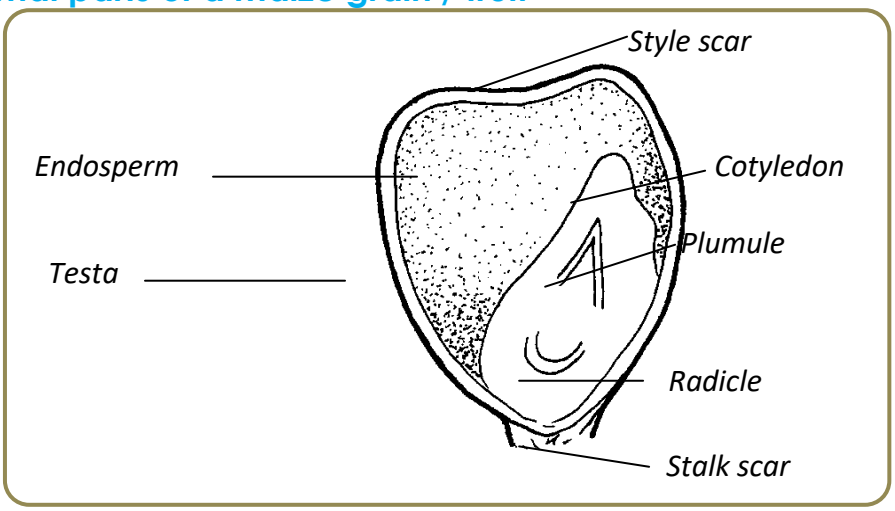
Maize grain (fruit)

A maize grain is not called a seed but it is a **fruit**.
It is called a fruit because it has two scars.

Scars of a maize grain

- **Style scar** is the part where the style was attached.
- **Stalk scar** is the part which attaches the grain to cob

The internal parts of a maize grain / fruit



Functions of each part

Testa (seed coat)	It protects the inside parts of the grain.
Radicle	It develops into root system.
Plumule	It develops into shoot system.
Embryo	It grows into a new plant.
Endosperm	It stores food for the embryo.
Cotyledon	It absorbs food from the endosperm to the embryo
	It supplies the food for embryo during germination.
1. **Style scar**	The part where the style was attached.
2. **Stalk scar**	It attaches the grain to cob

ACTIVITY

1) What are seeds?

_____

_____

2) What are monocotyledonous seeds?

_____

_____

3) State any **two** examples of monocotyledonous seeds.
(i) _____
(ii) _____

4) Mention any **two** common characteristics of monocotyledonous seeds.
(i) _____
(ii) _____

5) State the reason why maize grain is called a fruit.

_____

_____

6) Mention any **two** scars found on a maize grain.

(i) _____

(ii) _____

7) Write the function of the following parts of a maize fruit.

(a) Testa (seed coat): _____

(b) Radicle : _____

(c) Plumule :_____

(d) Endosperm: _____

8) Which part of a maize fruit develops into shoot system?

_____

_____

9) Name the part of a maize grain which grows into a new plant.

_____

_____

LESSON

DICOTYLEDONOUS SEEDS

Dicotyledonous seeds are seeds with two cotyledons.

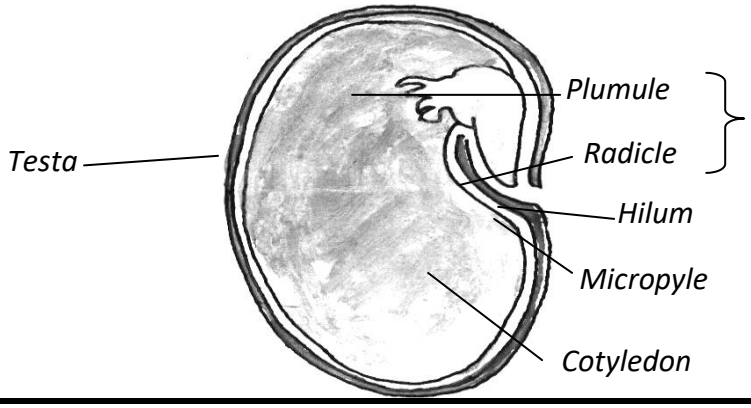
Examples of dicotyledonous seeds

1. Beans
2. Peas
3. Groundnuts
4. Oranges
5. Simsim
6. Avocado
7. Mangoes
8. Soya beans
9. Oranges

Characteristics of dicotyledonous seeds

1. They store food in the cotyledon.
2. They mostly have tap root system.
3. They undergo epigeal germination.
4. They have two cotyledons.
5. They have network leaf venation.

Internal parts of a bean seed



Functions of each part:

a) **Cotyledon** :	It stores food used by embryo during seed germination.
b) **Testa/ seed coat**:	It protects the inside parts of a seed.
c) **Radicle**	It develops into root system.
d) **Plumule** :	It develops into shoot system.
e) **Scar / hilum**	It is where the seed is attached to the pod or fruit.

f) **Micropyle**	It allows in air and water into the seed during germination.
g) Endosperm	**It** stores food for the embryo

Comparison of cotyledon of a maize grain and a been seed.

Similarities between maize grain and bean seed

1. Both maize grain and bean seed have seed coats
2. Both maize grain and bean seed have radicles
3. Both maize grain and bean seed have plumules
4. Both maize grain and bean seed have endosperm

Difference between cotyledon of a maize grain & a been seed

Maize grain	**Bean seed**
Maize grain has two scars	Bean seed has one scar
Maize grain has no micropyle	Bean seed has micropyle

ACTIVITY

1. What are dicotyledonous seeds?

   _____

   _____

2. Mention any **two** examples of dicotyledonous seeds.
   (i) _____
   (ii) _____
3. State any **two** characteristics of dicotyledonous seeds.
   (i) _____
   (ii) _____
4. What type of root system is commonly found in dicotyledonous seeds?

   _____

   _____

5. What is leaf venation?

   _____

   _____

6. Name the leaf venation commonly found in the dicotyledonous plants.

   _____

   _____

7. Which part of the bean store food for the germinating embryo?

   _____

   _____

8. State any **two** similarities between maize grain and bean seed
   (i) _____
   (ii) _____
9. State **two** differences between cotyledon of a maize grain and a been seed.
   (i) _____
   (ii) _____

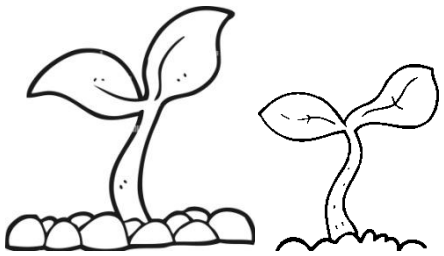
LESSON

Seed germination

Seed germination is process by which seed embryo develops into a seedling.

Seed germination is the development of seed embryo into seedling.

A seedling is a young plant.



The seeds take up water using the micropyle. The micropyle absorbs water which dissolves the food in the seeds which later swells and bursts then the radicles develop.

Conditions for germination

1. Moisture 2. Warmth 3. Oxygen

Excessive water is not needed during germination because it causes seed rotting

Importance of each condition

- Water (Moisture) : It softens the testa for the embryo to pass
  Water dissolves the stored food in the cotyledon
- Oxygen :It is used for respiration.
- Warmth:Provides the right temperature for germination

ACTIVITY

1) What is seed germination?

_____

_____

2) What name is given to the young plants shown below?

_____

3) State any **two** conditions necessary for germination to take place.
   (i) _____
   (ii) _____

4) How useful is oxygen during seed germination?

_____

_____

5) In which way is water useful during seed germination.

_____

_____

6) Mention **one** importance of warmth to the germination bean seeds.
   (i) _____
   (ii) _____

LESSON

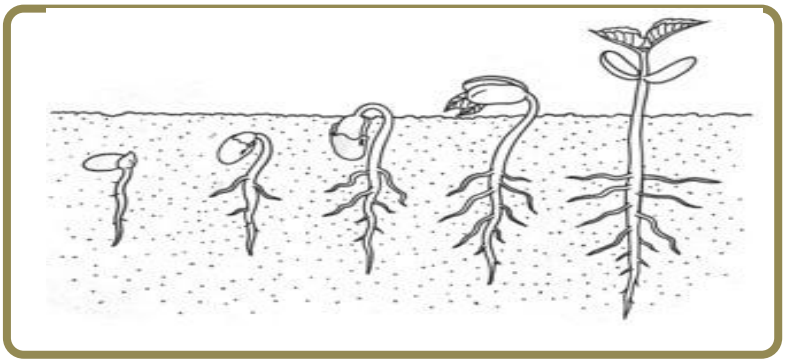
Types of germination

1. Epigeal germination
2. Hypogeal germination.

Epigeal germination

Epigeal germination is the type of germination where the cotyledon comes out of the ground / soil.

Illustration to show stages of epigeal germination



Steps under gone by a seed during germination

1. The seed absorbs water and swells
2. The radicle grows and pushes through the Testa
3. The radicle grows down wards and it is protected by the root cap
4. Root hairs absorb water and mineral salts.

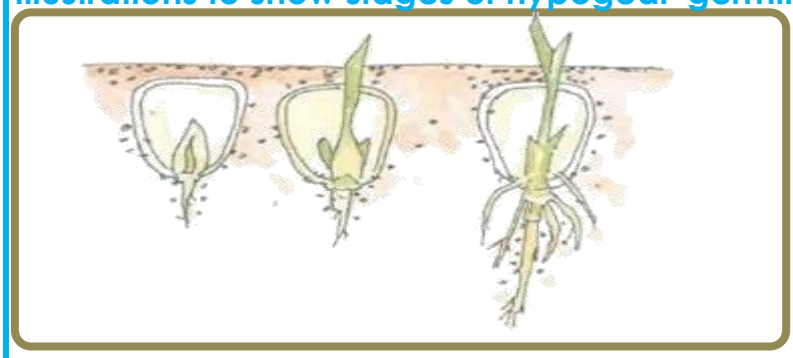
Plants which undergo epigeal germination

1. Beans
2. Soya
3. Peas
4. Groundnuts
5. French beans
6. Simsim

Hypogeal germination

It is the type of germination where the cotyledon remains in the soil.

Illustrations to show stages of hypogeal germination



Plants with hypogeal germination

1. Maize
2. Wheat
3. Rice
4. Sorghum
5. Millet
6. Oats
7. Barley

Uses of seeds to people and other animals:

1. Some seeds are eaten
2. Some are sold
3. For feeding poultry
4. For decoration
5. For planting.

Importance of plants to man.

1. Some plants are used as food
2. Some plants are used as herbal medicine
3. Plants provide oxygen to man during photosynthesis
4. Some plants provide us with building materials

5. Some plants are used as mulches.
6. Plants are source of manure.

ACTIVITY

1. State any **two** types of germination.
   (i) _____
   (ii) _____
2. What is hypogeal germination?

   _____

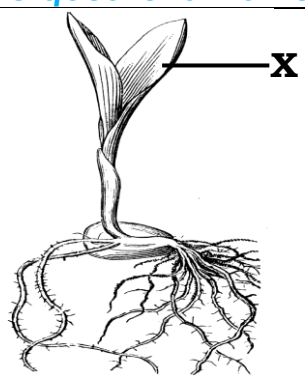
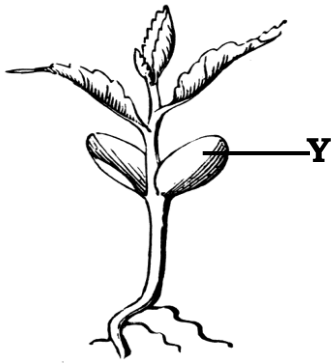
   _____
3. Name the type of germination undergone by bean seeds.

   _____

   _____
4. Define hypogeal germination.

   _____

   _____
5. ***The diagram below show two different kinds of seedlings. Use them to answer the questions that follow.***

	
Seedling A	**Seedling B**

   a) Name the type of germination in seedlings marked with letter A and B.
      (i) Seedling A: _____
      (ii) Seedling B: _____
   b) Name **one** crop which undergoes the type of germination in **A** above.

