

**LORENCIA JUNIOR SCHOOL**  
**PRIMARY SIX SCIENCE LESSON NOTES FOR TERM 1, 2022.**

**THEME: THE WORLD OF LIVING THINGS**  
**TOPIC: CLASSIFICATION OF LIVING THINGS**

**What are living things?**

-Living things are things which have life.

**Characteristics of living things**

- They feed.
- They grow.
- They breathe.
- They respire.
- They move.
- They excrete.
- They reproduce.
- They respond to stimuli.

**What are stimuli?**

-These are signals in the environment to which living things respond.

**Examples of stimuli**

- Water
- Light
- Touch
- Gravity
- Chemicals

**Groups of living things**

- Plant kingdom
- Animal kingdom
- Bacteria/Monera kingdom
- Fungi kingdom
- Protocista kingdom

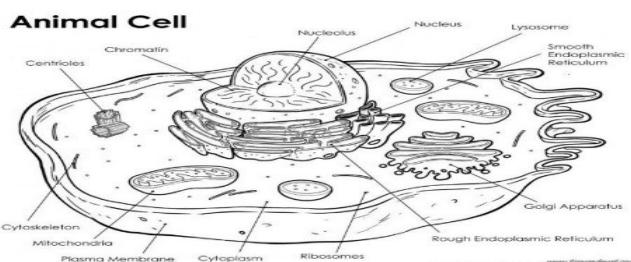
**NB:** All living things are made up of cells.

**What is a cell?**

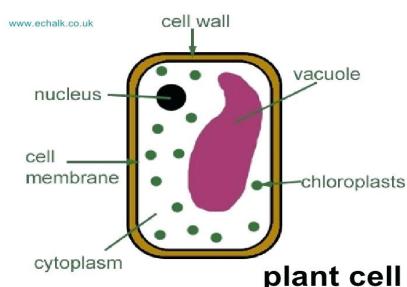
-A cell is the smallest functional unit of a living thing.

-Cells enable living things to grow, excrete, reproduce and protect themselves.

**A structure of an animal cell**



**A structure of a plant cell**



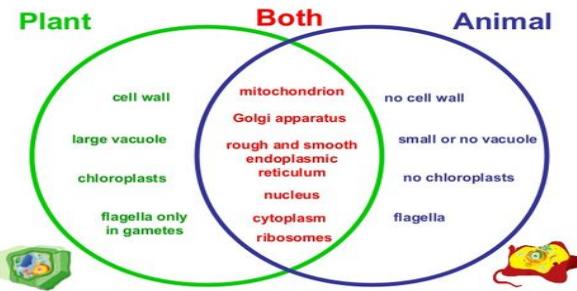
## Where does respiration occur in a cell?

- Mitochondria.

## Differences between plants and animals

- Plants have chlorophyll while animals lack chlorophyll.
- Plants make their own food while animals can't make their own food.
- Plants have slow response to stimuli while animals have quick response to stimuli.
- Plant cells have cell walls while animal cells don't have cell walls but have cell membranes.
- Animals move from one place to another while plants can't move from one place to another.

## Compare and Contrast



## ANIMAL KINGDOM

### Classification of animals

-Classification is the grouping of things according to their common characteristics and features.

### Why are animals classified?

- For easy identification

### Factors considered when classifying animals

- Ways of breathing
- Ways of reproduction
- Body divisions
- Adaptation to the environment
- Number of legs
- Ways of movement
- Mode of feeding

### Groups of animals

-Animals are divided into **two main groups**, namely;

- Vertebrates
- Invertebrates

## VERTEBRATES

-Vertebrates are animals with backbones.

### Characteristics of vertebrates

- They have backbones.
- Their brains are protected by the skull.
- They have endoskeleton.
- They have water proof skins.
- They have an alimentary canal.

### Classes of vertebrates

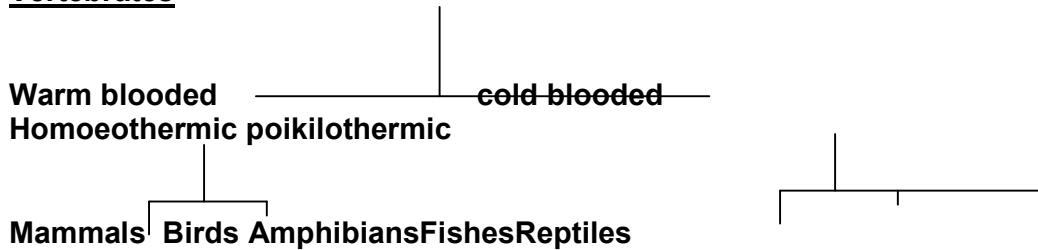
-There are five classes of vertebrates, namely;

- Mammals
- Birds
- Fishes
- Reptiles
- Amphibians

### Major groups of vertebrates

- Warm blooded (homoeothermic) vertebrates
- Cold blooded (poikilothermic) vertebrates

## Vertebrates



### **Warm blooded vertebrates**

- These are animals that keep their body temperature constant.
- Their body temperature does not change according to the surrounding.

#### **Groups of warm blooded vertebrates are;**

- Mammals
- Birds

### **Cold blooded vertebrates**

- These are animals that cannot keep their body temperature constant.
- Their body temperature changes according to the temperature of the environment they live in.

#### **Groups of cold blooded vertebrates are;**

- Amphibians
- Fishes
- Reptiles

### **Examples of cold blooded animals**

- Frogs
- Lizards
- Snakes
- Toads
- Tortoises
- Chameleon
- Fish
- Salamander

## **FISHES**

- This is a group of vertebrates with a scaled body living in water.

### **Characteristics of fish**

- They have streamlined bodies.
- They have scaled bodies.
- They have fins for swimming and protection.
- They are cold blooded animals
- They use gills for breathing in dissolved oxygen in water.
- They reproduce by laying eggs.
- They undergo external fertilization.
- They have nostrils for smelling food materials.
- They have lateral lines for detecting sound waves in water.
- They live in water.

### **Objects with streamlined bodies.**

- Spear
- Arrow
- Aeroplane
- Fish
- Birds

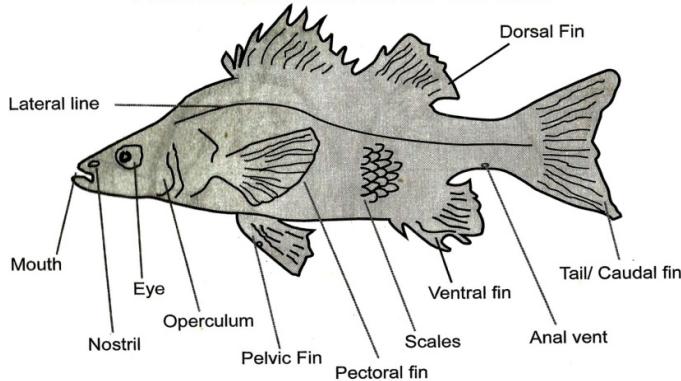
### **Qn. How is a streamlined body helpful to a fish?**

- It helps a fish to overcome viscosity friction in water.

### **Qn.What is viscosity?**

- Viscosity friction is the force which opposes movement in liquids and gases/air (fluids).

# THE STRUCTURE OF A FISH



## Functions of each part of a fish

### a) Mouth

- It is used by fish for taking in food.
- It allows water with dissolved oxygen.

### b) Nostrils

- It is used by fish to smell and taste food materials.

### c) Eyes

- It is used by fish to see while in water

### d) Scales

- They cover the fish's body to provide protection against scratches.
- It protects the fish from external injuries.

### e) Operculum/gill cover

- It covers and protects the gills from damage.
- It opens to allow water to flow out when the fish is breathing.

### f) Lateral line

- It helps the fish to detect or sense danger in water by receiving sound waves (vibrations of water).

### g) Fins

- They enable the fish to swim in water.
- They are used for protection against its enemies.

### h) Dorsal fin

- It is used for defence against enemies.
- It helps the fish to balance while swimming in water.

### i) Caudal fin

- It helps the fish to change direction.
- It helps in forward movement.
- It helps a fish to increase speed.
- It enables the fish to swim by moving side to side.

### j) Anal(ventral) fin

- It prevents the fish from rolling in water.

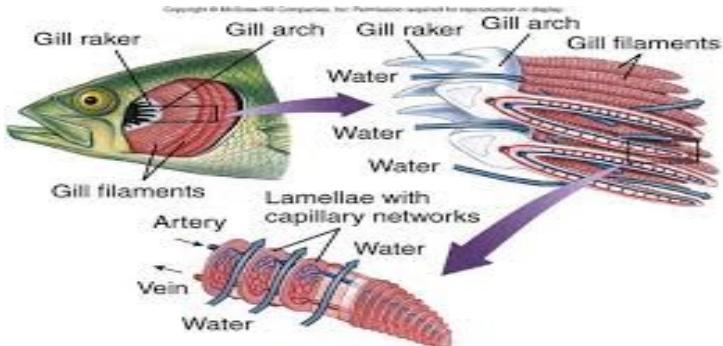
### k) Paired fins(pectoral and pelvic fins)

- They are responsible for downward and upward movement.
- They help in body balance.
- They also enable the fish to slow down or to stop when swimming.

### l) Swim bladder

- It controls the depth at which a fish swims.
- It keeps the fish buoyant on water.
- A tilapia has a swim bladder.

## Breathing mechanism of the fish



### Functions of each part

#### a). Gillrakers

- It traps solid particles which are swallowed in water.

#### b). Gill bars

- It gives attachment and support to the gill filaments.

#### c). Gill filaments

- They provide the surface area for the exchange of gases.
- It is where gaseous exchange occurs.
- They absorb dissolved oxygen from water.

**NB:**

-The fish breathes in dissolved oxygen in water using the internal gills.

### Why does a fish die immediately it is removed from water?

- It can only use gills to trap dissolved oxygen from water.
- It can only breathe in dissolved oxygen from water.

### What do fish feed on?

- |             |             |         |
|-------------|-------------|---------|
| • Algae     | • Worms     | • Toads |
| • Planktons | • Smallfish |         |
| • Frogs     | • Insects   |         |

### Reproduction in fish

-Fish reproduce by laying eggs.

-A group of eggs laid by fish is called **a row**.

-They undergo external fertilization.

### Qn. How does external fertilization occur in fish?

- The female fish lay eggs in shallow water and the male shed sperms on the laid eggs in water immediately.

### Qn. What name is given to the young one of fish?

- *Alevin (fry)*

### How does a fish protect itself?

- The fish has scales on its body which covers and protects it against scratches.
- The fish has a lateral line used for sensing and detecting the movement of its enemies in water.
- The fish uses the fins to swim so as to escape away from its enemies and uses the dorsal fin for spiking its enemies.
- The fish has a slippery body with mucus structure which enable them to easily escape from its enemies when caught.

### Adaptations of fish to swimming/living in water

- The fish has a streamlined body which controls viscosity friction when swimming.
- The fish has gills used for breathing in dissolved oxygen in water.
- The fish has a lateral line used to sense danger while in water.

- The fish has fins used for swimming and protection.
- The fish's body is covered with scales for protection against scratches.
- Some fish like tilapia have swim bladders which help to control the depth of fish and prevent it from sinking.

### **Importance of fish**

- It is a source of food(proteins).
- Fish's bones are crushed and included in animal feeds.
- Fish is exported to earn foreign exchange to the country.
- The fish industry is the source of employment to people.
- Fish controls the spread of malaria.
- Moonfish (mukene) is used locally to treat measles.
- Fish is used for decoration at home in aquarium.
- Fish bones are also used in making glue.

## **REPTILES**

-Reptiles are crawling vertebrates with four limbs apart from the limbless reptile called a snake.

### **Characteristics of reptiles**

- They reproduce by laying eggs (they are oviparous).
- They undergo internal fertilization.
- They have scaled bodies.
- They have hearts with three chambers.
- They use lungs for breathing.
- They are cold blooded animals.
- They have 4 limbs except the snake which is limbless.
- They have external ears.