      _____

      _____
   c) Name the type of leaf venation marked with letter **X**

      _____

      _____
   d) How important is the part of seedling marked with letter **Y**?

      _____

      _____
6. Name the type of germination where the cotyledon remains in the soil.

   _____

   _____
7. State any **two** plants which undergo type of germination named above.
   (i) _____
   (ii) _____
8. State any **two** uses of seeds to people.
   (i) _____
   (ii) _____

9. Mention any **two** importance of plants to man.

(i) _____

(ii) _____

LESSON

Differences between monocotyledonous and dicotyledonous plants

Monocotyledonous plants	Dicotyledonous plants
They have seeds with one cotyledon	They have seeds with two cotyledons
Have fibrous root system	Have tap root system
Their leaves have parallel leaf venation	Their leaves have network leaf venation
Their seeds undergo hypogeal germination	Their seeds undergo epigeal germination

Importance of plants to animals

- Some plants are used as food
- Plants provide oxygen to animals
- Plants are habitat for some animals

How plants depend on animals

- Plants get carbon dioxide from animals
- Plants get manure from animal wastes.

How animals depend on plants

- Animals get oxygen from plants
- Animals get food from plants
- Some animals use plants as their habitats.

Ways how plants depend on each other.

- Some plants get extra support from others
- Some plants provide shade to others
- Some plants depend on others for nutrients.

ACTIVITY

1) Mention any **two** importance of plants to animals

(i) _____

(ii) _____

2) Give any **two** importance of animals to plants.

(i) _____

(ii) _____

3) State any **two** ways how animals depend on plants.

(i) _____

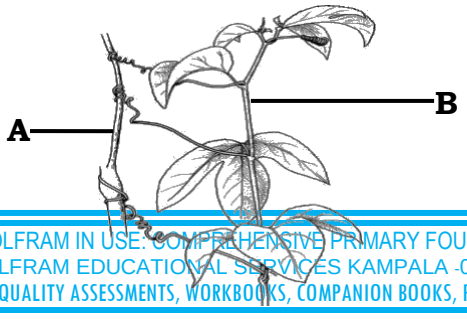
(ii) _____

4) Mention any **two** importance of plants to other plants.

(i) _____

(ii) _____

The diagram below is of a climbing plant. Use it to answer questions that follow.



5) In which way is plant **A** important to plant **B**?

_____

_____

6) What type of stem is plant B?

_____

_____

7) Name the structure which helps Plant **B** to climb on to stem **A**.

_____

_____

8) Give any **two** things animals get from plants.

(i) _____

(ii) _____

9) In which way is the germination in beans different from those of maize grains?

_____

_____

10) Which type of root system is common in

(a) monocotyledonous plants? _____

(b) dicotyledonous plants? _____

LESSON

CROP GROWING

A crop is a plant grown and cared for a purpose.

Types of crops

1. Cereal crops
2. Leguminous crops
3. Tubber crops
4. Fruit crops
5. Vegetables

Cereals

Cereal crops are crops grown to produce grains

Cereals are sometimes called grains or monocots.

Examples of cereals

Maize	Millet	Wheat	Rice	Sorghum

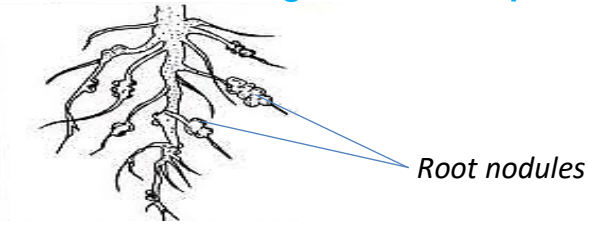
Leguminous crops (Legumes)

- They have nodules on their roots.
- They have seeds in pods.

Examples of legumes

- Beans
- Peas
- Groundnuts
- Soya beans

Root structure of a leguminous crop



Root nodules:-

- Root swellings found on roots of leguminous plants.

- They keep nitrogen fixing bacteria.

NB: Nitrogen fixing bacteria trap nitrogen from air and change in to nitrates as plant food.

ACTIVITY

1. What are crops?

   _____

   _____
2. State any **two** types of crops commonly grown in your area.
   (i) _____
   (ii) _____
3. Which type of crops are sometimes called grains or monocots?

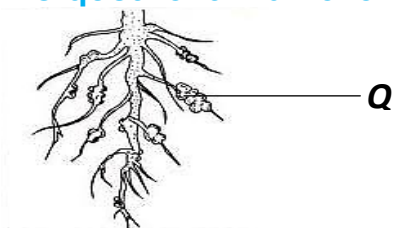
   _____

   _____
4. Mention any **two** examples of cereals.
   (i) _____
   (ii) _____
5. Why are maize grouped under cereal crops?

   _____

   _____
6. State any **two** characteristics of leguminous crops.
   (i) _____
   (ii)_____

   Below is a root structure of a leguminous crop. Study it carefully and answer the questions that follow.



7. Name the plant part marked with letter Q.

   _____

   _____
8. Mention any **two** examples of leguminous plants with such structure on the.
   (i) _____
   (ii)_____
9. Which bacteria trap nitrogen from air and change in to nitrates as plant food?

   _____

   _____
10. State the main use of nitrogen fixing bacteria in the soil.

    _____

    _____

LESSON

Fruit crops

These are crops grown purposely for the fruits.

Fruit crops are crops that we eat their fruits.

Examples of fruit crops

1. Mangoes
2. Apples
3. Pumpkins
4. Pawpaw
5. Pine apples.

Root crops

These are crops which store their food in roots.

1. Sweet potatoes
2. Cassava
3. Carrots

Vegetables

Vegetables are crops that we eat their leaves.

Examples of vegetables

1. Cabbage
2. Spinach
3. Lettuce
4. Dodo
5. Nakati
6. Bbuga

Types of vegetables

- ✓ Leaf vegetables e.g cabbages , spinach etc
- ✓ Root vegetables e.g carrots
- ✓ Fruity vegetables e.g tomatoes, eggs plants etc.

Groups of crops (categories of crops)

1. Annual crops
2. Perennial crops

Annual crops:

These are crops which mature and harvested within one year.

Examples of annual crops

sunflower	Sorghum	Maize	Beans	Ground nuts

Perennial crops:

These are crops that are harvested year after year.

Examples of perennial crops

1. Coffee crop
2. Tea crop
3. Banana crop

ACTIVITY

1. What are fruit crops?

   _____

   _____
2. Mention any **two** examples of fruit crops

   (i) _____

   (ii)_____
3. What are root crops?

   _____

   _____
4. Mention any **two** examples of leaf vegetables

   (i) _____

   (ii)_____
5. State any **two** examples of root vegetables

   (i) _____

   (ii)_____
6. What are annual crops?

7. Mention any **two** examples of annual crops.
   (i) _____
   (ii) _____
8. What are perennial crops?

   _____

   _____
9. Give any **two** examples of perennial crops
   (i) _____
   (ii) _____

LESSON

CROP GROWING PRACTICES

Land preparation

It is done during dry season to:-
- Prevent the weeds from germinating again after digging and ploughing.
- Prevent the soil from sticking on to the hoe or plough.

Ways of preparing land
1. Digging
2. Ploughing
3. Slashing / clearing
4. Cutting big trees
5. Harrowing
6. De – trashing. (Removing tree stumps)

Garden tool / implements used in preparing land
1) Hoes
2) Ox ploughs
3) Tractors
4) Slashers
5) Rakes
6) Panga
7) Axe

Ploughing land
- ✓ It is done using a tractor, ox-plough, hoes, and forked hoe.
- ✓ Ploughing the land is done to make the soil loose and soft
- ✓ It makes the soil aerated

Importance of preparing land
1. It softens the soil.
2. Digging and ploughing allows water into the soil.
3. It makes planting easy.
4. Allows air in to the soil.
5. Cutting away big trees opens space for crops to get enough sunlight.
6. To remove weeds

ACTIVITY

1) Why should land be prepared first?

   _____

   _____
2) State any **two** reasons why land preparation is done during dry season.
   (i) _____

(ii)_____

3) Write down any **two** ways of preparing land

(i) _____

(ii)_____

4) What is de–trashing?

_____

_____

5) Mention any **two** tools used for detrashing in the garden.

(i) _____

(ii)_____

6) Draw and name any **three** garden tools used in preparing garden.

7) State any **two** farm implements used in preparing land.

(i) _____

(ii)_____

8) Mention any **two** importance of preparing land

(i) _____

(ii)_____

LESSON

Selecting viable planting materials

Viable planting materials refer to the materials which are capable of germination.

Examples of planting materials

1. Seeds
2. Suckers
3. Stem cuttings
4. Rhizomes
5. Bulbs

Qualities of good planting materials

1. They should be mature
2. They should not be damaged
3. They should be free from pests.
4. They should be free from diseases.
5. They should not be too old.
6. They should be of the same variety.

Importance of selecting planting materials

1. It prevents wastage of land.
2. It ensures quality plants.
3. It prevents wastage of time.
4. It prevents wastage of labour.

Seed viability:

Seed viability is the ability of a seed to germinate.

Planting and sowing

This is putting of planting materials in the soil to germinate.

Note: Planting is done during wet / rainy season.

Reasons for planting crops in wet season

- There is enough water for seed germination.
- The soil is soft for easy growth of roots.

ACTIVITY

1. Define viable planting materials.

   _____

   _____

2. State any **two** examples of planting materials.
   (i) _____
   (ii)_____
3. Mention any **two** qualities of good planting materials.
   (i) _____
   (ii)_____
4. Mention any **two** importance of selecting planting materials.
   (i) _____
   (ii)_____
5. Define Seed viability.

   _____

   _____

6. Mention any **two** physical signs of seeds not viable for planting.
   (i) _____
   (ii)_____
7. Name the best season for planting crops.

   _____

   _____

8. State any **two** reasons for planting crops in wet season.
   (i) _____
   (ii)_____
9. What is seed dormancy?

   _____

   _____

10. State any **two** causes of seed dormancy.
    (i) _____
    (ii)_____

LESSON

Methods of planting

Row planting

This is the putting of planting materials in the soil in a line.

Advantages of row planting

- It makes weeding easy.
- It makes harvesting easy.
- It controls easy spread of pests and diseases.
- It avoids wastage of seeds and other planting materials.
- It allows proper spacing of crops.

Disadvantages of row planting

1. It needs a lot of labour.
2. It is time consuming.

3. It requires large piece of land

Example of plants planted by row planting

1. Maize
2. Cassava
3. Beans
4. Pineapple
5. Potatoes.

Activity

1) Mention any **two** methods of planting commonly use in your area.
   (i) _____
   (ii)_____
2) Define row planting.
   _____
   _____
3) Mention any **two** advantages of row planting
   (i) _____
   (ii)_____
4) State any **two** disadvantages of row planting.
   (i) _____
   (ii)_____
5) Name any **two** examples of crops planted by row planting.
   (i) _____
   (ii)_____

Broadcasting method

This is the planting of seeds by throwing them using the hand in a garden.

Examples of seeds planted by broadcasting method

Millet Sorghum

Advantages of broadcasting methods

1. It saves time.
2. It does not need a lot of labour.
3. It does not waste nutrients in soil.

Disadvantages of broadcasting methods

1. It makes weeding difficult.
2. It makes harvesting difficult.
3. Pests and diseases can easily spread.
4. Competition for nutrients and sunlight

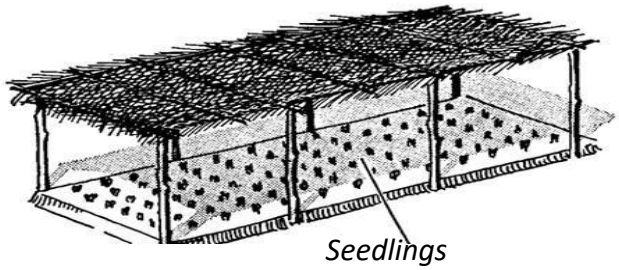
ACTIVITY

1) Define broadcasting method of planting seeds.
   _____
   _____
2) Mention any **two** advantages of broadcasting method of planting seeds.
   (i) _____
   (ii)_____
3) Mention any **two** disadvantages of broadcasting method.
   (i) _____
   (ii)_____
4) Name any **two** crops that cannot be planted by broadcasting method.
   (i) _____
   (ii)_____

LESSON

Nursery bed

A nursery bed is a small garden where seedlings are grown before they are transplanted.



Transplanting

This is the transfer of seedlings from a nursery bed to the main garden.

Note:

- Trowel is the garden used during transplanting.
- Transplanting is best done in the evening.

Why transplanting is done in the evening

- It prevents wilting of the seedlings.
- There is little loss of water from the soil through evaporation.

Examples of plants grown in a nursery bed.

1. Tomatoes
2. Onions
3. Coffee
4. Cabbages
5. Passion fruits.

Importance of a nursery bed

1) It gives a farmer time to prepare the main garden.
2) It protects seedlings from heavy rain drops.
3) It protects seedlings from strong sunshine.
4) It helps farmers to select healthy seedlings.
5) It helps water to sink deeply in to the soil.

Advantages of early planting

- Crops make full use of rainfall for the season.
- Cereals mature early therefore get good market.
- Crops grow fast enough and compete with weeds for light nutrients and water before they flow.

ACTIVITY

1) What is nursery bed?

_____

_____

2) Define the word **transplanting.**

_____

_____

3) Name the best time for transplanting.

_____

4) Why is transplanting done in the evening?

_____

5) State any **two** examples of crops raised in a nursery bed first.
(i) _____
(ii)_____
6) Mention any **two** conditions that lead seeds to be planted in nursery bed first.
(i) _____
(ii)_____
7) Mention any **two** importance of a nursery bed.
(i) _____
(ii)_____
8) Mention any **two** advantages of early planting to the farmers.
(i) _____
(ii)_____

LESSON

Crop growing practices

These are different activities done before and after planting seeds

Examples of crop growing practices

They all refer to all ways in which farmers care for their crops in the garden.
They include:

1. Weeding
2. Thinning
3. Watering
4. Manuring
5. Applying fertilizers.
6. Staking
7. Mulching
8. Providing shade.
9. Pruning.

Weeds

Weeds are plants which grow in a place where they are not wanted.

Examples of weeds

1. Wild finger millet
2. Black jack
3. Wandering Jew
4. Spear grass
5. Star grass
6. Couch grass
7. Elephant grass
8. Nut grass
9. Timothy grass
10. Macdonald's eye

Uses of weeds

a) For feeding some farm animals
b) For thatching houses
c) For mulching
d) Some weeds are used in the making of herbal medicine
e) When weeds rot, they improve on soil fertility

Dangers of weeds

1) Weeds hide pests and diseases
2) They lead to poor growth of crops
3) Some weeds are poisonous to animals
4) Weeds compete with crops for sunlight, water and soil nutrients
5) Weeds make it hard for farmers to prun, spray and harvest
6) It is expensive to control weeds.
7) Reduce human efficiency during farm operation
8) Reduce quality of farm products

ACTIVITY

1. What are crop growing practices?

_____
_____

2. Mention any **two** examples of crop growing practices.
   (i) _____
   (ii)_____
3. What term is used to mean plants which grow in a place where they are not wanted?

   _____

   _____
4. Mention any **two** examples of weeds.
   (i) _____
   (ii)_____
5. State any **two** uses of weeds.
   (i) _____
   (ii)_____
6. Give any **two** examples of weed used for mulching.
   (i) _____
   (ii)_____
7. Mention any **two** dangers of weeds to the crop farmers.
   (i) _____
   (ii)_____

LESSON

Weeding

Weeding is the removal of unwanted plants from the garden.

Ways of controlling weeds.

1. By uprooting and burning them
2. By mulching the garden
3. By spraying with herbicides
4. Slashing the weeds
5. By cutting and burning them

Advantages of weeding a garden

1. It makes harvesting easy.
2. It creates spaces for farm activities.
3. It reduces overcrowding of plants in the garden
4. It controls the easy spread of diseases.
5. It reduces competition for light, nutrients, water and space in the garden.
6. It prevents the easy spread of crop pests.

ACTIVITY

1) What are weeds?

   _____

   _____
2) How is weed different from weeding?

   _____

   _____
3) Mention any **two** garden tools used for weeding
   (i) _____
   (ii)_____
4) State any **two** ways of controlling weeds in the garden.
   (i)

(ii)_____

5) Name the chemical used for controlling weeds.

_____

_____

6) Suggest **two** reasons why weeds are more successful than crop plants in the garden.

(i) _____

(ii)_____

7) Mention any **two** reasons why farmers weed their cross in the garden.

(i) _____

(ii)_____

LESSON

Pruning

Pruning is the removal of unwanted parts of a plant.

Parts of the plants that we prune

leaves, branches, stems

Plants that are pruned include

1) Banana
2) Coffee
3) Cocoa
4) Lemons
5) Oranges

Garden tools used for pruning

1) Secateurs
2) Pruning saw
3) Pruning shears
4) Pruning knife
5) A sickle

Plants which are pruned include

1. Orange plant
2. Banana plant
3. Tomato plant
4. Coffee plant
5. Lemon plant

Importance of pruning

1) It reduces hiding places for pests
2) To reduce transpiration rate
3) To facilitate harvesting
4) It gives good space for spraying and harvesting
5) It reduces competition for sunlight, air, water and soil nutrients among crops
6) Pruned materials can be used for mulching
7) Pruning reduces overcrowding of plants in the garden
8) It improves on the quality of fruits
9) It improve on the yields of crops
10) It simplifies movement within the garden.

ACTIVITY

1) What is pruning?

_____

_____

2) Mention any **two** examples of plants that are mainly pruned.

(i) _____

(ii)_____

3) Name any **two** parts of the plants that can be prune.

(i) _____

(ii)_____

4) Give any **two** examples of plants that can be pruned.

(i)

(ii)_____

5) Draw and name any **two** garden tools used for pruning crops.

6) Mention any **two** importance of pruning crops to the farmers.
(i) _____
(ii)_____

7) State any **two** ways of reducing competition among plants in the garden.
(i) _____
(ii)_____

8) Mention any **two** things for which plants compete.
(i) _____
(ii)_____

9) Name the main garden tool used for pruning.
_____
_____

LESSON

Thinning

This is the removal of excess seedlings from a planting hole or a nursery bed.

Categories of crops removed

1. Diseased crops
2. Poor growing crops
3. Damaged crops

Methods of thinning

1) Uprooting/digging out the plant
2) Cutting the plant at the base area

Tools used for thinning

1) Panga 2) Hoe 3) Hands

Advantages of thinning crops

1. It creates space for crops to grow
2. It gives good space for pruning, spraying and harvesting
3. It makes weeding easy
4. It reduces hiding places for pests
5. It prevents overcrowding in seedlings
6. It reduces competition for soil nutrients among plants.
7. Thinned materials can be used for mulching
8. Crops grow bigger and yield more
9. It prevents the easy spread of diseases.

Commonly thinned crops

1. Cotton
2. Sunflower
3. Banana
4. Millet
5. Maize
6. Rice
7. Sorghum
8. Simsim

ACTIVITY

1) What scientific term is used to mean the removal of excess seedlings from a planting hole or a nursery bed?

_____

_____

2) Why do farmers thin seedlings in the nursery beds?

_____

_____

3) Mention any **two** methods of thinning crops.
   (i) _____
   (ii)_____
4) Mention any **two** tools used for thinning crops
   (i) _____
   (ii)_____
5) Mention any **two** advantages of thinning crops.
   (i) _____
   (ii)_____
6) Give **two** commonly thinned crops
   (i) _____
   (ii)_____

LESSON

Mulching

Mulching is the covering of top soil with dry plant materials in the garden.

Note: Plant materials used in mulching are called mulches.

Examples of mulches

a) Dry banana leaves
b) Dry maize stalks
c) Dry grass
d) Spear grass.
e) Coffee husks

Advantages of mulching

1. Mulching keeps moisture in the soil
2. Mulching controls soil erosion
3. Mulching controls pests
4. Mulching improves soil fertility
5. Mulching controls growth of weeds

Disadvantages of mulching

1. Mulches can easily catch fire and burn crops.
2. Mulches are hiding places for crop pests e.g. rats.
3. Some mulches can turn into weeds
4. Mulches can easily catch fire and destroy crops
5. Mulching is tiring
6. It provides breeding ground for pests and disease vectors.
7. It is expensive to carryout.

ACTIVITY

1. What is mulching?

   _____

   _____

2. What name is given to the materials used in mulching?

_____

_____

3. Give any **two** examples of mulches.
   (i) _____
   (ii)_____
4. Why are dry banana leaves used as mulches?

   _____

   _____
5. Mention **two** advantages of mulching.
   (i) _____
   (ii)_____
6. State any **two** disadvantages of mulching.
   (i) _____
   (ii)_____
7. Mention any **two** crop pests which breed under mulches.
   (i) _____
   (ii)_____
8. State any **two** disadvantages of mulching.
   (i) _____
   (ii)_____

LESSON

Types of Mulching Materials

- **Organic materials**.
  They include sawdust, wood shavings, coffee pulp, dry grass, banana leaves, dry maize stalks and any other appropriate vegetation.
- **Inorganic/synthetic materials**
  They can be black, yellow or transparent polythene sheets.

NB; how does mulching conserve soil moisture?
Mulching prevents direct sun rays from reaching the soil to cause evaporation.
How does mulching improve soil fertility?
Mulches rot and form humus.
How does mulching control soil erosion?
By reducing the speed of fast flowing water

ACTIVITY

1) What name is used to mean materials used for mulching in the garden?

   _____

   _____
2) State any **two** types of mulching materials.
   (i) _____
   (ii)_____
3) Mention any **two** examples of organic materials.
   (i) _____
   (ii)_____
4) Give another name for inorganic materials.

   _____

   _____
5) How does mulching conserve soil moisture?

_____

_____

6) How does mulching improve soil fertility?

_____

_____

7) How does mulching control soil erosion?

_____

_____

8) Apart from mulching mention any **two** ways of controlling soil erosion.

(i) _____

(ii)_____

Below is an illustration of a farm activity. Use it to answer questions that follow

(a) Name the crop growing activity illustrated below.

_____

(b) What scientific name is used to which can be used to carry out the above activity?

_____

(c) Mention any **two** materials which can be used to carry out the above illustrated activity.

(i) _____

(ii)_____

(d) State any **two** importance of carrying out the above illustrated activity.

(i) _____

(ii)_____

LESSON

Manuring

Manuring is the putting of manure in the soil to make it more fertile.
manure is a material put in the soil to make it more fertile

Types of manures

1. Natural fertilizers/ organic mature
2. Artificial fertilizers / inorganic manure

Organic Manures/ natural fertilizers

They are obtained from plant and an animal remains after decomposition.

Sources of natural fertilizers

1. Animal dung and urine
2. Plant remains
3. Green plants.

Types of organic matter/natural fertilizers

1. Compost manure:

It is got from plant materials and animal wastes.

2. Green manure:
   It is got from ploughed, buried and rotten green materials like legumes.
3. Farm yard manure (F.Y.M):
   It is got from farm animal wastes, urine and decayed material.

Importance of organic manures/natural fertilizers

- They improve soil structure
- They improve water holding capacity of the soil
- They increase soil fertility
- They help to keep PH of soil stable
- They reduce toxicity of plant poisons
- They increase the humus content in the soil
- They do not have residual effect on the soil.

Disadvantages of organic manures

1. They have low nutritive value
2. It is tiring to apply
3. They spread diseases and pests
4. They spread weeds
5. Soluble nutrients are easily leached

Activity

1) What are organic manure?
2)
3) Mention any **two** types of natural fertilizers.
   (i) _____
   (ii)_____
4) How is humus formed?
   _____
   _____
5) State any **two** advantages of using farm yard manure.
   (i) _____
   (ii)_____
6) Write in full FYM.
   _____
   _____
7) Suggest any **two** disadvantages of using natural fertilizers.
   (i) _____
   (ii)_____
8) Mention any **two** sources of natural manure.
   (i) _____
   (ii)_____

Inorganic manures/ artificial fertilizers

These are chemical substances which are manufactured to supply the nutrients to the plants.

Types of inorganic manures

There are two main types of inorganic fertilizers

1. Straight fertilizers
2. Mixed /Compound fertilizers.

Advantages of inorganic manures

1. The mixture is stable
2. They contain all the major plant nutrients in right proportions
3. They save the farmer's Labour

Disadvantages of inorganic manures

They are slightly more expensive than straight manures.
They may be unsuitable for most of the soils which lack only one nutrient

ACTIVITY

1) What are inorganic manures?

_____

_____

2) State any **two** types of artificial fertilizers.
   (i) _____
   (ii)_____
3) Give any **two** advantages of using of inorganic manures.
   (i) _____
   (ii)_____
4) Suggest any **two** disadvantages of using of artificial fertilizers.
   (i) _____
   (ii)_____

LESSON

Staking/ plant training

This is supporting plants having weak stems using strong sticks e.g. in tomatoes, garden peas and some bean varieties.

Methods of staking

(a) **Propping**.
This is providing support to tall varieties of bananas and those with heavy bunches using forked (Y- shaped) stakes.

(b) **Trellising**.
This is providing support to crops with vines using wire or sisal strings. The strings are held by poles at definite spacing e.g. in passion fruits.

(c) **Earthing up**
This is the placement of soil in form of a heap around the base of the plant.