### **Groups of reptiles**

- Lizards
- Crocodiles and alligators.
- Shelled reptiles(tortoises, turtles and terrapins).
- Snakes

### **Lizards**

#### **Examples are;**

- Chameleons
- Geckoes
- Common lizards
- Monitor lizards
- Agama lizards

### **Characteristics of reptiles**

- They have two pairs of limbs
- They have movable eyelids
- Their tongues are fleshy

### **Chameleons**

- They change colour to protect themselves.
- They also camouflage so as to trap their prey like mosquitoes and flies.
- They have sticky tongues for trapping their prey.
- They use tails to hold twigs so that they don't fall.

### **Qn: How are chameleons important to man?**

- They eat insect vectors like mosquitoes and houseflies which spread disease-causing germs.

## **What is camouflaging?**

-This is the act of changing colours by the chameleon to resemble the immediate surrounding

## **Crocodiles and alligators**

-These are the largest and strongest groups of reptiles.  
-They are carnivorous.  
-They have scaled backs.  
-They partly live on land and in water depending on the temperature in the atmospheric temperatures.  
-They lay eggs and cover them in sand to provide them with warmth and protect them against predators.

## **Shelled reptiles**

-They have hard shells around their bodies for protection.  
-They commonly live in water but they always come out to get food and lay eggs on land.  
-They always lay eggs in sand and hide them from enemies which are hatched by the heat of the sun.  
-Turtles and tortoise protect themselves by pushing/hiding their heads and legs inside the hard shells.

## **Examples of shelled reptiles are;**

- Tortoises
- Terrapins
- Turtles

## **Snakes**

-These are limbless reptiles which move by gliding.

## **Characteristics of snakes**

- They have no limbs.
- They are carnivorous.
- They have forked tongue for touch and smell.
- They undergo moulting.
- They move by contraction of body muscles.
- They have a large number of ribs and vertebrae.

## **Types of snakes**

- Poisonous snakes
- Non -poisonous snakes
- Constrictor snakes

## **Non poisonous snakes**

-These are snakes without poisonous glands and without fangs.  
-They don't produce venom.

## **Examples of non- poisonous snakes**

- Green grass snakes
- House snakes
- Flying snakes
- Sand boa
- Egg eating snakes
- Eastern hog
- Wolf snakes

## **How do non- poisonous snakes defend themselves?**

-By running away from their enemies

## **Characteristics of non -poisonous snakes**

- They don't have fangs.

- They have solid teeth for biting.
- They don't venom.
- They eat rats, mice, frogs and other snakes.
- They swallow their prey alive.

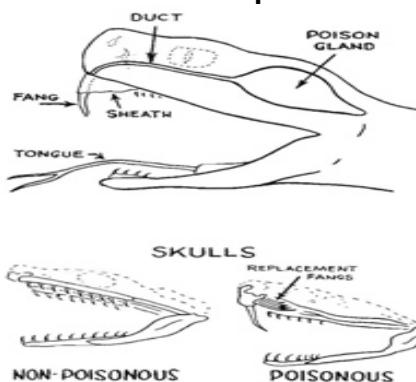
### Poisonous snakes

- These are snakes with poison glands and fangs.
- They produce poisonous fluid called venom.
- They inject venom in their enemies to paralyse the prey to death.

### Examples of poisonous snakes

- Green mamba
- Black mamba
- Puff adder
- The cobra
- Gabon viper

### The structure of a poisonous snake showing its parts



### Function of each part

- Fangs –to inject poison into its prey
- Venom glands –to produce poison (venom)
- Venom duct –to pass poison from the glands to the fangs
- Backward pointed teeth –for holding its prey
- Forked tongue –sense organ for smell and touch

### Qn: How are eyes of snakes protected from dust?

- By the help of transparent membranes.

### Characteristics of poisonous snakes

- They have fangs.
- They produce venom.
- They always leave two marks at the bitten part.

### Why are snake fangs hollow?

- To allow venom to pass through into its enemy

### Why do snakes bite?

- Snakes don't bite to offend but they bite for protection.

### Why do snakes moult?

- To increase in size

### First aid for a snake bite

- Tie above the bitten spot.
- Put a black stone at the bitten spot.

### Steps followed when giving first aid for snake bites

- Identify the type of snake if possible.

- Tie above the bitten spot.
- Apply a black stone at the bitten spot.
- Quickly carry the victim to the hospital.

**Qn: Why do we tie above the bitten spot when giving first aid for snakebites?**

- To stop blood containing venom from flowing to the heart.

**Qn: Why do we put a black stone at the bitten spot?**

- To suck poison from the bitten spot.

#### Dangers of snake venom.

- It paralyses heart muscles.
- It lowers temperature of blood leading to clotting of blood in body tissues.

#### Constrictors

-These are snakes that kill their prey by coiling around them using their strong muscles to suffocate them to death.

-They swallow their prey as a whole.

#### Examples of constrictors

- Pythons
- Anaconda
- Boas

#### Advantages of reptiles

- They are a source of food to some people for example snakes, tortoises and crocodiles.
- The snake skins are used to make leather items.
- Reptiles act as tourist attractions.
- Snake venom is used to make medicine against snake bites.
- Reptiles are used to control pests and insect vectors by feeding on them.
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#### AMPHIBIANS

-Amphibians are vertebrates that have the ability to breathe both in water and on land.

-They are double life vertebrates.

#### Characteristics of amphibians

- They are cold blooded.
- They live both in water and on land.
- They reproduce by laying eggs.
- They undergo external fertilization.
- They have three chambered hearts.
- The adults have two pairs of limbs.
- They breathe by using lungs, moist skin and lining of the mouth cavity.

#### Examples of amphibians

- Frogs
- Toads
- Newts
- Salamanders

**NOTE:** The young one of an amphibian is called **a tadpole and it uses gills for breathing.**

#### Differences between toads and frogs

Toads	Frogs
• Have short hind legs	• Have long hind legs
• Mostly live on land	• Mostly live in water
• Have no teeth	• Have teeth in the upper jaw
• Have dry rough skins	• Have moist smooth slippery skins
• Have partly webbed feet	• Have fully webbed feet
• Have poison glands	• Don't have poison glands
• Lay eggs in double ribbon spawn	• Lay eggs in big masses

Eggs laid by a toad	Eggs laid by a frog.

### How are frogs adapted to life in water?

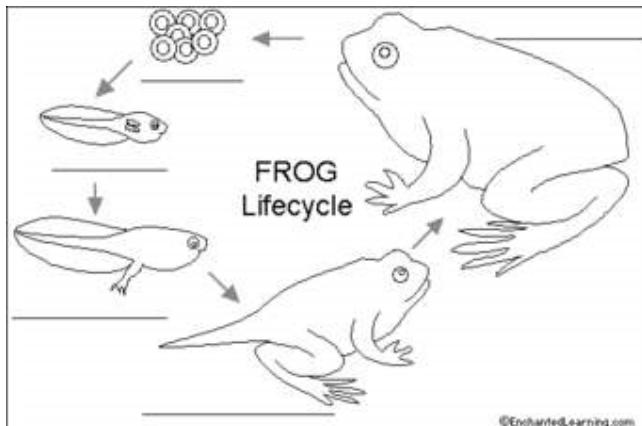
- They use their moist skins for breathing.
- They are streamlined.
- They have fully webbed hind feet for swimming.

### Reproduction in amphibians

-Amphibians reproduce by laying eggs.

-They undergo external fertilization.

### Life cycle of an amphibian.



### Why are eggs of amphibians laid with a slippery jelly on them?

- To hold them together.
- To protect them from predators.
- To prevent them from drying up.

### Importance of amphibians to man

- Some amphibians are eaten as food by some people.
- They eat disease vectors in the environment.

### How do toads protect themselves?

- By producing a poisonous milky substance to cover their skins.

### BIRDS

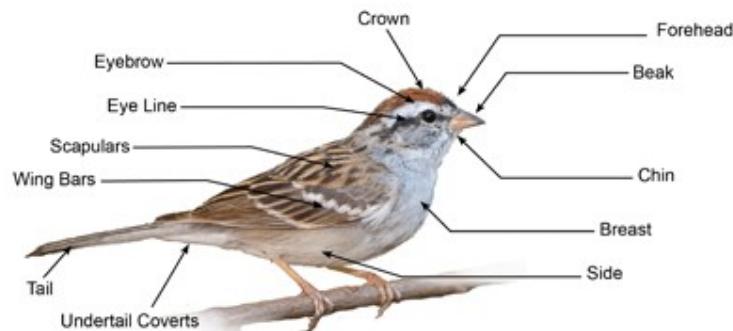
-Birds are warm blooded vertebrates whose bodies are covered with feathers.

### Characteristics of birds

- They are warm blooded.
- Their bodies are covered with feathers.
- They undergo internal fertilization.
- They reproduce by laying eggs.
- They have scales on their legs.
- They have two pairs of limbs.
- Their fore limbs are modified into wings.
- They care for their young ones.

- They are streamlined.
- They use lungs for breathing.
- They have beaks for feeding.

### External parts of a bird



### Function of each part of a bird

- a). **Wings** –used for flying
- b). **Beak** –used to pick food  
-to fight enemies
- c). **Claws** –for holding and fighting enemies
- d). **Spur** – used for defence against enemies

### Why are bodies of birds streamlined?

- To overcome viscosity (friction) in air during flight.

### How is a nictitating membrane helpful to a bird?

- It protects the bird's eyes from moving air during flight.

### Types of feathers

- Quill feathers (flight feathers)
- Covert feathers (body feathers)
- Down feathers
- Filoplume feathers

### Quill feathers/flight feathers

- These are feathers that birds use **for flying**.
- They are found on the tail and wings.

### A structure of a quill feather



### Covert/body feathers

-These are feathers which cover the whole body of a bird.

### Functions of body feathers

- To keep the bird warm.
- To streamline the bird.

### A structure of a body feather

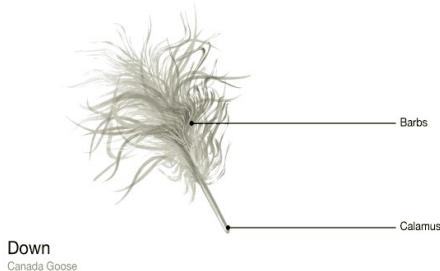


Covert feather

## **Down feathers**

- These are the first feathers to appear on a chick.
- They lie underneath the body feathers.
- They keep the chicks warm during cold weather (They help in insulating the bird).

### **A structure of a down feather**



## **Filoplume/hair feathers**

- These are the tiniest feathers found nearest to the skin of a bird.
- They can be seen clearly after removing the body and down feathers.
- They are the hairy feathers on the bird's body.

### **A structure of a filoplume feather**



## **Functions of feathers to birds**

- They keep the birds body warm.
- They enable birds to fly.
- They give the colour and shape for identification.
- They protect the bird's skin from injuries.

## **How are birds adapted to flying?**

- They have hollow bones to reduce their weight.
- They are streamlined to reduce friction in air during flight.
- They have wings for flying.
- They have got flight feathers.
- They have hollow air sacs to make respiration effect during flight.
- Their eyes are covered with a nictitating membrane.
- They have no pinnae to obstruct the flow of wind.

## **Groups of birds**

- Perching birds
- Swimming birds
- Wading birds
- Climbing birds
- Birds of prey
- Scratching birds
- Scavenger birds
- Flightless birds

### **Perching birds**

-These are birds that have two toes pointing forward and one backward which they use for perching on the branches.

### **Groups of perching birds**

- Seed eaters
- Nectar suckers
- Insect eaters
- Fruit eaters

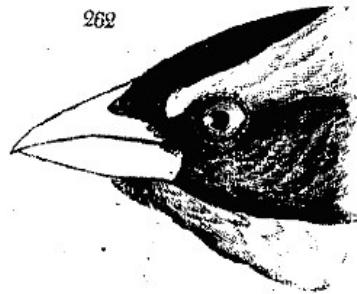
#### **Seed eaters**

-These are birds with short conical beaks which they use to pick seeds.