(d) **Training**
This is the use of sticks or wires to give support to a growing plant. E.g in tomatoes

Examples of staked crops are;

1) Banana
2) Passion fruits
3) Vanilla crops
4) Tomatoes

Reasons for staking

1) Staking enable easy spraying of crops
2) Staking protect fruits from damage from the ground
3) Staking give support to the plants
4) Staking enables easy harvesting
5) Weeding of crops is made simpler.

ACTIVITY

1. What is staking?

   _____

   _____

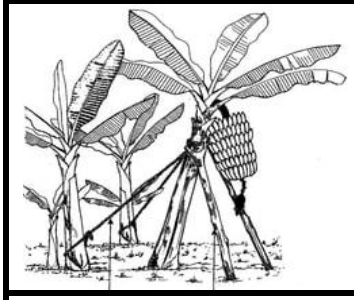
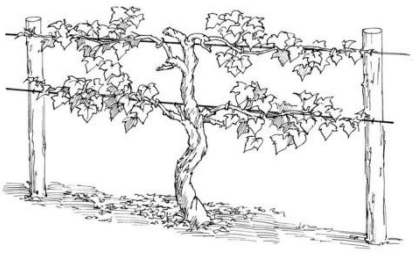
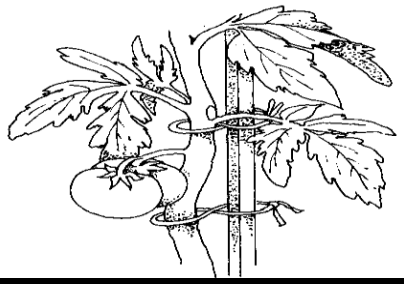
2. Mention any **two** methods of plant training.
   (i) _____
   (ii)_____
3. How is a Y –shaped stakes important to banana farmers?

   _____

   _____

4. Give **two** examples of staked crops.
   (i) _____
   (ii)_____
5. Mention any **two** reasons for staking crops in the garden.
   (i) _____
   (ii)_____
6. Name the method of staking the following kind of crops:
   (a) Tomatoes: _____
   (b) Banana: _____
   (c) Passion fruits : _____

6. Name any **one** example of plant staked using the following methods.

LESSON

Crop rotation

It is the growing of different types of crops on the same piece of land seasonally.

Advantages of crop rotation

1. It maximizes utilization of nutrients
2. It controls weeds
3. It controls soil pests and disease
4. It improve on soil fertility
5. There is soil structure improvement
6. It controls soil erosion

Note:

1. Legumes are alternated with non – leguminous plants.
   Why: They make soil more fertile since legumes add nutrients to the soil.
2. Shallow rooters are alternated with deep rooters.
   Why? This balances the use of nutrients from soil at different levels.
   Watering: Is the supply of water to crops

Factors influencing crop rotation

1) Crop root depth

2) Soil structure
3) Pests and disease control.
4) Weed control
5) Crop nutrient requirement
6) Soil fertility

ACTIVITY

1) What is crop rotation.

_____

_____

2) Mention any **two** reasons for carrying out crop rotation.
   (i) _____
   (ii)_____

3) Why are legumes alternated with non – leguminous plants?

_____

_____

4) State the reason why shallow rooters are alternated with deep rooters.

_____

_____

5) Mention any **two** factors influencing crop rotation
   (i) _____
   (ii)_____

6) Mention **two** farm expenses reduced by practicing crop rotation.
   (i) _____
   (ii)_____

LESSON

Watering

Water can be applied to the garden artificially. This practice is called **irrigation**.

Irrigation:

This is the practice of applying water artificially to the soil in areas where there is no rain or where rain is inadequate.

It is usually practiced;

i) In dry areas.
ii) During dry periods.
iii) In the growing of paddy rice.

Uses of water in soil

1. It makes the soil soft for roots to grow easily.
2. It is used for seed germination.
3. Plants use water to make food.
4. It softens the ground for easy weeding.
5. Cools the plants during transpiration.

Advantages of irrigation

1) It helps in controlling pests and diseases
2) Enable crop production during dry season
3) Reclaim arid and semi-arid land for farming
4) Supplement rainfall in crop production
5) Help provides enough water to crops
6) Creates favourable temperature for proper plant growth
7) Enable supply of fertilizer in irrigation water

Disadvantages of irrigation

1) It may encourages soil erosion
2) Excess water may cause leaching.
3) Excess water may rot all the crops
4) Water droplets harden the soil.
5) It requires a lot of skills
6) It is expensive to install.
7) It can spread diseases to crops and people

Factors that determine the type of irrigation to be used in an area

1) The source of power
2) Type of soil
3) Topography
4) Type of crops grown.
5) Methods of planting crops
6) Availability of water.
7) Capital
8) Knowledge and skills
9) Climatic records

ACTIVITY

1) Define irrigation.

_____

_____

2) Mention any **two** conditions that can lead to watering of crops in the garden.
   (i) _____
   (ii) _____
3) Which season is the best for watering crops.

_____

_____

4) Give **two** uses of water in soil
   (i) _____
   (ii) _____
5) Mention any **two** advantages of irrigation
   (i) _____
   (ii) _____
6) Mention **two** disadvantages of irrigation to:
   (a) The soil
   (i) _____
   (ii) _____
   (b) The farmers
   (i) _____
   (ii) _____
   (c) The crops
   (i) _____
   (ii) _____
7) Give **two** factors that determine the type of irrigation to be used in an area
   (i)

(ii)_____

LESSON

CROP HARVESTING

Harvesting is the collection of mature crops from the garden.
Harvesting is the removal of mature and ready crops from the garden.

- Harvesting is usually done in the dry season.
- There is enough sunshine to dry harvested crops.

Methods of harvesting crops

1. By uprooting using hands e.g. soya beans, beans, ground nuts
2. By cutting using a panga e.g. sugar cane, bananas
3. By digging out using a hoe e.g. cassava, sweet potatoes
4. By hand picking e.g. coffee, tomatoes, oranges

Early harvesting

This refers to the situations in which a crop is harvested before it is ready.
It is also referred to as premature harvests

Conditions that leads to premature harvests

1. Poor weather conditions
2. Pests and disease attacks
3. Hunger
4. Need to catch high prices

Disadvantages of early harvesting

1) Seeds contain a lot of moisture, so they can rot
2) The quality of seed is poor
3) The grain are small and shrunk
4) The seeds are not good for harvesting

Ways of processing crops

1) Sun drying
2) Smoking
3) Adding chemicals to crops

ACTIVITY

1) What is crop harvesting?

_____

_____

2) Why is harvesting usually done in the dry season?

_____

_____

3) State **two** methods of harvesting crops
   (i) _____
   (ii)_____
4) State **two** crops harvested by:
   (a) by uprooting using hands
   (i) _____
   (ii)_____
   (b) by cutting using a panga
   (i) _____
   (ii)_____

(c) by digging out using a hoe
(i) _____
(ii)_____
(d) by hand picking
(i) _____
(ii)_____

5) What is early harvesting?

_____

_____

6) State **two** conditions that lead to premature harvests.
(i) _____
(ii)_____

7) Mention any **two** disadvantages of early harvesting
(i) _____
(ii)_____

8) Give **two** ways of processing harvested crops.
(i) _____
(ii)_____

LESSON

CROP STORAGE

Crop storage is the keeping of harvested crops safely for future use.

1. Seeds and cereals after sun drying them, should be stored properly
2. Other foods like cassava are sundried after harvesting to prevent them from rotting.

Reasons why farmers store food

1. To be eaten in dry season.
2. To avoid wastage of food.
3. To fight hunger
4. For planting in next season.
5. To be sold when market prices are better.

Places where food can be stored

1. In granaries
2. Silos
3. Stores
4. In refrigerators / freezers

Types of stores

1) Traditional stores e.g. granaries
2) Modern stores e.g. silos

Methods of storing root crops

- Temporary storage e.g. burying the tubes under wet soil
- Long time storage (after drying the slices) e.g. storing in granaries /sacks /slices (modern stores) silos

Qualities of a good store

1. It should be well ventilated.
2. The roof should not leak.
3. It should have rat guards.
4. It should be clean and dry.
5. The storage facility should be free from storage pests like rats, bean weevils.

ACTIVITY

1) What are crop storage?

_____

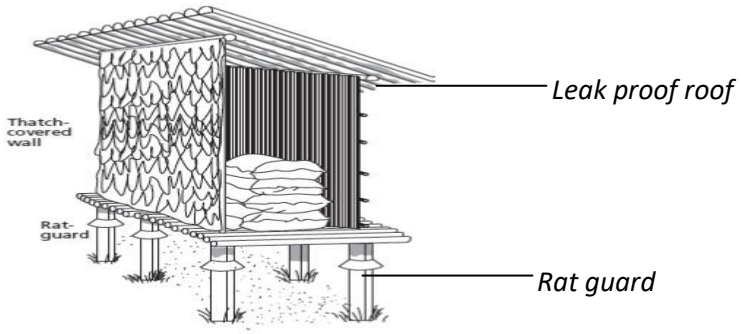
_____

2) State any **two** reasons why farmers store food.
   (i) _____
   (ii)_____
3) Suggest any **two** places where farmers store their food.
   (i) _____
   (ii)_____
4) Mention any **two** methods of storing root crops.
   (i) _____
   (ii)_____
5) Mention **two** crops which are stored in the garden.
   (i) _____
   (ii)_____
6) State **two** ways of controlling storage pests from the store.
   (i) _____
   (ii)_____
7) Mention any **two** crops that cannot be stored for a long time.
   (i) _____
   (ii)_____
8) Mention any **two** qualities of a good store.
   (i) _____
   (ii)_____
9) Why should a good store be:
   (a) free from rats?_____
   (b) leaking proof? _____
   (c) clean and dry?_____

LESSON

A storage facility (granary)

A granary is a locally made facility for storing harvested crops.
Most cross store in the granary are cereals.



Note:

1. Rat guards prevent rats from entering into the granary
2. Leak proof roof prevents damping and rotting of the seeds.

Reasons why rat guards should be fixed on a granary

To prevent rats from entering the granary.

3. How are the rat guards adapted to their function?

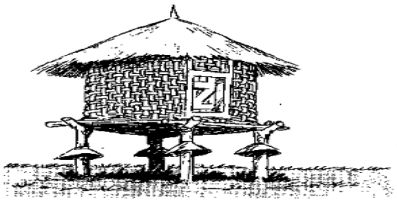
Rat guards have slippery surfaces that make rats to slide when entering the granary.

Conditions for proper storage of food

1. The seeds or grains should be stored when they are dry
2. Stores should be well ventilated
3. The roofs of stores should not leak
4. Rat guards should be fixed on the granary
5. Root crops should be dried first before storing them
6. Seeds should be dusted with pesticides before storing them

ACTIVITY

The diagram below shows a storage facility. Use it to answer questions that follow.



1) Name the storage facility shown above.

_____

_____

2) Name the part marked with letter K.

_____

_____

3) State any **one** reason why part marked K should be fixed on a granary.

_____

_____

4) State **two** reasons why the above structure should be raised above the ground.

(i) _____

(ii) _____

5) How are the rat guards adapted to their function?

_____

_____

6) State any **two** qualities of a good store.

(i) _____

(ii) _____

7) State **two** conditions for proper storage of food crops.

(i) _____

(ii) _____

8) Mention any **two** crops that can be stored in the facility above.

(i) _____

(ii) _____

LESSON

CROP PESTS AND DISEASES

Crop pests

Crop pests are living organisms which destroy crops. They include: animals, birds and insects.

Groups of crop pests

1) Field pests
2) Storage pests

Field pests

Field pests are pests which destroy crops from the garden.

Examples of field pests

1. Army worms
2. Birds
3. Termites
4. Maize stalk borer
5. Locusts
6. Squirrels
7. Aphids
8. Cotton Stainer
9. Snails
10. Banana weevil

Storage pests are living organisms which destroy crops from the store.

Examples of some storage pests

1. Rats
2. Maize weevil
3. Bean weevil
4. A storage beetle.
5. Harvest mites

Activity

1) How are field pests different from the storage pest?

_____

_____

2) What are field pest?

_____

_____

3) State any **one** reason why birds are called field pests.