#### **Examples of seed eaters**

- Pigeons
- Doves
- Weaver birds
- Finches

#### **A diagram showing a beak of a seed eater**



#### **Insect eaters**

-These are birds with short narrow beaks used for picking insects on the ground

#### **Examples of insect eaters**

- Sparrows
- Robin
- Swallows
- Bee-eaters
- Swift
- Cuckoo

#### **Beak of an insect eater**



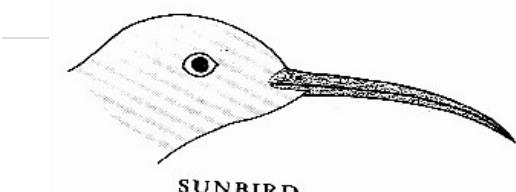
#### **Nectar sucking birds**

-These are birds which have long slender beaks for sucking nectar from the base of flowers.

#### **Examples of nectar suckers**

- Sun birds
- Humming birds

#### **A diagram showing a beak of a nectary bird (nectar sucker)**



SUNBIRD

### **Fruit eaters**

- A horn bill is a good example of a fruit eater.
- It has a long stout beak for collecting fruits.

#### **A diagram showing a beak of a fruit eater**



### **Birds of prey**

- These are birds which hunt and kill their prey for food.

#### **How are birds of prey suitable for their mode of feeding (characteristics of birds of prey)?**

- They have strong hooked beaks for tearing flesh of their prey
- They have a strong eye sight to enable them locate their prey at a distance
- They have strong curved claws called talons for holding their prey

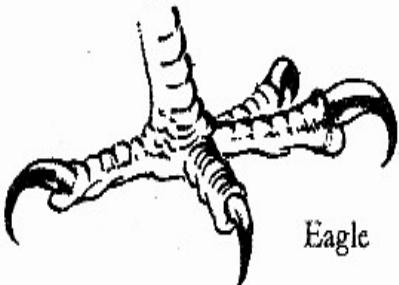
#### **Examples of birds of prey**

- Eagles
- Kites
- Owls
- Hawks
- Secretary birds
- Falcons

#### **A beak of a bird of prey**



#### **A foot of a bird of prey**



### **Swimming birds**

-These are birds with fully webbed feet to enable them flap water and also float on water when swimming.

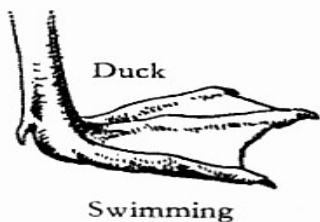
-They have a broad flat spoon like beaks.

-They mainly feed on worms, snails and other insects which are found in mud.

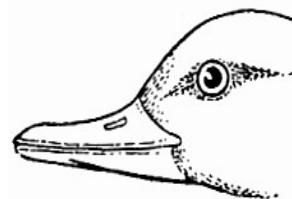
#### **Examples of swimming birds**

- Ducks
- Geese
- Swans
- Boobies
- Sea gulls
- Pelicans
- Cormorants
- Penguins
- Teals

**A foot of a swimming bird**



**A beak of a swimming bird**



### **Wading birds**

-Wading birds are commonly living a long side water bodies.

-They have long, thin beak for catching frogs, fish and worms.

-They have long and thin legs with half webbed toes which enable them walk in mud and shallow.

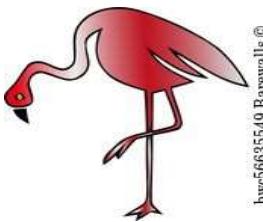
#### **Examples of wading birds**

- Heron
- Crested crane
- Flamingo
- Ibis
- Kingfisher

**A beak of a wading bird**



**A foot of a wading bird**



bwe56635549 Barewalls ©

### Flightless birds

-These are birds which are unable to fly but can run very fast on the ground.

#### Examples of flightless birds

- Kiwi
- Ostrich
- Cassowary
- Penguin
- Emu
- Rhea
- Pelicans

#### Diagrams of flightless birds



### Reasons why flightless birds are unable to fly

- They have bone marrow which makes them heavy.
- They have small weak wings without flight feathers.

#### Climbing birds

-These birds have the ability to climb trees.

-They have a chisel shaped beak for digging holes in the trunk.

-They have two toes pointing forward and two toes pointing backward.

-These toes help them to hold themselves firmly on the trees as they climb.

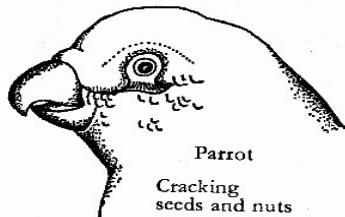
-A wood pecker feeds on insects found in wood.

-A parrot feeds on hard nuts/seeds.

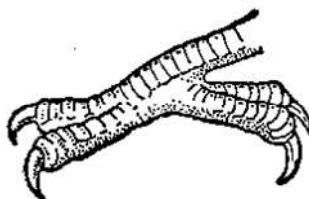
#### Examples of climbing birds

- Parrots
- Wood peckers

#### A beak of a climbing bird



#### A foot of a climbing bird



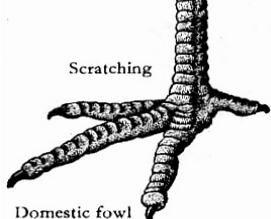
## Scratching birds

- These are birds with strong and blunt claws for scratching the ground to find food.
- They have short pointed beaks.
- They commonly feed on grains and insects.

### Examples of scratching birds

- Chicken
- Turkeys
- Guinea fowls
- Crested francolin

### A foot of a scratching bird



### A beak of a scratching bird



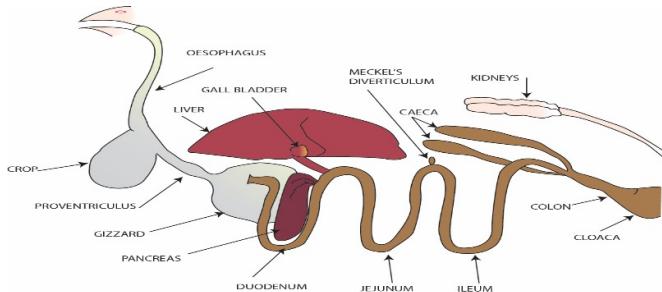
## Scavenger birds

- These are birds which feed on the meat killed by other animals.
- They have beaks and talons similar to those of birds of prey.
- Scavenger birds help to clean up the environment by eating the leftover meat killed by other animals(carrion).

### Examples of scavenger birds

- Vultures
- Crows
- Marabou storks

### The alimentary canal of a bird



### Function of each part

- a). Beak –for picking food.
- b). Gullet –passes food to the crop.
- c). Crop–it stores, moistens softens food before it goes to the stomach.

- d). **Stomach** –it is where food is mixed with digestive juices.
- e). **Gizzard** –it is where food is crushed into soluble particles.
- f). **Grit (palables)** –these are small stones found in the gizzard which help to crush food into small particles.
- g). **Small intestines** –it is where absorption of food takes place.
- h). **Large intestines** –it is where absorption of water takes place.
- i). **Caeca** –it is where undigested food is stored before it is passed out as droppings.
- j). **Cloaca/vent** –it is an opening where undigested food is passed out of the bird's body as droppings.

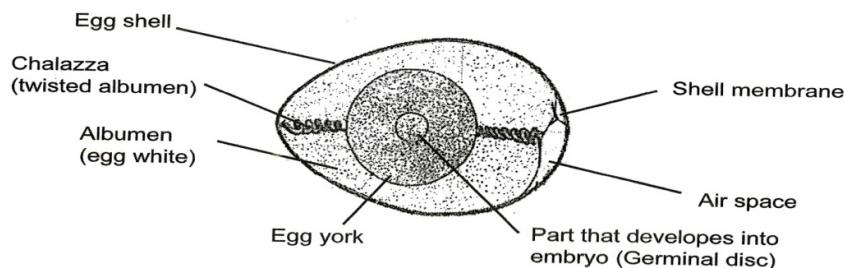
**NB:** Carnivorous birds (birds of prey and scavenger birds) **don't have crops** because the meat they eat does not need moistening and softening.

#### How do birds reproduce?

- Birds reproduce by laying internally fertilized eggs.

#### Parts of an egg

## PARTS OF AN EGG



#### Functions of each part

##### a). Egg shell

- It protects the inside parts of an egg from physical damage.
- The egg shell is porous to allow easy exchange of gases inside the egg.

##### b). Shell membrane

- It prevents bacteria and other micro-organisms from entering and destroying the egg.

##### c). Albumen/egg white

- It is the source of water and water salts to the growing embryo.

##### d). Egg yolk

- It is the source of proteins and fats for the growing embryo.

##### e). Germinal disc

- It develops into a chick after fertilization.

##### f). Chalaza (twisted albumen)

- It holds the yolk and the embryo in position.

#### Why is the chalaza twisted?

- To allow room for expansion and contraction during temperature changes.

#### Uses of birds to man

- They are a source of food to man in form of eggs and meat.
- Some birds help man in pollination of crops like sun birds.
- Bird's feathers are used for decoration.
- Birds help in seed dispersal like the fruit eaters.

- Some birds like scavenger birds help to clean up the environment by feeding on the leftover meat of other animals which may smell and attract vectors like houseflies.
- Birds are a source of income to man once sold.
- Some birds are kept at home as pets.
- Birds are used for customary purposes like paying dowry.

### **Dangers/disadvantages of birds in the environment**

- Some birds are crop pests for example doves, pigeons and weaver birds.
- Some birds cause accidents on run-ways of air ports.
- Some birds are vectors or keep vectors like fleas and mites.
- Some birds cause sound pollution especially weaver birds.
- Some birds are predators to poultry birds for example eagles, kites and vultures.

### **MAMMALS**

-Mammals are warm blooded vertebrates with mammary glands, sweat glands and fur on their bodies.  
-Mammals give birth to their young ones alive except monotremes.

### **Special characteristics of mammals**

- They have mammary glands.
- They have sweat glands.
- They have fur on their bodies.
- They produce live young ones except monotremes.
- They breast feed their young ones.

### **General characteristics of mammals**

- They are warm blooded.
- They have fur on their bodies.
- They care for their young ones.
- They have mammary glands.
- They use lungs for breathing.
- They have sweat glands.
- They have four chambered hearts.
- They undergo internal fertilization.
- They produce their young ones alive.

### **Groups of mammals**

- Primates (most advanced mammals)
- Ungulates (hoofed mammals)
- Rodents (gnawing mammals)
- Chiroptera (flying mammals)
- Monotremes (egg laying mammals)
- Marsupials (pouched mammals)
- Cetaceans (sea mammals)
- Insectivorous (insect eating mammals)
- Carnivorous (flesh eating mammals)

### **Primates (most advanced mammals)**

-This is the most advanced group of mammals with well- developed brains.

### **Examples of primates**

- |   |  |
|---|--|
| <ul style="list-style-type: none"> <li>• Man</li> <li>• Bush babies</li> <li>• Chimpanzees</li> </ul> | <ul style="list-style-type: none"> <li>• Baboons</li> <li>• Monkeys</li> <li>• Gorillas</li> </ul> |
|---|--|

## **Characteristics of primates**

- They have well developed brains.
- They use their fore limbs for holding and hind limbs for walking.
- They have five fingers on each hand and five toes on each foot.
- They are omnivorous
- They have four types of teeth, namely; incisors, canines, premolars and molar

## **Ungulates (hoofed mammals)**

-These are mammals which have hooves in their toes.

-All hoofed mammals are mainly herbivorous.

-Herbivorous animals are animals which entirely feed on vegetation or plants.

### **Groups of ungulates**

- Even toed ungulates
- Odd toed ungulates

### **Even toed ungulates**

-These are mammals with an even number of toes; 2 toes or 4 toes.

#### **Examples of even toed ungulates**

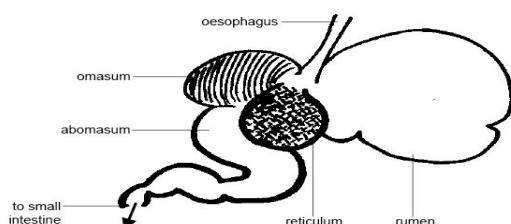
- |                |            |
|----------------|------------|
| • Cows         | • Pigs     |
| • Sheep        | • Antelope |
| • Hippopotamus | • Giraffe  |
| • Goat         | • Warthog  |

**NB:** Some even toed ungulates are ruminants or non- ruminants

### **What are ruminant animals?**

-These are animals which chew cud.

They have four stomach chambers;



#### **Examples of ruminant animals**

- |         |             |           |
|---------|-------------|-----------|
| • Cows  | • Camels    | • Giraffe |
| • Goats | • Antelopes |           |
| • Sheep | • Zebra     |           |

### **What are non -ruminant animals?**

-These are animals which don't chew cud.

#### **Examples of non -ruminants**

- |           |                |
|-----------|----------------|
| • Pig     | • Hippopotamus |
| • Warthog |                |

### **What is cud?**

-This is food sent back in the mouth of ruminants for re-chewing.

### **Odd toed ungulates**

-These are ungulates with odd number of toes; 2 toes.

#### **Examples of odd toed ungulates**

- |            |          |
|------------|----------|
| • Zebra    | • Horse  |
| • Elephant | • Donkey |
| • Rhino    |          |

## Hooves of different ungulates



## Carnivorous or flesh eating mammals

-These are mammals which feed entirely on flesh/meat.

### Characteristics of carnivorous mammals

- They have well developed canine teeth for tearing the flesh of the prey.
- They have good speed to run and catch their prey (they are very fast).
- They have good sense of smell to trace easily the ways of their prey.
- They have a good eye sight to easily see their prey.
- They have sharp claws for killing, tearing and holding their prey.
- They have soft pads in their feet which help them to run after their prey without making noise.
- They have strong sense of hearing.

### Carnivorous animals are divided into two;

- Dog family
- Cat family

#### Dog family carnivorous mammals

- Domestic dog
- Jackal
- Hyena
- Fox

#### Cat family carnivorous mammals

- Lion
- Cheetah
- Tiger
- Leopard
- Man-goose
- Jaguar
- Domestic and wild cats

### How are carnivorous mammals adapted to running after prey?

- They have soft pads under their feet which enable them to run after their prey without making noise.

### What features do carnivorous mammals use for protection?

- Claws
- Developed canine teeth

## RODENTS (GNAWING MAMMALS)

-These are mammals with well- developed incisor teeth for biting food rapidly.

### Characteristics of rodents

- They have well developed incisors for biting food rapidly.
- They make holes in the ground which they use as their habitats.
- Most rodents are vegetarians because they feed on vegetation.

### Examples of rodents

- |             |               |             |
|-------------|---------------|-------------|
| • Squirrels | • Rats        | • Beavers   |
| • Hares     | • Mice        | • Porcupine |
| • Mole rats | • Guinea pigs |             |

## Insectivorous mammals

- They have sensitive snouts and strong claws for digging the ground.
- They have a good speed and a good sense of smell.
- They mostly hunt at night and sleep during day time (they are **nocturnal**).
- Most of the insectivores are toothless like pangolin.
- They are protected by sharp pointed scales (spines) on their back for example a hedgehog.

### Examples of insectivorous mammals

- Hedgehog
- Pangolin
- Aardvark
- Porcupines
- Aardwolf
- Elephant shrews

## Diagrams of insectivores

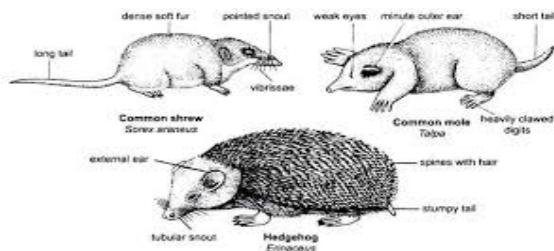


Fig. 30.8. Insect-eating mammals (Insectivora).

## CHIROPTERA (FLYING MAMMALS)

- These are mammals with their fore limbs modified into wings for flying.

### Examples of flying mammals

- Bats

### Types of bats

- Insect eating bats
- Fruit eating bats
- Vampire bats

### Insect eating bats

-Insect eating bats are those that feed on insects like, grass hoppers, locusts, mosquitoes, white ants.

### Fruit eating bats

-These are bats which feed on a variety of fruits

### How are bats useful to man?

- They eat dangerous insects like mosquitoes
- Fruit eating bats help in seed dispersal

### How are bats dangerous?

- They suck blood from animals like horses, cows and buffalos.
- They destroy farmers' fruits.

### How are echoes helpful to bats?

- They help bats locate their food at night
- They help bats to dodge obstacles

## MARSUPIALS (POUCHED MAMMALS)

-These are mammals which have pouches (pockets) on their abdomen for carrying their young ones.

-The young ones are carried in the pouches until they are fully developed.

-In the pouch, there are breasts teats which the young ones suckle from.

## Examples of pouched mammals

- Kangaroo
- Koala bears
- Wallabies

## Diagrams of pouched mammals



## How is a tail very important to a kangaroo?

- A kangaroo uses its tail to balance when it is moving or hopping.

## MONOTREMES (EGG LAYING MAMMALS)

- These are the most primitive mammals because they reproduce by laying eggs.
- They are also called oviparous mammals.
  - ✓ They have a poisonous spine on the hind legs which produces poison for protection when it pricks an enemy

## What are oviparous mammals?

- These are mammals which reproduce by laying eggs.

## Reasons why monotremes are regarded as mammals

- They have mammary glands
- They feed their young ones on breast milk
- They have sweat glands

## Examples of monotremes

- Duckbilled platypus
- Spiny ant eater (echidna)

## Diagrams of monotremes



## State any one similarity between monotremes, reptiles, amphibians and birds.

- They all reproduce by laying eggs.

## CETACEANS (SEA MAMMALS/MARINE MAMMALS)

- These are mammals which live in seas, oceans and great lakes.

-They are also called aquatic mammals because they live in water.

### Characteristics of cetaceans

- They have internal ears (pinnae).
- They have their front limbs modified as flippers for swimming.
- They have mammary glands.
- They give birth to their live young ones and feed them on breast milk.
- They have a layer of fats under their skins called **blubber** which they use to generate heat so as to keep them warm.

### Examples of sea mammals

- Whales
- Seals
- Dolphins
- Porpoise
- Dugongs
- Sea lions

### Diagrams of sea mammals



### How are sea mammals able to survive in cold water?

- By the help of blubber fats that keep them warm.

### Name the largest sea mammal.

- A whale

**Study the table below showing classification of vertebrates and use it to answer the questions that follow.**

A	B	C	D	E
Frogs	Lizards	Tilapia	Doves	Man
Toads	Snakes	Nile perch	Hens	Bats
Newts	Chameleons	Moon fish	Eagles	Whales
salamanders	Crocodiles		vultures	Rabbits

- How are animals in group A, B and C similar?
- How are animals in group D and E similar?
- State any difference between animals in group B and D
- How is the reproduction of animals in group E different from that of animals in group D?
- How are animals in group C and D similar in terms of reproduction?
- In which way is the fertilization of animals in group A different from that of group B?

### INVERTEBRATES

- These are animals without backbones.

-Invertebrates are divided into six groups as shown below;

## Invertebrates

Coelenterates	Worms	Arthropods	Echinoderms	Sponges	Molluscs
---------------	-------	------------	-------------	---------	----------

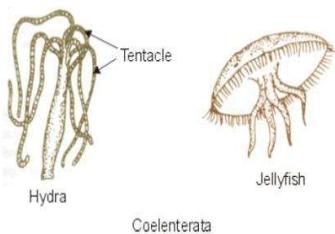
### COELENTRATES

- They are stinging animals.
- They have tentacles.
- They have cylindrical bodies with two layers.
- They have only one opening which acts as the mouth and the anus.
- They live in seas and oceans.

#### Examples of coelenterates

- Hydra
- Jelly fish
- Corals
- Sea anemones

#### Diagrams of coelenterates



### MOLLUSCS

- These are invertebrates with soft and unsegmented bodies.

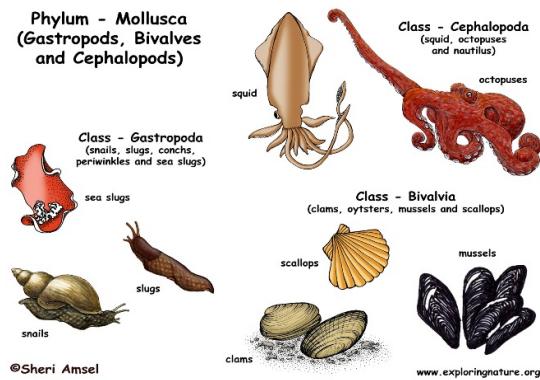
#### Characteristics of molluscs

- They have shells for protection.
- They have mantles.
- They have tentacles which they use as sense organ for smell, touch, detecting sound, temperature and tasting food.
- Sea molluscs use gills for breathing while land molluscs use simple lungs for breathing.

#### Examples of molluscs

- Water snails
- Garden snails
- Octopus
- Oysters
- Slugs
- Cuttle fish
- Squids
- Cowries

#### Diagrams of molluscs



### Examples of sea molluscs

- Oysters
- Octopus
- Cuttle fish
- Squids
- Cowries

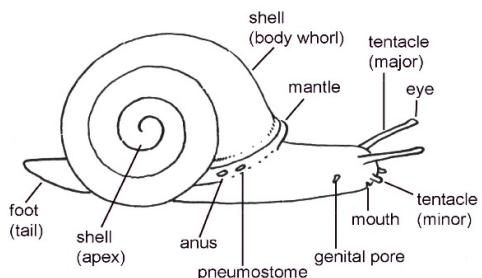
### Examples of land molluscs

- Garden snails
- Slugs

NB: **Tentacles** are used by the slugs as sense organs **for smelling and detecting sound and temperature**.

-Some molluscs like water snails spread schistosoma worms which cause **bilharziasis or schistosomiasis** to man.

### The structure of a snail



### ECHINODERMS

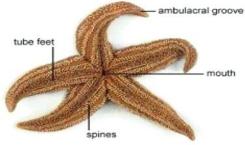
- They are sea invertebrates.
- They have spines on their skins.
- They have unsegmented bodies.
- Their bodies are made up of 4 or more tentacles.

### Examples of echinoderms

- Star fish
- Sea lilies
- Sea urchins
- Sea cucumbers

### A structure of a star fish

This starfish  
is showing you its  
oral  
surface.



## SPONGES (PORIFERA)

- They live in water.
- They breathe and feed through many holes or pores on their bodies.
- Food and water are absorbed as water flows through the holes.
- They have internal flame of the skeleton of lime.

## WORMS

- These are long and thin soft bodied animals.
- They breathe through the moist skin.

### Groups of worms

- Segmented worms (annelids)
- Round worms (nematodes)
- Flat worms

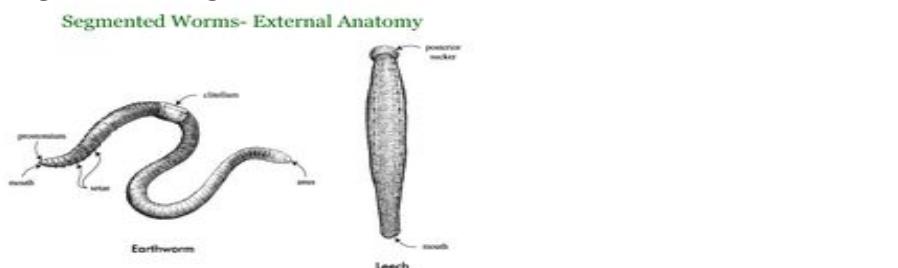
### Segmented worms

- These are worms whose bodies are divided into segments or rings.
- They mostly live in water and soil.