_____

_____

4) Give **two** examples of field pests.
   (i) _____
   (ii) _____
5) Name any one pest which destroy these crops
   a) maize: _____
   b) banana: _____
6) Mention **two** examples of crops affected by the storage pests.
   (i) _____
   (ii) _____

Uses of pests to farmers

1) Some pests are a source of food to man e.g. grasshoppers and locusts.
2) Some are eaten by farmer's poultry e.g. caterpillars
3) Some crop pests decompose organic matters

Dangers of pests to crops

1. They weaken plants.
2. They lead to low produce of crops
3. They lead to poor growth of crops.
4. They destroy crops.
5. they force farmers to waste money in controlling them

Signs of pest attack on crops

1) Holes in leaves, fruits & stems on crops
2) Change in colour of leaves, stem and fruits
3) Pre – mature ripening
4) Abnormal deformed parts
5) Seeds with holes
6) Rotten tubers
7) Stunted growth in a plant.

ACTIVITY

1) What are crop pests?

   _____

   _____

2) Mention **two** examples of pests eaten by human beings.
   (i) _____
   (ii) _____
3) State any **two** dangers of crop pests to the farmers.
   (i) _____
   (ii) _____
4) State **two** signs of pest attack on crops in the garden
   (i) _____
   (ii) _____
5) State any **one** cause of stunted growth in plants.

   _____

   _____

6) Mention **two** effects of storage pests
   (i) _____
   (ii) _____
7) Mention **two** ways of controlling crop pests.
   (i) _____
   (ii) _____

(a) Mention any **two** crops destroyed by rats.
   (i) _____
   (ii) _____

(b) State **two** ways of controlling the above animal.
   (i) _____
   (ii) _____

LESSON

Crop diseases

a disease is a ……

Some crop diseases.

Disease	**Plant attacked**
Cassava mosaic Leaf rot	Cassava plant
Tomato blight	Tomatoes
Ground nut Rosette	Groundnuts

Leaf spot Maize streak	Maize
Powderly mildew	Mangoes, pawpaw, turnips
Smuts	Sugarcane, maize, sorghum
Rust	Cereals (millet, maize, barley, wheat)
Panama	Banana

Ways of controlling crop diseases

1. By crop rotation.
2. Spraying chemicals.
3. Uprooting and burning of infected crops.
4. Planting healthy materials.
5. Proper spacing
6. Early planting.

ACTIVITY

1. What are crop diseases?

   _____

   _____
2. Name **one** crop affected by the following diseases
   (a) Tomato blight: _____
   (b) Smuts _____
   (c) Rust_____
   (d) Panama_____
3. Suggest any **two** causes of diseases in crops.
   (i) _____
   (ii) _____
4. Suggest any **two** parts of a plant affected by diseases.
   (i) _____
   (ii) _____
5. Mention **two** signs and symptoms of disease attack in crop plants.
   (i) _____
   (ii) _____
6. State any **two** effects of diseases to the farmers.
   (i) _____
   (ii) _____
7. What kind of planting materials help to control diseases in plants?

   _____

   _____

LESSON

Effects of pests and disease damage on crops

1. The leaves and stems loses chlorophyll
2. The root tubers get damaged
3. The root crop which develop are of a poor quality
4. They lead to poor yield
5. They lead to stunted growth

Major control methods of pests

1. **Mechanical control method**

- ✓ physical guarding (Fencing the garden)
- ✓ Silting traps /scares
- ✓ Staying scary crows

The above methods can control pests like wild pigs, moles, birds, rodents etc

2. Biological pest control

This is where a predator is used to control the pests e.g. taming a cat to kill rats.

3. Cultural methods

- ✓ By practicing crop rotation
- ✓ The available pests of a particular crop
- ✓ Early planting and harvesting
- ✓ Practicing resident species /varieties
- ✓ Through proper control of weeds
- ✓ By planting disease free materials

Chemical control method

This is a method where a farmer sprays pesticides and insecticide to kill the pests

ACTIVITY

1. Write any **two** effects of pests and disease damage on crops.
   (i) _____
   (ii) _____
2. Mention any **two** mechanical method of controlling pests.
   (i) _____
   (ii) _____
3. State any **two** cultural methods of controlling pests.
   (i) _____
   (ii) _____
4. Give **two** examples of pests controlled by use of chemicals.
   (i) _____
   (ii) _____
5. Mention **two** chemicals used for controlling pests.
   (i) _____
   (ii) _____

LESSON

Record keeping

This is a practice where a farmer writes down all the activities done on the farm.

Farm records

Farm records are written information about various activities carried out on a farm.

Types of farm records

a. Feeding records:
These show the amount of feeds bought, consumed and methods of feeding.

b. Breeding records:
These include reproduction, birth or death rates.

c. Production records:
These show yields of various farm produce e.g. eggs, milk, meat

d. Health records:

These include when and which animals were sick, what treatment they got or which ones to cull.

e. Labour records
These include the number of farm laborer, type of work they do and their wages.

f. Marketing records
These include where, when and what prices various products were sold.

g. Sales and expense records
These are records that show income and expenditures of the farm business.

Reasons why crop farmers keep records

1. To know the progress of the farm
2. Proper records can be used to get loans in the bank
3. To plan for the farm for future use
4. To know whether the farmer is making profits or losses.
5. Farm records help farmers to make decisions on the farm
6. Records enable the farmers to be taxed fairly by the government.

ACTIVITY

1. What is record keeping?
   _____
   _____
2. What do you understand by farm records?
   _____
   _____
3. Mention **two** types of farm records.
   (i) _____
   (ii) _____
4. Apart from money, mention any **two** farm records that can be kept in a bank.
   (i) _____
   (ii) _____
5. State **two** reasons why crop farmers should keep records
   (i) _____
   (ii) _____
6. Which type of farm records:
   (a) show the amount of feeds bought, consumed and methods of feeding?
   (b) show yields of various farm produce?_____
   (c) shows income and expenditures of the farm business? _____

LESSON

Food preservation

Food preservation is the preventing of food from going bad.

Methods of preserving food (modern / local)

Sun drying	Cassava, sweet potatoes, maize, Irish potatoes, Onions, millet, rice, sun flower, wheat, beans, soya beans, peas.
Freezing	Oranges, mangoes, avocados, sweet banana, Irish potatoes, cucumber, cabbage, water melon.
Tinning / canning	Beans, Tomatoes

Salting	Meat / fish
Smoking	Meat + fish
Refrigeration	All fruits / vegetation / meat / fish
Roasting	Meat / fish

ACTIVITY

1. What is food preservation?

_____

_____

2. Mention **two** reasons why we preserve food.
   (i) _____
   (ii) _____
3. State any **two** methods of food preservation.
   (i) _____
   (ii) _____
4. Give **two** examples of food preserved by:
   (a) Sun drying
   (i) _____
   (ii) _____
   (b) Freezing
   (i) _____
   (ii) _____
   (c) Tinning
   (i) _____
   (ii) _____
   (d) Salting
   (i) _____
   (ii) _____
   (e) Smoking
   (i) _____
   (ii) _____
5. State any **two** examples of food preserved by either salting or smoking.
   (i) _____
   (ii) _____

LESSON

Food paths

Food paths are different stages in food production.

Types of food path

a) Village food path
b) Town food path
c) Earning food path

Village food path:

This is the food path where farmers grow crops for home consumption

Stages of village food path

- Land preparation (clearing the land)
- Planting
- Caring for crops
- Harvesting

Town food path

This is the food path where farmers good or produce food for sale.

Stages in town food path

a) Clearing the land
b) Planting
c) Caring for crops
d) Harvesting
e) Drying seeds
f) Marketing
g) Buying and cooking food
h) Eating

Activity

1. What is food path?

   _____

   _____

2. Mention any **two** types of food path.
   (i) _____
   (ii) _____
3. What is village food path?

   _____

   _____

4. State any two stages of village food path.

   _____

   _____

5. Define the term town food path.

   _____

   _____

6. Mention any **two** stages in town food path.
   (i) _____
   (ii) _____
7. What is earning food path?

   _____

   _____

Earning food path

This is the food path where people who work and get salary use it to buy food in markets.

Stages of earning food path

1. Getting salary
2. Budgeting
3. Buying food

Blocks of food path

Blocks of food path are problems faced in food production and may lead to little yield when harvested.

Examples of blocks of food path

a) Crop pests
b) Crops diseases
c) Poor farming methods
d) Poor health
e) Weather disasters
f) Earth quake

ACTIVITY

1) What is earning food path?

   _____

   _____

2) Give **two** stages of earning food path.
   (i) _____
   (ii) _____
3) What are blocks of food path?
   _____
   _____
4) which block of food path is controlled by:
   a) crop rotation? _____
   b) use of pesticides? _____
5) State any **two** examples of blocks of food path.
   (i) _____
   (ii) _____

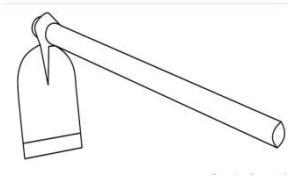
LESSON

Garden tools

These are tools used by farmers to carry out garden activities.

Common garden tools and their uses

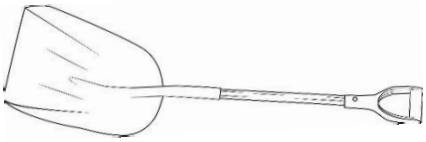
Hoe



1. Digging
2. Planting
3. Weeding
4. Harvesting

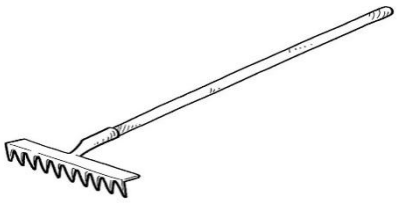
Spade

Mixing manure
· Lifting soil



3

Rake

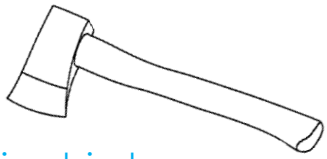


Leveling soil
Collecting weeds

· **Wheel burrow**

- Carrying soil
- Carrying manure
- Carrying harvest

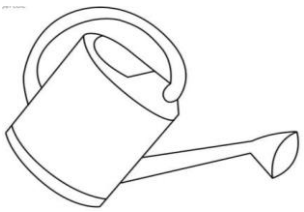
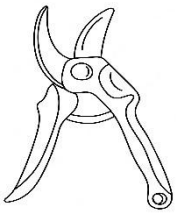
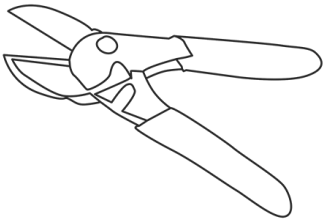
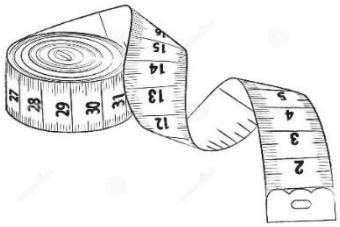
Axe



Cutting big trees
·Chopping wood

Panga

Cutting small branches of trees
· Cutting trees
· Harvesting sugar cane

	 **watering can** Watering crops Watering seedlings	 **Forked hoe** Digging hard ground ·Digging stony ground
	 **Secateurs** Pruning crops	 **Pruner** Pruning crops
	 **Garden fork** Mixing manure	**Shovel**  Transplanting · Carrying seedlings
	Pick axe  Digging in rocky ground Digging in stony soils	**Knives**  1. Harvesting 2. Pruning **3.** Peeling
	 **Tape measure** Spacing crops in the garden	**Hand fork**  Light weeding Removing seedlings from soil

Ways of caring for garden tools

- Storing garden tools in clean dry places.
- Painting or oiling garden tools.
- Cleaning them after use.

ACTIVITY

1) Mention any **two** tools used for :
   (a) Digging
   (i) _____
   (ii) _____
   (b) Pruning
   (i) _____
   (ii) _____
   (c) Harvesting
   (i) _____
   (ii) _____
2) Name the garden too used for watering
   _____
   _____
3) Name the tool used for spacing cross in the garden.
   _____
   _____
4) Mention **two** crops harvested using knives.
   (i) _____
   (ii) _____
5) Apart from harvesting crops, mention any **two** other uses of knives to farmers.
   (i) _____
   (ii) _____
6) How is the use of a rake different from that of the forked hoe?
   _____
   _____
7) Draw and name any **two** garden tools used in transplanting seedlings.

8) Name the place where seedlings are finally transplanted.
   _____
   _____

LESSON
THEME:THE ENVIRONMENT
TOPIC 3: WEATHER IN OUR SUB COUNTY/ DIVISION

WEATHER

Weather is the condition of the atmosphere at a given time.

The average weather condition of a place recorded for a long period of time is called **climate**

Types / states / conditions of weather

1. Rainy weather
2. Sunny weather
3. Cloudy weather
4. Windy weather

Elements of weather (factors / weather makers / aspects of weather

1. Rainfall
2. Humidity
3. Air pressure
4. Sunshine
5. Temperature
6. Cloud cover
7. Wind

ACTIVITY

1) What is weather?