### Examples of segmented worms

- Earthworms
- Leeches
- Bristle worms

### Diagrams of segmented worms



### Earthworms

- They live in the soil and feed on soil and dead decaying vegetation.
- They are hermaphrodites because they have two sexual organs.

### Importance of earthworms in the soil

- Earthworms help to aerate the soil by making holes or tunnels in the soil.
- Earthworms decompose the organic matter to form humus in the soil.

### NOTE:

- Earthworms respire through **their moist skin**.
- Earthworms die immediately if oil is poured on its body because **the moist skin is blocked and it is unable to breathe**.

-Earthworms come out of the soil after heavy raining in order to get undissolved oxygen for breathing.

### Flat worms

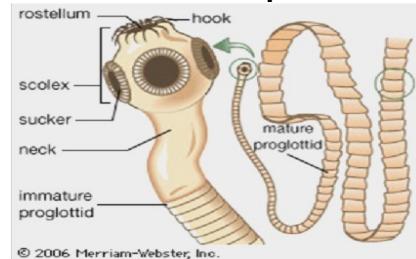
-These are worms with flat and segmented bodies.

-Flat worms are parasites because they depend on other animals for food.

### Examples of flat worms

- Tape worms
- Liver flukes

### A structure of a tape worm



-Tape worms live in small intestines and feed on the **digested food**.

-The head of the tape worms is called **scolex**.

-The body of the tape worm is divided in rings called segments.

### How people get infected with tape worms

- Through eating under cooked meat from infected animals.
- Eating unwashed raw vegetables and fruits contaminated with tape worm eggs.
- Through drinking unboiled water contaminated with tape worm eggs.

### Signs of tape worm infection

- Passing out stool with eggs or segments of tape worms
- Passing out watery stool
- A person always feels hungry.

### How to prevent tape worm infection

- Always eat well cooked meat especially pork.
- Washing vegetables and fruits properly if they are to be eaten when raw
- Washing hands before eating and handling food.
- Drinking well boiled water

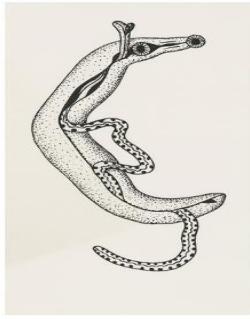
### Liver flukes



-They are paper-like and they live in the liver of infected animals.

-They drain the liver of the infected animal and start feeding on the bile and blood.

### Blood flukes (schistosoma worms).



-The schistosoma worms are parasites which cause **bilharziasis (schistosomiasis)** to man.

### **Signs and symptoms of bilharziasis**

- Blood stains in urine.
- Blood stains in stool.
- Enlargement of the liver and the abdomen.

### **How to prevent bilharziasis**

- Avoid swimming in streams, ponds or swamps with dirty water.
- Using latrines for proper disposal of human excreta
- Drinking well boiled water
- Washing hands with clean water and disinfectants.
- Control water snails by spraying chemicals on water.

### **Round worms**

-These are worms with cylindrical bodies

### **Examples of round worms**

- Common round worms
- Pin worms
- Eel worms
- Hook worms
- Thread worms
- Whip worms

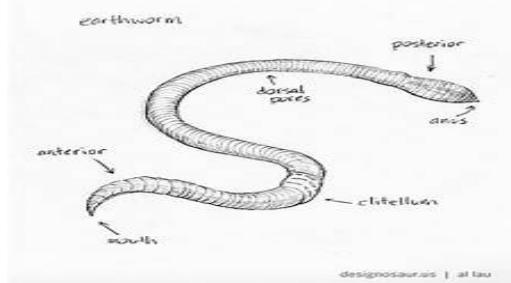
### **Hook worms**

-Hook worm infection can lead to **anaemia** because hook worms suck blood from the victim.

### **How hook worms enter our bodies**

- Hook worms mainly enter our bodies through walking bare footed in dirty places.
- Hook worms live in the blood streams where they suck blood from.

### **A structure of a hook worm**



### **Signs and symptoms of hook worm infection**

- Abdominal pain
- General body weakness

- A person develops diarrhoea
- Loss of weight
- Pale tongue and gum
- Pale eyelids and fingernails

### **Ways of controlling hook worm infection**

- Always wear shoes whenever you are walking in the dirty places like toilets
- Use clean water to wash hands after using the latrines

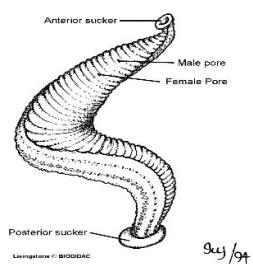
### **Ways through which common round worms are spread**

- Drinking unboiled contaminated water
- Through eating with unwashed contaminated hands
- Through eating raw unwashed contaminated vegetables

### **NOTE**

-Round worms live in **small intestines** and **they feed on the digested food**

### **A structure of a common round worm**



## **ARTHROPODS**

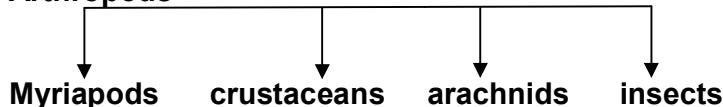
-Arthropods are invertebrates with segmented bodies and jointed legs.

### **Characteristics of arthropods**

- They have jointed legs
- They have segmented bodies
- They have exoskeleton

### **Groups of arthropods**

#### **Arthropods**



## **MYRIAPODS**

-These are arthropods with many jointed legs and segments.

### **Characteristics of myriapods**

- They have many jointed legs.
- They have many body segments.
- They have at least one pair of legs on each segment.

### **Sub groups of myriapods**

- Chilopoda
- Diplopoda

### **Chilopoda**

- They have only one pair of jointed legs on each segment.
- It has one pair of antennae and many legs.
- They move very fast and **feed on insects and worms** (they are carnivorous).

- They have fore limbs modified as poisonous claws that are used to paralyse the prey.
- They protect themselves **by biting**.
- They also produce a bad smell for protection.

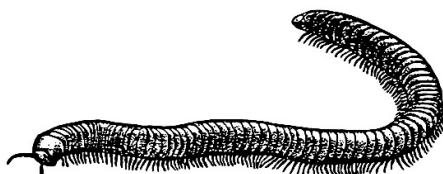
NB: **A centipede** is an example of a chilopoda



### Diplopoda

- They have two pairs of jointed legs on each segment.
- They protect themselves **by curling up or coiling**
- They feed on vegetation (they are herbivorous)
- They also produce a fluid with a bad smell and also irritating effect on the person's body.

NB: **A millipede** is an example of a diplopoda.



### How are millipedes important in the soil?

- Millipedes make holes tunnels in the soil which help in soil aeration.

### CRUSTACEANS

-These are arthropods with a very hard exoskeleton and two main body parts.

#### Characteristics of crustaceans

- They have five pairs of jointed legs
- They have two main body parts i.e. cephalothorax and abdomen
- Some live in fresh water and others live in salty water
- They use gills for breathing
- They are eaten as food

#### Examples of crustaceans

- |             |            |                |
|-------------|------------|----------------|
| • Cray fish | • Lobsters | • Cyclops      |
| • Crabs     | • Prawns   | • Sand hoppers |
| • Wood lice | • Shrimps  |                |

#### Diagrams of crustaceans

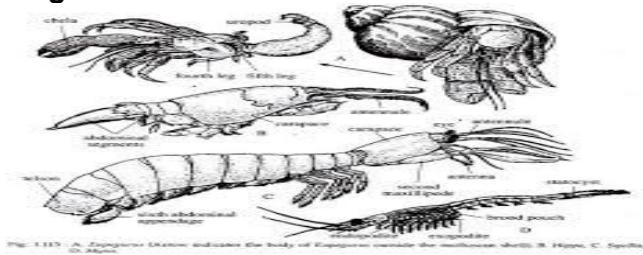


Fig. 3.115: A. Diagram illustrates the body of Crayfish (cambarus). B. Diagram illustrates the body of a crab (Portunus). C. Diagram illustrates the body of a shrimp (Crangon).

### ARACHNIDS

-These are arthropods with eight jointed legs and two main body parts.

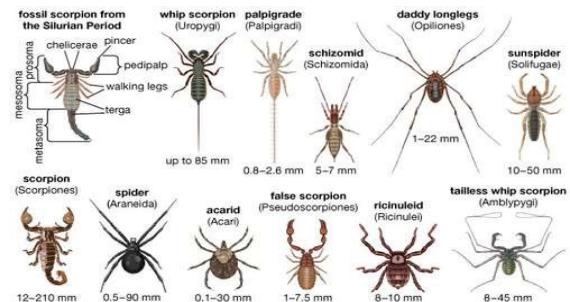
#### Characteristics of arachnids

- They have 8 jointed legs.
- They have 2 main body parts ie; cephalothorax and abdomen.
- They use **book lungs** for breathing.

### Examples of arachnids

- Spider
- Lice
- Scorpion
- Ticks
- Mites

### Diagrams of arachnids



### Spiders

- They have spinnerets used to spin silk for making webs.
- Webs are used by spiders to trap their prey and also used for protection.
- Spiders breathe through special organs on their bodies called book lungs.
- Not all spiders make webs, some hunt for their prey.

### Scorpions

- They live under stones, logs and holes
- They have large tails and a poisonous sting on their abdomen which they use to sting their enemies.
- Scorpions don't lay eggs but give birth to live young ones.

### Ticks

- They live on the skins of animals
- They carry many types of germs in the protozoan group which cause diseases to animals.

### Examples of tick borne diseases

- East coast fever
- Heart water
- Red water
- Anaplasmosis
- Typhus fever in **man**
- Relapsing fever in **man**

### Ways of controlling ticks

- By spraying using acaricides
- Dipping animals in dip tanks
- By practicing paddock grazing

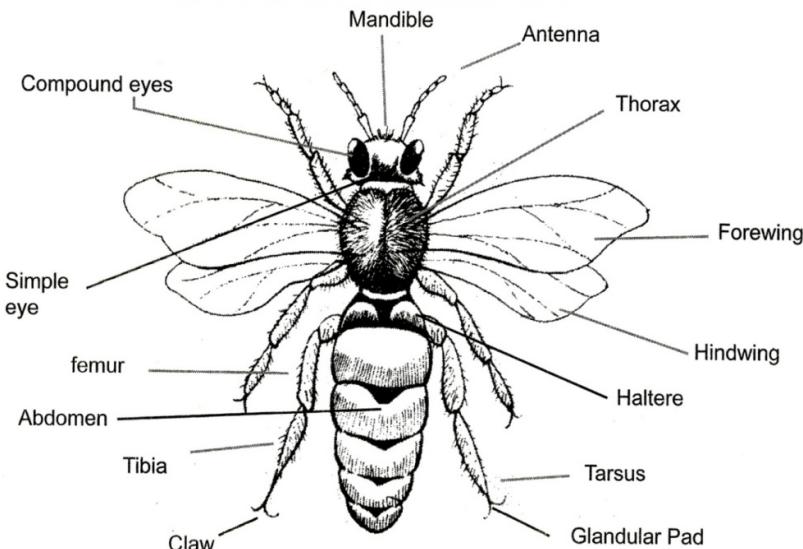
### INSECTS

- These are arthropods with six jointed legs and three main body parts.

### Characteristics of insects

- They have 6 jointed legs.
- They have 3 main body parts ie; head, thorax and abdomen.
- They use spiracles for breathing.
- They have a pair of antennae.

# PARTS OF AN INSECT



## HEAD

### Antennae/feelers

- They are sense organ for tasting, hearing, smelling and feeling.

### Proboscis

- It is a mouth part used for sucking food like blood, fluids from and nectar.

### Examples of insects which use proboscis for feeding

- |              |                |
|--------------|----------------|
| • Mosquitoes | • Tsetse flies |
| • Houseflies | • Butterflies  |
| • Bees       | • Moths        |

### Insects that use mandibles for feeding for examples;

- |                |               |
|----------------|---------------|
| • Termites     | • Cockroaches |
| • White ants   | • Locusts     |
| • Grasshoppers | • Crickets    |

## THORAX

- It gives attachment for the legs, wings and halters.
- Some insects have **suction pads** in their feet which enable them to walk on walls upside down without falling.

### Halteres

- They are used by insects to balance in air during flight.

## ABDOMEN

- It contains the breathing organs called spiracles.
- It contains the reproductive, digestive and respiratory parts.
- Stinging insects like bees have **stings for protection** and **ovipositor for laying eggs**

## METAMORPHOSIS

-These are stages of growth and development an insect undergoes.

### Types of metamorphosis

- Complete metamorphosis
- Incomplete metamorphosis

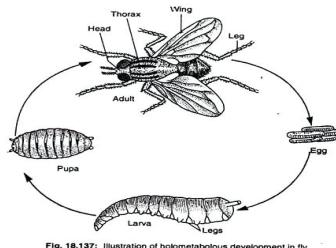
### What is complete metamorphosis?

- This is where an insect undergo 4 stages of growth and development; **eggs, larva, pupa and adult.**

## Examples of insects that undergo complete metamorphosis

- Housefly
- Bees
- Butterflies
- Mosquitoes
- Moths
- Tsetse flies

## A diagram showing complete metamorphosis



## Houseflies

- House flies lay their eggs in rotting bodies, rubbish pits, exposed food and faeces.
- The larva of the house fly is called **maggot**.
- We are not allowed to pour oil/paraffin in the pit latrines because they can lead to death of maggots that **help in breakdown of large volumes of faeces**.

## How are maggots useful in latrines?

- They breakdown large volumes of faeces by feeding on it
- The inactive, non-feeding or dormant stage of any insect is pupa stage.
- The adult stage of an insect is called **an imago**.
- The house fly is able to carry germs from one place to another because **it has a hairy body**.

## House flies are vectors because they spread the following diseases;

- Typhoid
- Trachoma
- Cholera
- Diarrhoea
- Dysentery
- Polio

## Ways of controlling diseases spread by house flies

- Covering the left-over food
- Keeping the latrines covered/clean and smoked
- Promoting proper disposal of human excreta
- Spraying all house flies using insecticides
- Burning all the rubbish on the rubbish pits to prevent breeding of house flies

## Mosquitoes

### Types of mosquitoes

- Anopheles mosquitoes
- Culex mosquitoes
- Aedes/tiger mosquitoes

## All mosquitoes above are vectors and each spread the following diseases;

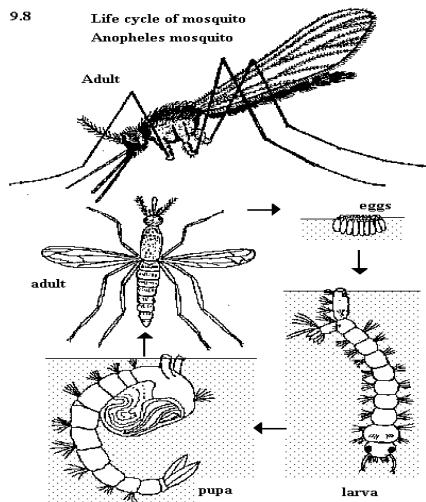
Mosquito	Diseases
• Anfemale anopheles mosquito	• Malaria
• Culex mosquito	• Elephantiasis/West Nile fever
• Tiger/aedes mosquito	• Yellow fever, dengue fever,
• Tiger/aedes mosquito	• Zika fever

### Anopheles mosquitoes

- There are two types of anopheles mosquitoes i.e.;
- The male and female anopheles mosquitoes.

- Female anopheles mosquitoes spread plasmodia germs which cause malaria to man.
- Female anopheles mosquitoes feed on blood.
- Male anopheles mosquitoes feed on nectar or plant juice.
- Mosquitoes breed in stagnant water.

### The life cycle of an anopheles mosquito



### Characteristics of anopheles mosquitoes

- They lay eggs singly with an air float.
- Their larva stages lie parallel on water surface when breathing.
- The body of an adult lies in a sloopy position while at night.
- They have spotted wings.

### Culex mosquitoes

- Culex mosquitoes spread **elephantiasis or filariasis, West Nile fever and zika**.
- Elephantiasis is caused by **filaria worms**.
- The person suffering from elephantiasis grows big feet.
- The culex mosquitoes lay eggs in stagnant water.

### The life cycle of a culex mosquito

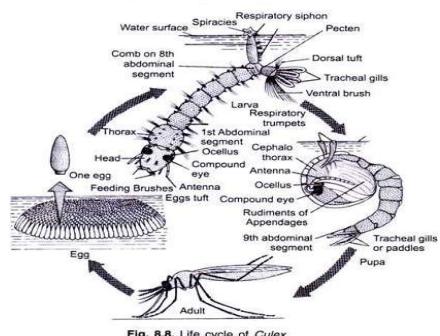


Fig. 8.8. Life cycle of *Culex*

### Characteristics of culex mosquitoes

- They lay eggs in a raft (many together).
- The body of the larva lies at an angle on the water surface when breathing.
- The body of an adult lies horizontally while at rest.

### Aedes/tiger mosquitoes

- Tiger mosquitoes spread yellow fever to man.
- Yellow fever is a watervector habitat disease caused by a virus.

-Tiger mosquitoes lay eggs in the stagnant water and bushes.

### Characteristics of tiger mosquitoes

- They lay eggs singly
- The body of an adult tiger mosquito lies horizontally while at rest.
- The body of a tiger mosquito has white and black spots.
- The larva lies at an angle on the water surface when breathing.

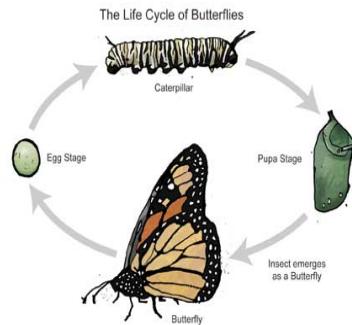
### NOTE:

-The larva of the mosquito has got the breathing trumpet called siphon which they use for breathing.

### Butterflies and moths

- They undergo complete metamorphosis.
- Their larva stages are called caterpillars.
- They use a **proboscis for feeding**
- Butterflies lay eggs under leaves for protection against sun's heat and enemies.
- The stage of a butter fly which is harmful to the crops is the larva stage (it is a crop pest).
- Butterflies and moths are useful to man because they help in pollination.
- The moth is able to pollinate flowers at night by the help of the scent produced by flowers at night.

### The life cycle of the butterfly



### NOTE:

-Butterflies are harmful to man because their larva stages (caterpillars) are pests to man's crops.

### How does a caterpillar protect itself?

- By use of its **prickly hair** that irritates its enemies.

### Larva stages of different insects

Insect	Larva stage
• Mosquito	• Wriggler
• Housefly	• Maggots
• Butterflies	• Caterpillar
• Bees and wasps	• Grub

### INCOMPLETE METAMORPHOSIS

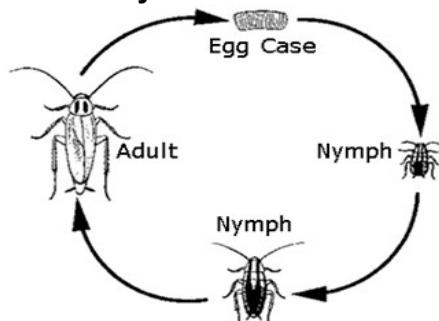
-These are the 3 stages of growth and development an insect undergoes i.e.; **eggs, nymph and adult**.

### Examples of insects which undergo incomplete metamorphosis

- Grasshoppers
- Locusts
- Crickets

- Cockroaches
- Termites
- White ants

### The life cycle of a cockroach



- A nymph is different from its adult is that the nymph is wingless while an adult has wings.
- Locusts and grasshoppers use mandibles to feed.
- They are all crop pests.

## PROTOCTISTA KINGDOM

### Characteristics of protocista kingdom

- They have one cell
- They have the nuclei enclosed in the membrane
- They are neither plants, fungi nor animals.
- They live in liquids (fluids) because they don't have protection against drying out.

### Groups of protocista

- Algae
- Protozoa
- Euglena

### Algae

- They have chlorophyll
- They make their own food
- They mostly reproduce by means of spores
- They grow on salty and flesh water

### Examples of algae

- Spirogyra
- Sea weeds
- Focus

### Uses of algae

- It is used as food to man and other animals
- They add oxygen in water which is breathed in by water animals
- They are used in the making of fertilizers

### Protozoa

- They lack chlorophyll
- They are very small (they are microscopic)
- They have only one cell
- They are found in flesh waters, seas, in blood of animals so they are parasites
- Protozoa like amoebae **reproduce by means of cell division or binary fission**

**Examples of protozoa are;**

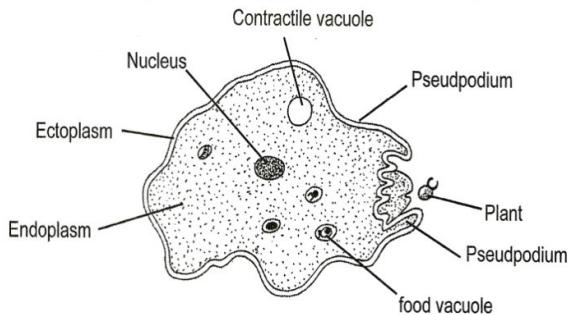
- Amoeba
- Paramecium
- Trypanosome
- Plasmodium

**Diseases caused by protozoa**

Protozoa	Disease
• Plasmodium	• Malaria
• Trypanosome	• Nagana in animals and sleeping sickness in man
• Amoeba	• Amoebic dysentery

**A structure of an amoeba**

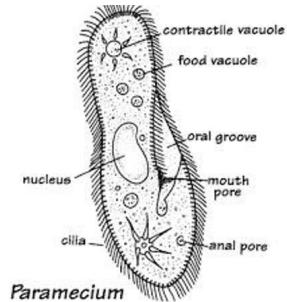
## AMOEBA (SINGLE CELLED ANIMAL)



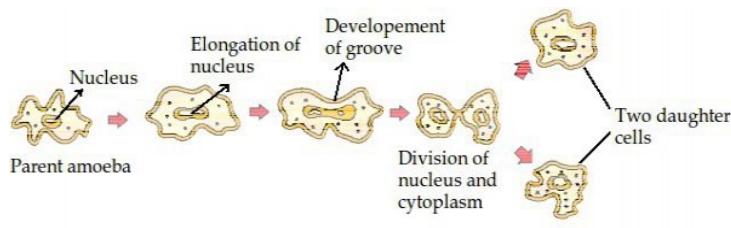
**NB:**

- Amoeba reproduces asexually by **binary fission/cell division**.
- Amoeba moves by means of the false legs called **pseudopodia**

**The structure of the paramecium**



**An illustration showing cell division or binary fission**



Binary fission in Amoeba

## **THEME: MATTER AND ENERGY**

### **TOPIC: SOUND ENERGY**

#### **What is energy?**

- Energy is the ability to do work.

#### **What is sound?**

- Sound is a form of energy which stimulates the sense of hearing.
- Sound is a form of energy that enables us to hear.
- Sound is a form of energy produced by vibrations of objects.

#### **What is meant by the term vibration?**

- Vibration is the to and fro movement of an object producing sound.

#### **Importance of sound**

- For communication.
- For entertainment.
- Provides employment opportunities to people.
- Promote culture ie traditional folk songs.

#### **Why do animals make sound?**

- To communicate to others.
- To locate food.
- For protection.
- To look for their mates.

#### **Types of sound**

##### **Music**

- Music is an organised sound produced by regular vibrations.