_____

_____

2) What term is used to mean the average weather condition of a place recorded for a long period of time?

_____

_____

3) State any **two** conditions of weather.
   (i) _____
   (ii) _____
4) Mention any **two** conditions of weather which affects farming greatly.
   (i) _____
   (ii) _____
5) Which element of weather shows rainfall?

_____

_____

6) Mention any **two** elements of weather.
   (i) _____
   (ii) _____
7) **Match the weather condition to the correct weather maker**

Weather condition	Weather maker
Windy	Cloud cover
Cloudy	Rainfall
Rainy	Sunshine
Sunny	Wind

LESSON

Rainfall

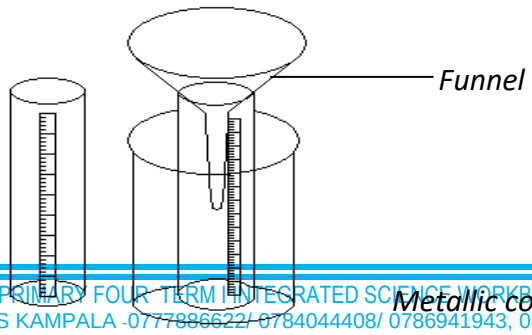
Rain is water falling in separate drops from clouds.

Rainfall is the amount of rain water that falls in a certain area at a certain time.

The measuring units of rainfall are millimetres (mm)

Instruments used to measure rainfall

Rainfall is measured by an instrument called a rain gauge



Measuring cylinder _____ _____

Rain gauge is supposed to be put in an open place.

Reasons why a rain gauge put in an open place

- To get the correct amount of rainfall received.
- To prevent obstruction of rain drops.

The rain gauge should be raised 30cm above the ground to prevent running water from entering the measuring cylinder.

Reason why rainfall is measured in millimeters

To know how deep rain water has entered the ground

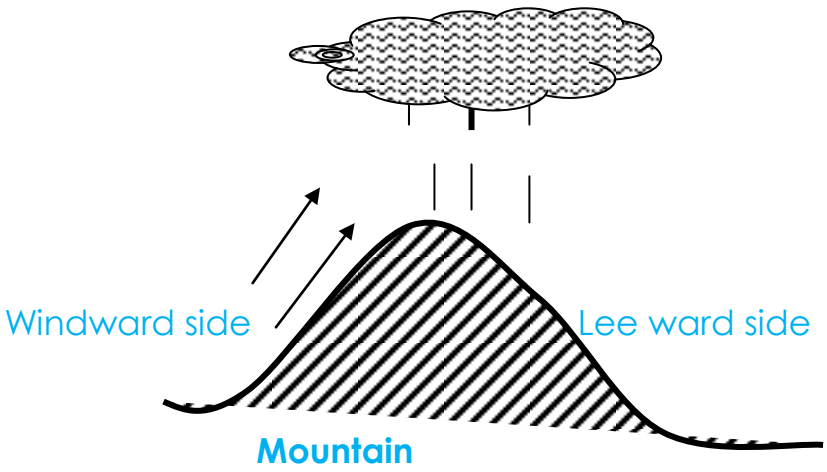
Types of rainfall

There are three types of rainfall namely:-

1. Relief rainfall
2. Convectional rainfall
3. Cyclonic rainfall.

Relief rainfall

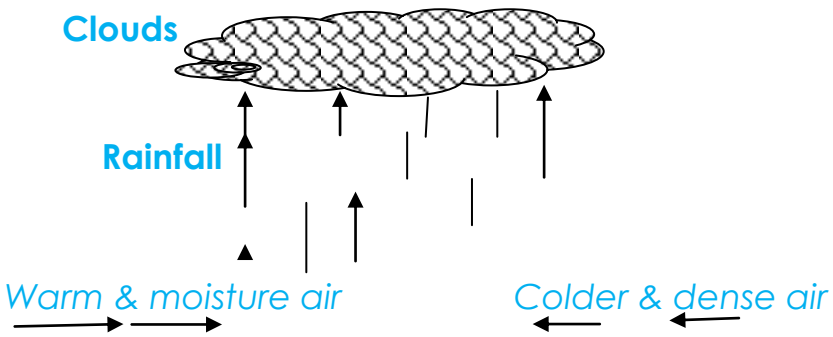
This is a type of rainfall received around mountainous and hilly places.
It is also known as **Orographic rainfall.**



Cyclonic rainfall

This is the type of rainfall received on land and places near water bodies.
It is formed in the same way as the water cycle.

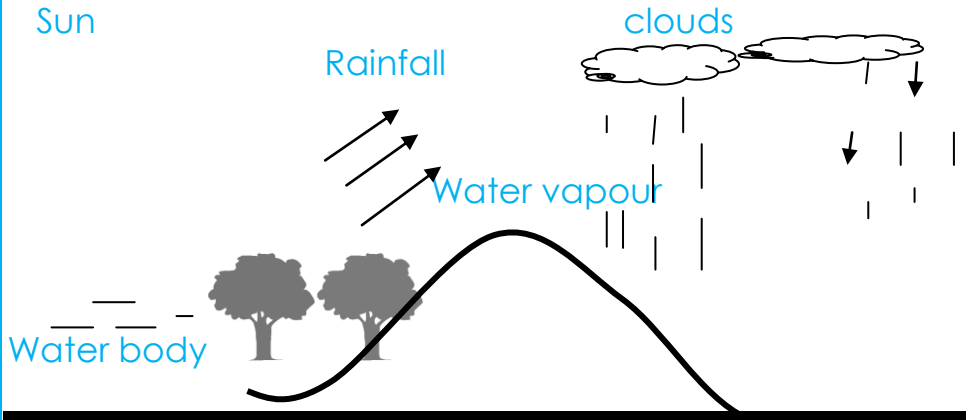
This type of rainfall is received as a result of warm air meeting cold air in a certain place.



Convectional rainfall:-

This is the type of rainfall received on land and places near water bodies.
It is formed in the same way as the water cycle.

A diagram to illustrate a water cycle



ACTIVITY

1) In which way is rain different from rainfall?

2) State the measuring units of rainfall.

3) Why is rain fall measured in millimeters?

4) How is a rain gauge important to a farmer?

5) Why is a rain gauge put in an open place?

6) Why is a rain gauge raised at least 30 cm off the ground?

7) Mention any **two** types of rainfall.
   (i) _____
   (ii) _____

8) What are relief rainfalls?

9) Give another name for orographic rainfall.

10) Name the type of rainfall received on land and places near water bodies.

LESSON

Water cycle is a process by which rain is formed.

Experiment to show a water cycle (diagram)

Things to use

- Kettle
- Source of heat

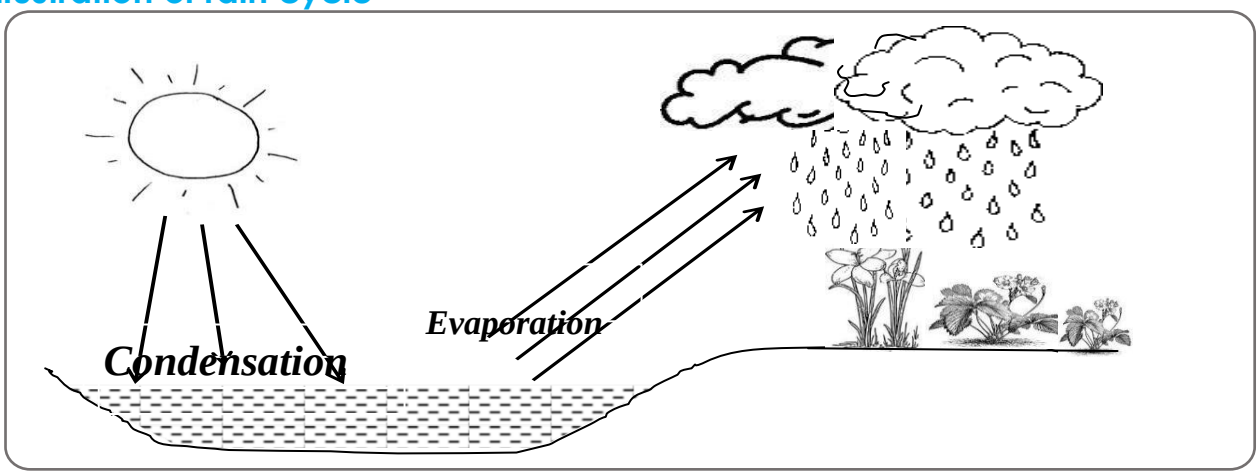
✍ Water ✍ Cold container

Comparison of the experiment to the rain cycle:

Kettle-water body

Fire-sun

Illustration of rain cycle



Note:

Water cycle is a process by which rain is formed.

The water cycle involves the following process:

1. **Evaporation:**

This is a process by which water changes to vapour.

2. **Transpiration:**

This is the process by which plants lose water to the atmosphere in form of water vapour through the stomata.

3. **Condensation**

This is the process by which vapour changes in to water.

Steps in the water cycle

- The sun heats the water body and plants.
- Evaporation and transpiration occur. (Evapotranspiration).
- Water vapour condenses to form clouds.
- When clouds are heavy, they fall as rain by gravity.

ACTIVITY

1) What is water cycle?

_____

_____

2) State the main source of heat in the water cycle.

_____

_____

3) Name the process by which rain is formed.

_____

_____

4) By what process do water changes to vapour?

_____

_____

5) What is transpiration?

_____

_____

6) Name the type of rainfall received in:
(a) Forested areas: _____
(b) Mountainous areas : _____
7) Name the process by which vapour changes in to water
_____
_____

LESSON

Importance of rainfall

1. It cools down the atmospheric temperature.
2. Rain is the main source of water.
3. It provides water for plant growth.
4. It helps farmers' crops to grow and have good yields quickly.
5. It makes the soil soft for easy cultivation.
6. It increases the volume of water in water bodies for generation of electricity.

Disadvantages (dangers) of too much / heavy rainfall

1. Too much rainfall cause floods.
2. A lot of rainfall causes delay in transport.
3. A lot of rainfall causes very cold temperature.
4. Brings difficulty in constructing roads, houses etc.
5. Too much rainfall can spoil crops and buildings.
6. It also kills people.

Effects of rain on the environment

1. Rain reduces temperature in the environment
2. Rain reduces dust.
3. Rainfall softens soil

ACTIVITY

1. What is rainfall?
_____
_____
2. State any **two** importance of rainfall to:
(a) Crops in the garden
(i) _____
(ii) _____
(b) The farmers.
(i) _____
(ii) _____
3. Mention **two** disadvantages of heavy rainfall.
(i) _____
(ii) _____
4. In which **two** ways are rainfall a problem to crop farmers?
(i) _____
(ii) _____
5. State any **two** effects of rain on the environment
(i) _____
(ii) _____

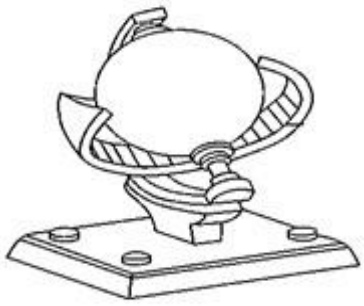
LESSON

SUNSHINE

Sunshine is the heat and light we get from the sun.

Sunshine is measured by an instrument called **sunshine recorder**.
Sunshine recorder is also called a Campbell's stroke.

Diagram of a sunshine recorder/ Campbell stroke



Advantages / uses / importance of sunshine

1. It helps in rain formation.
2. It dries harvested crops.
3. It helps plants to make their own food.
4. Helps our skin to make vitamin D.
5. It kills some germs.
6. It dries wet clothes
7. For generating solar electricity
8. For warmth

Note: Sun is the main natural source of heat and energy.
It provides us with vitamin D with the help of the skin.

Disadvantages / dangers of too much sunshine

1. It makes it very hot.
2. Too much sunshine makes the soil hard for cultivation.
3. It dries water sources.
4. It kills animals and plants.

Effects of sunshine in the environment:

1. Strong sunshine dries up water bodies.
2. Strong sunshine dries up plants in the garden.
3. Strong sunshine dries and hardens the soil.