##### **Noise**

- Noise is a disorganised sound produced by irregular vibrations.

#### **Sources of sound**

There are two sources of sound;

- Natural sources of sound
- Artificial sources of sound

#### **Natural sources of sound**

-These are things that produce their own sound.

#### **Examples of natural sources of sound**

- |   |   |
|---|---|
| <ul style="list-style-type: none"><li>• Wind blowing</li><li>• Volcanic eruption</li><li>• Earthquakes</li><li>• Child crying</li></ul> | <ul style="list-style-type: none"><li>• Birds singing</li><li>• Cock crowing</li><li>• Dog barking</li><li>• A bull bellowing</li></ul> |
|---|---|

#### **Artificial sources of sound**

-These are man-made objects which produce sound

#### **Examples of artificial sources of sound**

- |   |   |
|---|---|
| <ul style="list-style-type: none"><li>• Radios</li><li>• Telephones</li><li>• Drums</li><li>• Whistle</li></ul> | <ul style="list-style-type: none"><li>• Machines from industries</li><li>• Xylophones</li><li>• Pianos</li><li>• Band</li></ul> |
|---|---|

#### **How sound is produced?**

-Sound is produced by means of vibration of an object

## Methods of producing sound

There are 4 methods used for producing sound, these are;

- By plucking e.g. guitar
- By blowing e.g. whistle and flute
- By hitting/beating e.g. drums and bells
- By rubbing e.g. tube fiddle

## How living things produce sound

### 1. Mammals

- By vibration of the vocal cords

### 2. Bees and mosquitoes

- By rapid flapping or motion of their wings which cause air around to vibrate

### 3. Grasshoppers and crickets

- By rubbing their hind legs against their vibrating wings to produce sound.

### 4. Birds

- By vibration of the rings of cartilage in the trachea.

## Musical instruments

-Musical instruments are grouped into three categories, i.e.:

- Percussion musical instruments
- Stringed musical instruments
- Wind musical instruments

## Percussion instruments

-These are instruments which produce sound after being hit or struck or beaten.

-These are instruments produce sound by striking them in order to vibrate.

## Examples of percussion musical instruments

- |               |           |
|---------------|-----------|
| • Drum        | • Shakers |
| • Xylophone   | • Cymbals |
| • Thumb piano | • Bells   |
| • Triangles   | • Rattles |

## Diagrams showing percussion musical instruments



### NB:

-The drum produces sound after the **vibration of the skin when hit or beaten**.

## Stringed musical instruments

-These are instruments that produce sound when plucked or rubbed.

## Examples of stringed musical instruments

- Tube fiddle
- Guitar
- Bow harp/Adungu
- Lyre
- Violin
- Bass violin

## Diagrams showing stringed musical instruments



### NB:

-Stringed musical instruments produce **sound by vibration of the strings when plucked or rubbed.**

-A bow harp has a hole that allows air in and sound box that amplifies sound.

## Wind musical instruments

-These are instruments that produce sound when air is blown into them.

## Examples of wind musical instruments

- A flute
- Pan pipes
- Whistle
- Trombone
- Recorder
- A horn
- Trumpets
- Bugles
- Reeds

## Diagrams showing wind musical instruments



### NB:

-Wind musical instruments produce sound **by vibration of air blown inside.**

## How sound travels

-Sound travels from one point to another **by means of sound waves in air.**

-Sound waves travel in all directions from the source.

-Sound travels in all states of matter i.e.; solids, liquids and gases.

-Sound travels **fastest in solids** because solids have closely packed particles.

-Sound travels **slowest in gases** because molecules are loosely held.

## Summary

<b>State matter</b>	<b>of</b>	<b>solids</b>	<b>liquids</b>	<b>gases</b>
-------------------------	-----------	---------------	----------------	--------------

Comparison in relationship to sound transfer	fastest	faster	fast
	slow	slower	slowest

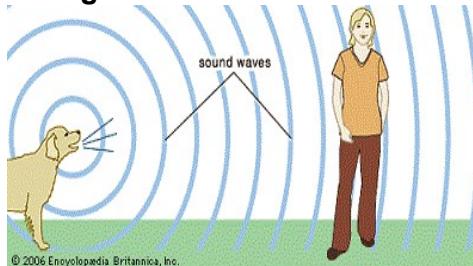
### NOTE:

-In order for sound to travel from one part to another, there must be a medium for sound transmission.

### Why can't sound travel through a vacuum?

- There is no medium that can transmit/carry sound waves.

### A diagram to show sound waves



### Properties of sound

- Sound travels by means of sound waves.
- Sound can be reflected.
- Sound needs a medium to travel.

### Which property of sound does an echo show?

- Sound can be reflected.

### Speed of sound

Sound travels at different speed in each state of matter as seen below;

- In normal air (gases) -330m/s
- In water (liquids) -1484m/s
- In iron (solids) -1500m/s

### Factors that affect the speed of sound

- Temperature

-At night when temperatures are very low, sound waves travel very nearer to the ground. This is why we are able to hear clearly at night.

- Heat

-The heat of the day makes sound waves rise high making it difficult to hear sound.

- Wind

-Wind blows sound waves further if it is blowing against its movement.

- Altitude

-Sound waves move easily along lower altitude than climbing uphill or a higher altitude.

### Terms used in the study of sound

- Amplitude

-This is the width of sound vibrations.

- Decibels

-This is a unit for measuring the loudness of sound.

- Frequency

-This is the number of sound vibrations produced by an object per second.

- Volume

-This is the loudness or softness of sound.

- Pitch

-This is the highness or lowness of sound.

### **Factors that affect pitch of sound**

- **Length of the vibrating strings**

-Long strings produce low pitches while shorter strings produce high pitches of sound.

- **Tension of the vibrating object**

-Tight objects/strings produce higher pitch of sound than loosened ones.

- **Size of the vibrating object/surface area of the vibrating object**

-Bigger objects produce low pitches of sound while smaller objects produce higher pitches of sound.

- **Thickness or thinness of the vibrating strings.**

-Thick strings produce low pitches of sound while thin strings produce high pitches.

- **Frequency**

-The higher the frequency, the higher the pitch of sound produced and the lower the frequency, the low the pitch of sound produced.

### **Applications of pitch of sound.(Activity)**

#### **1. Using different sizes of drums.**

- Which drum will produce the higher pitch of sound?
- Give a reason for your answer in (a) above.
- Which drum will produce the lowest pitch of sound?
- Give a reason for your answer in (c) above.
- To which group of musical instruments do drums belong?
- How do drums produce sound?
- How does sound produced by the drums above reach dancers ten meters away?

#### **2. Using a bow harp (adungu)**

- To which group of musical instruments does a bow harp belong?
- How does a bow harp produce sound?
- Which string will produce the highest pitch of sound when plucked?
- Give a reason for your answer in (c) above.
- Which string will produce the lowest pitch of sound?
- Give a reason for your answer in (e) above.

#### **3. Using bottles with different levels of water.**

- To which group of musical instruments do bottles belong?
- How do bottles produce sound?
- Which bottle will produce sound of the highest pitch?
- Give a reason for your answer in (c) above.
- Which bottle will produce sound of the lowest pitch?
- Give a reason for your answer in (e) above.

#### **4. Using strings of different thickness**

- Which string will produce the highest pitch of sound?
- Give a reason for your answer in (a) above.
- Which string will produce the lowest pitch of sound?
- Give a reason for your answer in (c) above.

#### **5. Using sound waves with different frequencies.**

Which sound wave above shows;

- The highest pitch of sound?
- The lowest pitch of sound?
- The highest frequency?
- The lowest frequency?

#### **6. Using panpipes of different sizes**

- To which group of musical instruments do panpipes belong?
- Which pipe will produce high pitch of sound when air is blown into them at once?

- c) Give a reason for your answer in (b) above.
- d) Which pipe will produce low pitch of sound?
- e) Give a reason for your answer in (d) above.

## **7. Using metallic round balls of different sizes.**

- a) Which metallic ball will produce high pitch of sound when hit?
- b) Give a reason for your answer in (a) above.
- c) Which metallic ball will produce low pitch of sound when hit?
- d) Give a reason for your answer in (c) above.

## **ECHOES**

### **What is an echo?**

- An echo is a reflected sound.

### **How is an echo formed?**

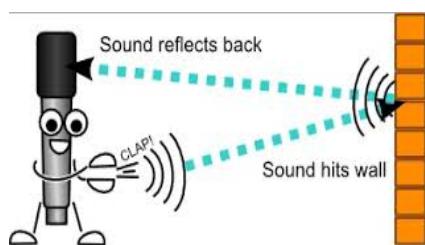
- An echo is formed by reflection of sound waves.

### **What causes an echo?**

- Reflection of sound waves

### **How echoes occur.**

When sound waves meet an obstacle like buildings or walls, it bounces back as seen in the diagram below;



### **Why are we unable to hear words when echoes are formed?**

- The wave length of an echo is very low as compared to the wave length of the normal sound.

### **Places where echoes commonly occur.**

- Empty rooms
- Valleys
- Corridors
- Mountains
- Forests
- Caves

### **Advantages of echoes**

- Pilots use echoes from hills, mountains, tall buildings to easily direct them during flight to prevent accidents.
- Sailors/navigators use echoes to determine the depth of water bodies using **an echo sounder (fathometer)**. The echo is recorded electrically by a **hydrophone** on the ship.
- War ships use echoes to determine whether there are obstacles in front of them.
- Bats use echoes to locate food and dodge obstacles.
- Sea mammals like whales use echoes to avoid danger and to keep in touch with the rest.
- Fishermen use echoes to detect fish shoals before setting the nets.

### **Echo location**

- Echo location is the use of echoes to detect objects.
- A bat uses echolocation to find its prey and dodge obstacles.

- Blind people use echolocation to avoid obstacles on their way. They use a special device called **echo stick/white cane** to locate the ways between buildings and tell direction of cars on the road.

### **Disadvantage of echoes**

- Echoes interfere with the original sound and cause noise.

### **Ways of reducing echoes in cinema halls**

- Covering cinema halls with soft porous materials, like; sponges, thick carpets, thick clothes and soft boards
- Covering cinema halls with thick curtains

### **How do soft porous materials reduce echoes in cinema halls?**

- By absorbing sound waves.

#### **NOTE:**

The speed of sound in air is 330m/s, calculate the distance and time covered by sound and echoes.

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}}$$

$$\text{Time} = \frac{\text{Distance}}{\text{Speed}}$$

$$\text{Distance} = \text{Speed} \times \text{Time}$$

#### **Example 1.**

-Kakai heard a gunshot after 3 seconds. How far was kakai from the firing place?

$$\text{Speed} = 330\text{m/s}$$

$$\text{Time} = 3 \text{ seconds}$$

$$\begin{aligned}\text{Distance} &= \text{speed} \times \text{time} \\ &= (330 \times 3) \text{ metres} \\ &= 990 \text{ metres}\end{aligned}$$

Kakai was 990 metres from the firing place.

#### **Example 2**

-Mutonyi was standing in a valley which was 660m and she heard a man clapping hands.

How long did it take Mutonyi to hear the sound of the claps?

$$\text{Distance} = 660\text{m/s}$$

$$\text{Speed} = 330\text{m/s}$$

$$\begin{aligned}\text{Time} &= \frac{\text{Distance}}{\text{Speed}} \\ &= \frac{660}{330\text{m/s}} \\ &= 2 \text{ seconds}\end{aligned}$$

It took Mutonyi 2 seconds to hear sound of a man clapping hands.

#### **Example 3**

-Vanessa heard an echo of a man splitting firewood from a forest after 4 seconds. How far was Vanessa from the man?

$$\text{Speed} = 330\text{m/s}$$

$$\text{Time} = 4 \text{ seconds}$$

$$\begin{aligned}\text{Distance} &= S \times T \\ &= (330 \times 4) \text{ [it was an echo]} \\ &\quad 2 \\ &= 660 \text{ metres}\end{aligned}$$

Vanessa was 660 metres from the man splitting firewood.