ACTIVITY

1. What is sunshine?

_____

_____

2. Name the main natural source of heat and energy

_____

_____

3. What special name is given to the food made by the plants with the help of sunshine?

_____

_____

4. Name the type of vitamin made by the skin with the help of sunshine.

_____

_____

5. Mention any **two** advantages of sunshine to the farmers.

_____

_____

6. What causes drought?

_____

_____

7. State any **two** dangers of too much sunshine.
   (i) _____
   (ii) _____
8. Give **two** effects of sunshine in the environment.
   (i)

(ii) _____

9. Which season is characterized by plenty of rainfall?

_____

_____

10. Name the instruments used to measure the intensity of sunshine.

_____

_____

LESSON

Clouds

Clouds are made up of many droplets of water vapour in the atmosphere
Clouds are grouped according to their heights and general shape.

Types of clouds

(a) Circus clouds

- They look like feathers in the sky.
- They are the farthest in the sky at a height of 800m to 16000m above the ground.

(b) Cumulus clouds

- They are white clouds which resemble cotton piles with a flat bottom.
- They can develop into thunder and thus they may indicate rain.

(c) Stratus clouds:

- They are nearer the earth than the cumulus cloud.
- They are a sign of fair weather.

(d) Nimbus clouds:

- They are clouds that bring us rain or give us rain.
- They are nearest to the earth.
- They are dark grey in colour.

Importance of clouds in the environment

1. Clouds bring rain
2. Clouds protect people and animal from direct sunlight
3. Cloud lowers the temperature of the environment

Effects of clouds on the environment

1. Clouds block direct sunlight. This reduces the brightness in our environment.
2. Clouds causes plane crash
3. Clouds cause thunderstorms

HUMUDITY:

Humidity is the amount of water vapour in the atmosphere.
When there is a lot of water vapour in the air, the weather is said to be **humid**.
Humidity is measured by an instrument called **hygrometer** or a wet and dry bulb.

ACTIVITY

1) Which type of cloud look like feathers in the sky?

_____

_____

2) Name the farthest cloud in the sky.

_____

_____

3) Mention **two** importance of cloud in the environment.

(i) _____
(ii) _____

4) State **two** types of clouds.
(i) _____
(ii) _____

5) Which clouds bring us rain?
_____
_____

6) How important is a nimbus cloud to the crop farmers?
_____
_____

7) State any **two** effects of clouds on the environment.
(i) _____
(ii) _____

8) State **one** disadvantage of clouds to us.
_____
_____

9) Name the weather instrument used to measure the intensity of cloud cover.
_____
_____

10) Define humidity.
_____
_____

LESSON

TEMPERATURE

Temperature is the degree of hotness or coldness of an object or a place.
The instrument used to measure temperature is called a **thermometer**.

A thermometer is read in two scales namely:-

- Degrees Celsius / centigrade
- Degrees Fahrenheit.

Temperature is measured in **degrees**

Types of thermometers

1. Clinical thermometer
2. Minimum and maximum thermometer.
3. Ordinary Scientific thermometer
4. Wall thermometer

1. Clinical thermometer

It is used in hospitals by doctors, nurses, etc to measure the human body temperature.
The temperature of a human body must remain constant at 37^0C or 98.4^0F except when the person is sick or has fever.

places where the clinical thermometer is placed to find the actual temperature

1. In the mouth but under the tongue to prevent biting and breaking the bulb.
2. In the arm pit.
3. In the anus

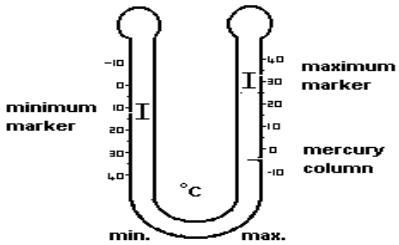
4. In the vagina.

NB: These parts maintain the temperature.

Diagram of a clinical thermometer

Kink prevents the back flow of mercury before readings are taken.
Bulb stores mercury.
Stem magnifies mercury thread.
-It protects the bore.
-It is where the thermometer reading is taken.
Bore allows expansion and contraction of mercury.
Glass envelope acts as a magnifying glass

Minimum and maximum thermometer



It is also called the six's thermometer because it was first made by James six.
The minimum and maximum thermometer is used to measure the lowest and highest temperature of the day.
It uses both alcohol and mercury.

ACTIVITY

1) What is temperature?

_____

_____

2) Name the instrument used to measure temperature.

_____

_____

3) Name any **two** liquids used in Six's thermometer.

(i) _____

(ii) _____

4) State any **two** types of thermometers

(i) _____

(ii) _____

5) State the unit used when reading and recording temperature on a clinical thermometer.

_____

_____

6) Name the thermometer used doctors to measure the human body temperature.

_____

_____

7) Name **one**place wherethe clinical thermometer is placed to find the actual temperature within human body.

_____

_____

8) Which part of clinical thermometer prevents the back flow of mercury before readings are taken

_____

_____

9) State **two** uses of stem on a clinical thermometer.

(i) _____

(ii) _____

10) Which part of a clinical thermometer allows expansion and contraction of mercury?

_____

_____

11) Which thermometer is used to measure the lowest and highest temperature of the day?

_____

_____

LESSON

Weather station

Weather station is a place where weather conditions are measured and recorded.

In a weather station, we find the Stevenson screen where delicate weather instrument are kept.

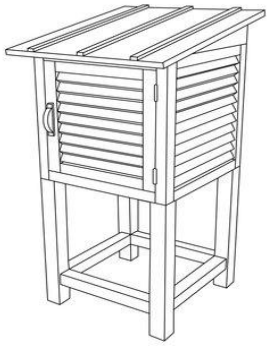
Examples of delicate weather instruments

1. Barometer
2. Hygrometer
3. Six's thermometer

A Stevenson screen is a wooden box in which some delicate weather instruments are kept safely.

It is painted white to reflect heat and it has louvers allow in free circulation of air.

Diagram of a Stevenson screen.



Weather forecasting

This is the predicting of weather changes.

- It is done by **meteorologists.**
- The study of weather changes is called meteorology.

Importance of weather forecasting.

1. It helps farmers to plan for their farming activities.
2. It helps travelers to know the type of clothes to wear.
3. It is where delicate weather instruments are kept.

ACTIVITY

1. Mention any **two** instruments found in a weather station.

(i) _____

(ii) _____

2. Why should weather station be fenced?

3. Who is a meteorologist?

4. What is weather forecasting?

5. Mention any **two** importance of weather forecasting.
   (i) _____
   (ii) _____
6. What is meteorology?

7. Name the wooden box in which some delicate weather instruments are kept safely.

8. Name any **two** delicate weather instruments kept in the box named above.
   (i) _____
   (ii) _____
9. How important are louvers to the Stevenson screen?

10. Why is a Stevenson screen painted white?

LESSON

AIR

Air is a mixture of gases.

Components of air

Components of air are gases that make up air.

Gases that make up air are;

- Carbon dioxide
- Nitrogen
- Oxygen
- Rare gases

Uses of different gases

Oxygen

Oxygen is used in:

1. Burning
2. Respiration
3. Germination

Carbon dioxide

1. It is used to put out fire (extinguish fire)
2. Preservation of foods and drinks.
3. Plants use it in the process of photosynthesis.

Note

Carbon dioxide is used in fire extinguisher because it does not support burning.

Nitrogen and rare gases

They are used in making of bulbs.

ACTIVITY

1. What is air?

   _____

   _____

2. State any **two** components of air.
   (i) _____
   (ii) _____
3. State any **two** properties of air.
   (i) _____
   (ii) _____
4. State any **two** biological processes which require oxygen.
   (i) _____
   (ii) _____
5. In which ways is the respiration similar to germination?

   _____

   _____

6. Why is carbon dioxide used in fire extinguishers?

   _____

   _____

7. Name the gas used in preservation of foods and drinks.

   _____

   _____

8. Why is the gas stated above used in preservation of foods and drinks?

   _____

   _____

9. Mention any **two** soft drinks preserved by use of carbon dioxide.
   (i) _____
   (ii) _____
10. Name **one** component of air used in making of bulbs.

    _____

    _____

LESSON

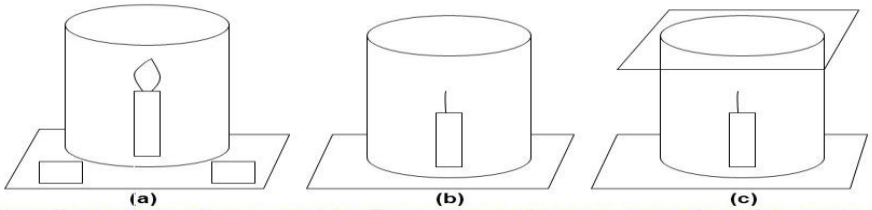
Properties of air

1. Air exerts pressure
2. Air has weight.
3. Air can be compressed.
4. Air occupies space.

An experiment to show that air supports burning

Things needed;

a. Candle
b. Matchbox
c. Glass cup



Fix a lighted candle on a table. Put a glass chimney over the table and rest it on a few wooden blocks in such a way so that air can enter the chimney. Observe what happens to the flame.

Now remove the blocks and let the chimney rest on the table. Again observe the flame.

Then put a glass plate over the chimney. Observe the flame again.

The candle burns freely in (a) because air enters the chimney from below.

The candle stops burning in (b) because air does not enter the chimney from below.

The candle does not burn in (c) because air is not available.

This shows that air is necessary for burning.

Observation

a. The flame burns for a short time then goes off (out)

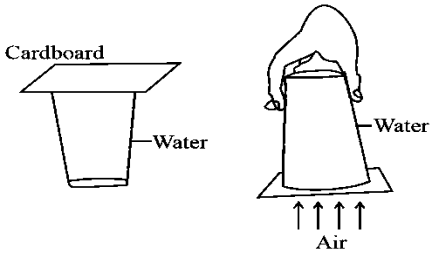
b. The flame goes out because there is no more oxygen to support it burning.

Conclusion

Air supports burning.

Note the part of air that supports burning is oxygen.

Experiment to show that air exerts pressure



Things needed

a. Glass cup.

b. Water

c. Cardboard paper.

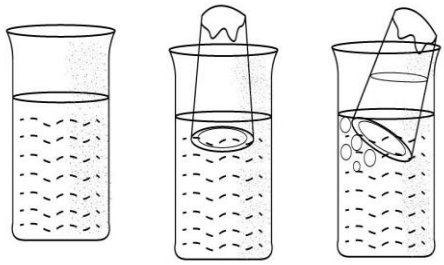
Steps to follow

1. Fill a glass cup with water
2. Cover the filled glass cup with the card paper.
3. Turn the glass cup upside down:

Observation

The card paper does not fall off because air is exerting pressure on it.

Experiment to show that air occupies space



Things needed;

- ✓ Glass cup
- ✓ Basin
- ✓ Water.

Steps

- ❖ Put water in a basin.
- ❖ Turn the empty glass upside down and lower it into the water.
- ❖ Tilt the glass cup slightly.

Observation

The air bubbles seen (observed) shows that air was in the glass.

Activity

1) What is air?

_____

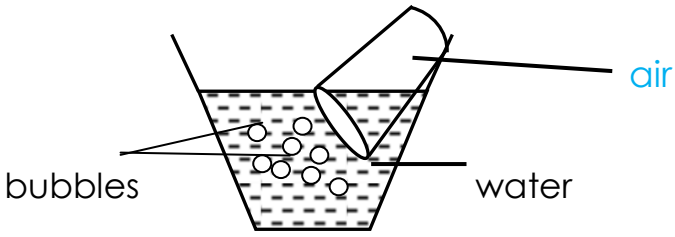
_____

2) State any **two** properties of air.

(i) _____

(ii)

3) Below was an experiment conducted by Pt children of Mother Ariam Junior School.



a) What is the experiment showing?

_____

_____

b) What are the bubbles showing in the experiment shown above?

_____

_____

Experiment to show that air has weight

Things needed

- Beam balance
- 2 Balloons
- Pin.

Steps to follow

1. Fill the balloons with air.
2. Then tie a balloon on each side of the beam balance
3. Prick one balloon with a pin to remove air.

Observation

The balloon with air moves down wards to show that it is heavier.

Air can be compressed

Some other things where compressed air is used are:

a) Gas cylinders.
b) Playing balls
c) Tubes in bicycle/motorcycle tyres and car tyres.

General uses of air

1. Air is used during burning.
2. Air is used during respiration.
3. Air is used during germination.
4. Air is used during photosynthesis.
5. Air is used in putting out fire.
6. Air is used during preserving tinned food and drink.

ACTIVITY

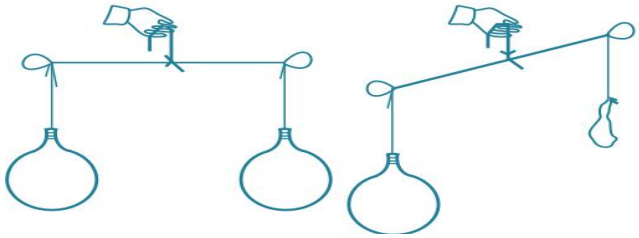
1) What is air?

_____

2) State any **one** property of air.

_____

Below is an experiment done by a P4 child. Use it to answer the questions that follow.



3) What is the experiment showing?

_____

_____

4) Mention **two** things where compressed air is used.
   (i) _____
   (ii) _____
5) State any **two** uses of air to people.
   (i) _____
   (ii) _____
6) Name the gas used in the firefighting equipment.

_____

_____

WIND

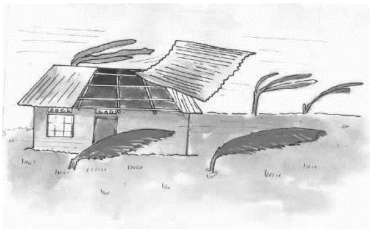
Wind is moving air/ it is the air in motion.

Types of wind

(a) Calm wind
(b) Light wind
(c) Strong wind
(d) Gale wind
(e) Stormy wind

Uses of wind

1. Wind is use to run boats.
2. Wind is used to run machines e.g. windmills
3. Wind is used for winnowing.
4. Wind dries our clothing.
5. Wind helps in pollination
6. Wind helps in seed dispersal



Dangers of wind

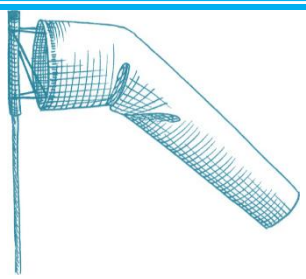
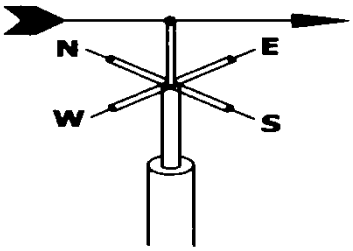
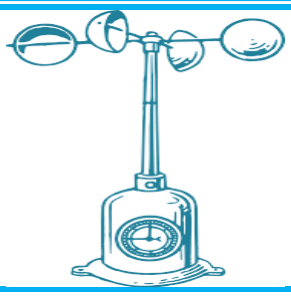
(a) Strong wind blows off roofs of houses.
(b) Strong wind destroys crops and trees.
(c) Wind blows away topsoil.
(d) Strong wind slows down the speed of moving objects.
(e) Strong wind capsizes boats.
(f) Spread diseases.

Aspects of wind

1. Wind strength
2. Wind direction
3. Wind speed

Diagram showing wind instruments.

Wind sock	Wind vane	Anemometer

		
It measures wind strength	It measures wind direction	It measures wind speed

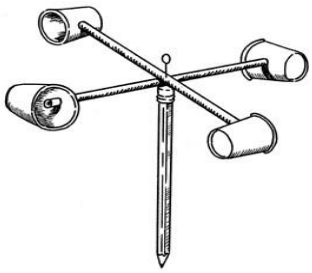
ACTIVITY

1. What is wind?

   _____

   _____

2. State **two** types of wind.
   (i) _____
   (ii) _____
3. Mention any **two** importance of wind to plants
   (i) _____
   (ii) _____
4. State any **two** uses of wind to people.
   (i) _____
   (ii) _____
5. Name the use of the following wind instruments.
   (a) Wind sock: _____
   (b) Wind vane: _____
   (c) Anemometer : _____
6. **Below is a diagram of a weather instrument. Use it to answer questions that follow.**



7. Name the wind instrument shown below.

   _____

   _____

8. What is the use of weather instrument shown above?

   _____

   _____

9. Which aspect of wind is recorded using the instrument above?

   _____

   _____

10. State **two** uses of wind to a farmer.
    (i) _____
    (ii) _____
11. Mention **two** aspects of wind that we measure and record.
    (i) _____

(ii) _____

12. Give any **two** disadvantages of wind.

(i) _____

(ii) _____

13. Mention any other **two** wind instruments found at weather station.

(i) _____

(ii) _____

LESSON

Water:

Water is the colorless and tasteless liquid formed from hydrogen and oxygen.

Natural sources of water

- These are God-made sources of water. e.g. lakes, oceans, wells, streams, rivers, swamps, springs, rainfall
- Rainfall is the main natural source of water.

Artificial sources of water

These are man-made sources of water e.g. boreholes, ponds, dams, wells

Water harvesters

Water harvesters refer to containers in which we collect and store water.

Examples of water harvesters

Tanks, drums, buckets, jerry cans, pots and basins

Properties of pure water

1. It has no colour
2. It has no taste
3. It has no smell
4. It takes the shape of the container

Domestic uses of water to people

1. Water is used for cooking.
2. We use water for drinking.
3. We use water for bathing
4. We use water for washing
5. We use water for cleaning

Industrial uses of water to people

1. For washing machines
2. Mixing building materials
3. For irrigation.

Other uses of water to people

1. Water is used for transport
2. Generating electricity
3. Irrigation
4. Recreational activities e.g. swimming, boat racing, raffling
5. Used for cooling and washing machines in industries

Uses of water to plants

1. It is used for germination
2. For photosynthesis

3. For transpiration
4. It dissolves mineral salts

Ways of saving water.

1. Through building water tanks.
2. Through constructing valley dams.
3. By closing taps when not in use.

ACTIVITY

1) Name the main natural source of water in the environment.

_____

_____

2) Mention **two** other natural sources of water.
   (i) _____
   (ii) _____
3) State any **two** artificial sources of water.
   (i) _____
   (ii) _____
4) Draw and name any **two** examples of water harvesters.

Jerry cans	Pots	Tank

5) State any **two** properties of pure water
   (i) _____
   (ii) _____
6) Give any **two** uses of water to people at home.
   (i) _____
   (ii) _____
7) Mention **two** industrial uses of water to people.
   (i) _____
   (ii) _____
8) State any **two** importance of water to plants.
   (i) _____
   (ii) _____
9) Mention **two** ways of saving water to be used in the dry season.
   (i) _____
   (ii) _____
10) Mention **two** importance of saving water to be used at home.
   (i) _____
   (ii) _____

TOPIC 9: PERSONAL HYGIENE

LESSON

- Personal hygiene is the way of keeping our bodies clean.
- It is also the general cleanliness of our bodies and things used.

Ways of keeping our bodies clean

These refer to things done to keep our bodies clean and they include:
1. Bathing regularly.
2. Cutting finger and toe nails short.
3. Brushing teeth every day.
4. Washing hands after visiting the toilet or latrine.
5. Washing hands after a physical task like digging, picking rubbish etc.
6. Washing hands before eating or touching food.
7. Washing clothes regularly.
8. Washing beddings regularly
9. Combing hair daily.
10. Ironing clothes and bedding.

Things used in keeping our bodies clean

1. Clean water
2. Bathing sponge
3. Towel
4. Tooth paste
5. Soap
6. Nail cutters /
7. Razor blades
8. Tooth brush
9. Comb
10. Dental floss
11. Tooth picks

ACTIVITY

1) What is personal hygiene?

_____

_____

2) Write down **two** ways of keeping our bodies clean

(i) _____

(ii) _____

Below is a diagram of an item used for cleaning the body.

3) Name the item shown above.

_____

_____

1) How useful is the item shown above.

_____

_____

4) Draw and name any **three** things used in keeping our bodies clean.

5) State **two** items used in brushing teeth.

(i) _____

(ii) _____

6) Mention any **two** importance of ironing our school uniforms.

(i) _____

(ii) _____

7) Mention **two** things that we need to wash regularly in order to promote personal hygiene.
(i) _____
(ii) _____
8) Mention any **one** item used for cutting fingernails short.
(i) _____
(ii) _____
9) State any **one** importance of cutting finger nails short.
_____
_____
10) Of what important is a dental floss in promoting personal hygiene?
_____
_____
11) Why do we need to brush our teeth using tooth paste?
_____

LESSON

How to keep things / items at home clean

Beddings and clothing:

1. Washing them
2. Ironing
3. Spreading under the sunshine
4. Spraying with insecticides

Diseases that result from poor personal hygiene

1. Scabies
2. Ringworm
3. Impetigo

Importance of keeping our bodies clean

1. It removes germs from the body
2. It controls the spread of germs.
3. It prevents bad body smell.
4. It prevents diseases like skin and teeth diseases
5. It prevents lice, mites and ticks.
6. To remove dirt on the body.
7. To be smart.

Dangers of not keeping our bodies clean

1. It leads to spread of germs.
2. It causes bad body smell.
3. It causes diseases like skin and teeth diseases
4. It breeds vectors like lice, mites and ticks.
5. It makes us shabby and unclean

ACTIVITY

1. Why do we need bed sheets?
(i) _____
(ii) _____
2. State any **two** reasons for keeping bed sheets clean.
(i) _____
(ii)

3. State **one** importance of spreading bedding under sunshine.
   (i) _____
   (ii) _____
4. Mention any **two** diseases that result from poor personal hygiene.
   (i) _____
   (ii) _____
5. Give any **two** importance of keeping our bodies clean.
   (i) _____
   (ii) _____

Below is an item used in keeping our bodies clean. Use it to answer question that follow.

6. Name the item above?
   (i) _____
   (ii) _____
7. Why do we wash our hands with clean water and the item above?
   (i) _____
   (ii) _____
8. Apart from washing hands, mention any **two** other importance of the item shown above.
   (i) _____
   (ii) _____

LESSON

Keeping our bedding clean

Bedding is a material laid above the mattress of a bed.

Importance of bedding

- For warmth
- For protection
- For hygiene

Components of bedding

1. Bed sheets
2. blankets
3. Pillows
4. Night dresses

Ways of keeping our bedding and clothes clean

1. Washing them clean
2. Drying and ironing them
3. Keeping them in dust free areas
4. Spreading under the sunshine
5. Spraying with insecticides

Reasons of keeping beddings and clothing clean

1. To prevent bad smell
2. It makes one looks smart and clean
3. To prevent parasites such as lice, bed bugs from breeding in them.
4. To reduce the spread of germs.

Dangers of poor personal hygiene

1. It leads to bad body smell.
2. Parasites like Jiggers, mites, ticks and lice can breed and affect the body
3. Leads to tooth decay.

4. It leads to easy spread of skin diseases
5. Diarrhoeal diseases can spread easily.

Diseases brought by poor personal hygiene.

DISEASES	CAUSE
Tooth decay	Bacterial
Scabies	Itch mite
Dysentery	Bacteria, Amoeba
Diarrhoea	Virus, Bacteria
Ring worm	Fungus
Trachoma	Chlamydia

ACTIVITY

1) What is bedding?

_____

_____

2) State any **two** components of bedding.
   (i) _____
   (ii) _____
3) Write down **two** ways of keeping our bedding and clothes clean
   (i) _____
   (ii) _____
4) Mention any **two** reasons of keeping beddings and clothing clean
   (i) _____
   (ii) _____
5) Suggest any **two** dangers of poor personal hygiene
   (i) _____
   (ii) _____
6) Mention any **two** examples of diarrhoeal diseases.
   (i) _____
   (ii) _____
7) Suggest **two** common parasites found on our bedding.
   (i) _____
   (ii) _____
8) Mention any **two** problems caused by the parasites named above.
   (i) _____
   (ii) _____

Cleanliness in our classrooms

A classroom is a building at school where we learn.

Classrooms are supposed to be kept clean all the time.

Reasons for keeping our classrooms clean.

1. To prevent spreading of diseases
2. To avoid bad smell of rotting items
3. To remove dust and dirt

4. To keep clean and healthy

Ways in which we can keep our classes clean

- By sweeping the floors
- By smearing the class
- Scrubbing the floors
- By throwing the papers in the dustbins
- By removing cob webs
- By cleaning dusts from doors, windows and walls

ACTIVITY

1. What is a classroom?

_____

_____

2. State any **two** reasons why we keep our classrooms clean.
   (i) _____
   (ii) _____
3. Write down **two** ways in which we can keep our classes clean.
   (i) _____
   (ii) _____
4. Name any **one** item used for sweeping our classroom.

_____

4. ***The diagrams below are of items used to clean our classrooms every morning. Use them to answer the questions that follow.***

a) Name the item marked with letter **A** and **B.**
   (i) Item A: _____
   (ii) Item B: _____

b) What is the use of item marked with letter A and B during class cleaning?

_____

_____

c) Apart from cleaning classes, mention any **two** other uses of the item marked with letter A.

(i) _____
(ii) _____