#### **Example 4**

-Akambawas standing 990 metres far from a cliff and heard echoes of the cock crows. How long did it take him to hear the echoes of the cock crowing?

$$\text{Distance} = 990 \text{ m}$$

Speed = 330m/s

Time =  $\frac{\text{Distance}}{\text{Speed}}$

$$= \frac{(990 \times 2)}{330} \text{ [it was an echo]}$$

= 3x2 seconds

= 6 seconds

It took Akamba 6 seconds to hear the echoes of the cock crowing.

#### **Trial questions.**

1. Peter shouted from the valley and it took 5 seconds for Esther to hear the sound. How far was Peter from Esther?
2. Ogwal was standing in the middle of the forest which was 1320m and he heard a woman chopping wood. How long did it take Ogwal to hear the sound from the chopping place?
3. Ashaba heard an echo of a man splitting firewood from the forest after 4 seconds. How far was Ashaba from the man splitting wood?
4. A man fires a gun while facing a cliff. He hears an echo after 8 seconds. If the speed of sound in air is 300m/s, how far is the man from the cliff?
5. A cliff is 993 metres away from where Apendi is standing. If Apendi blows a whistle, how long will it take her to hear the echo if the speed of sound in air is 331m/s?
6. A plane moves at a speed of 600m/s and the speed of sound in air is 300m/s;
  - a) Why is sound of a plane heard after it has already passed?
  - b) You are standing 1800m away from the plane in the air. How long does it take you to hear the sound of the plane?
  - c) By the time you hear the sound of the plane, how far has the plane moved?

#### **Methods/ways of storing sound**

- By recording
- By taping
- By writing notations i.e. solfa and staff notations

#### **Devices used to store sound.**

- Magnetic tapes
- Video tapes
- Video compact discs (VCDs)
- Compact discs (CDs)
- Digital Audio Tapes (DAT)
- Digital versatile discs/digital video discs (DVDs)
- Computer diskettes/floppy discs
- Memory cards
- Flash discs

#### **Devices used to reproduce stored sound.**

- Radio cassettes
- DVD players
- Gramophones
- Video disc players
- Video decks
- Computer monitors
- Film projectors
- Mobile phones
- Record players

#### **Ways of reproducing stored sound**

- Playing using radio cassettes

- Playing using mobile phones
- Playing using record players
- Playing using film projectors
- Playing using DVD players
- Playing using video decks
- Playing using gramophones
- Playing using computers
- Playing using video disc players

### **Instruments used to reproduce sound stored by sol-fa notation.**

- |   |   |
|---|---|
| <ul style="list-style-type: none"> <li>• Xylophones</li> <li>• Guitar</li> <li>• Keyboard</li> <li>• Thumb piano</li> <li>• Bow harp</li> </ul> | <ul style="list-style-type: none"> <li>• Panpipes</li> <li>• Lyre</li> <li>• Violin</li> <li>• Viola</li> </ul> |
|---|---|

### **Advantages of storing sound**

- For future entertainment.
- For future reference.
- For giving evidence in courts of law.

### **Musical scales**

The musical scales consist of the notes called **diatonic scales**.

There are two types of musical scales, these are;

- Solfa notation
- Staff notation

#### **Note:**

-**Notation** refers to the act of writing musical sound using notes.

**Solfa notation**

**Staff notation**

### **How can sound stored on either solfa or staff notation be reproduced?**

- By singing solfas

### **THE MAMMALIAN EAR**

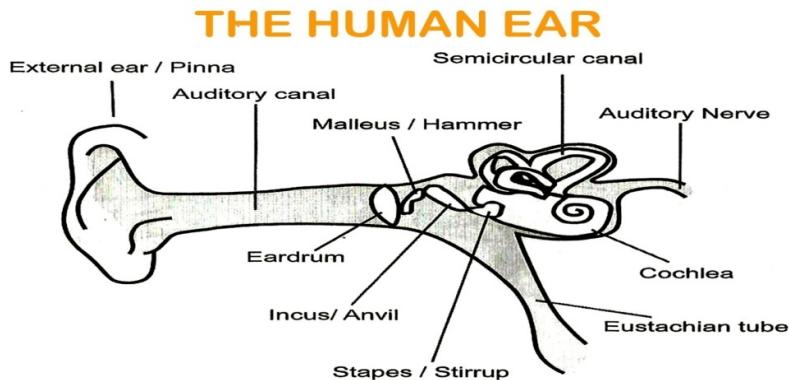
-The ear is a body organ that uses sound energy.

#### **Function of the ear**

- For hearing.
- For body balance and posture.

<b>Animal</b>	<b>Hearing organ</b>
• Mammals	• Ears
• Birds	• Ears
• Fish	• Lateral line
• Insects	• Feelers/antenna
• Molluscs (snails)	• Tentacles
• Reptiles	• Internal eardrums below their skins
• Amphibians	• Amphibians papilla

## The structure of the mammalian ear



### Region of the ear

-The mammalian ear is made of three main regions, ie;

- The outer ear
- The middle ear
- The inner ear

### The outer ear

-It is made up of **two parts**, ie;

#### Pinna

- It collects sound waves from the environment.

### Auditory canal

- It directs sound waves to the eardrum
- It also has short hair and wax which helps to trap foreign bodies like dust and some small insects from entering the middle ear.

### The middle ear

-It consists of the eardrum, the ossicles and the Eustachian tube.

#### The eardrum

- It vibrates and transmits sound vibrations to the ossicles.

### The ossicles

-It is a collective name given to the three small bones found in the middle ear.

-Their names can be got using the word '**MIS**' or '**HAS**' i.e.

M- Malleus	H- Hammer
I-Incus	A-Anvil
S-Stapes	S-Stirrup

-The stirrup/stapes is the smallest bone in the human skeleton.

-The hammer (malleus) is attached to the eardrum while the stirrup (stapes) is attached to the oval window.

- The ossicles help to amplify and send sound vibrations from the middle ear to the cochlea.

### Oval window

- It prevents the fluid from the inner ear from mixing up with air in the middle ear.

### Eustachian tube

-It is the tube from the middle ear to the mouth.

- It balances air pressure inside and outside the ear.

-It does this by allowing air to enter and releasing air from the middle ear.

-The Eustachian tube opens when swallowing food or yawning.

### The inner ear

-It is fluid filled space which consists of the semi-circular canal, cochlea and auditory nerve.

### **Semi-circular canals**

- They help to maintain body balance and posture.
- It is controlled by the cerebellum of the brain.

### **Cochlea**

- It changes sound vibrations to nerve impulses/signals.
- The cochlea has two fluids i.e. **perilymph and endolymph** that help **to convert sound vibrations to nerve impulses**.

### **The auditory nerve**

- It transports sound impulses to the brain for interpretation

### **Diseases of the ear**

- German measles
- Otitis

### **Disorders of the ear**

- Boils
- Deafness

### **Ear defects**

### **Causes of deafness**

- Old age
- Too much wax in the ears
- Diseases like German measles
- Damage of the eardrum
- Serious fractures on the skull

### **Permanent deafness**

- This is when a person is unable to hear completely.
- It is brought by many diseases like German measles.

### **Partial deafness**

- This is when a person is unable to hear clearly which can be brought by damage of the eardrum.

### **Correction of partial deafness**

- Putting oily ear buds in the ear overnight to soften wax.
- Injecting warm water through the auditory canal using a syringe (by syringing)

### **Sensory deafness**

- This is when a person is unable to differentiate between sounds produced.

### **Ways of controlling sensory deafness**

- Good feeding to enable one to keep healthy even at old age.
- Avoid travelling in vehicles under dangerous mechanical conditions (DMC).

### **Ways of caring for our ears.**

- Wash the ears with clean water and soap daily
- Avoid cleaning ears using sharp piercing objects like needles because they can damage the eardrum
- Always remove wax from the ears to prevent accumulation that can result into partial deafness
- Avoid loud noise that can burst the eardrum
- Always keep ears well dried using a clean soft pointed endcloth or cotton wool
- Seek proper medical assistance in case of a foreign body in the ear.

## THEME: HUMAN BODY

### TOPIC: THE CIRCULATORY SYSTEM

- The circulatory system is the transport system of the body.
- This is the system of the body responsible for transporting blood in the body.
- It consists of the organs that enable blood to move around the body.

#### What is blood circulation?

- Blood circulation is the movement of blood around the body.

#### What is double circulation?

- Double circulation is the movement of blood twice through the heart before it is pumped to all body parts.

#### Components/constituents of the circulatory system

- The heart
- Blood vessels
- Blood

#### The heart

- The heart is a muscular pumping organ of the body.
- It is the major component of the circulatory system.
- The function of the heart is **to pump blood to all parts of the body**.
- The heart is made up of strong muscles called cardiac muscles.
- The heart is protected by **the rib cage**.

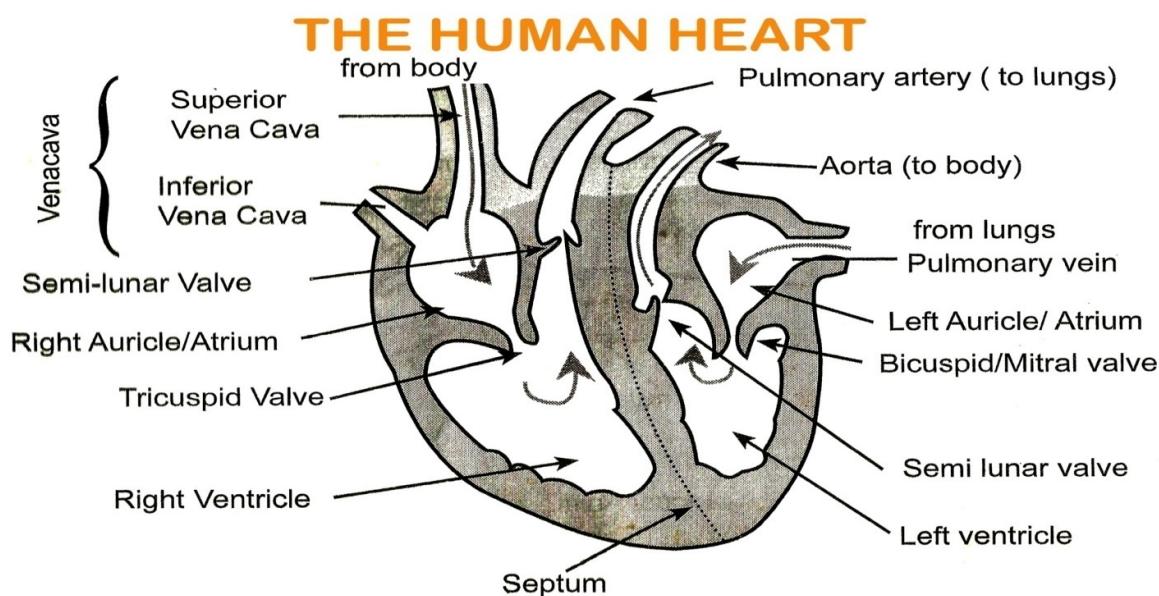
#### The chambers of the heart

-The heart has four chambers; the upper chambers are **auricles/atria** while the lower chambers are **ventricles**.

#### The four chambers of the heart are;

- Left auricle/atrium
- Right auricle/atrium
- Left ventricle
- Right ventricle

#### The structure of the mammalian heart



## **Functions of parts of the heart**

### **Vena cava**

- It carries deoxygenated blood from all body parts back to the heart.
- It is the biggest vein in the body.

### **Pulmonary artery**

- It transports deoxygenated blood from the heart to the lungs.

### **Pulmonary vein**

- It transports oxygenated blood from the lungs to the heart.

### **Aorta**

- It transports oxygenated blood from the heart to all body parts.
- It is the biggest artery in the body.

### **Septum**

- It is a muscular wall that divides the heart vertically into two parts, ie; the left and right hand side of the heart.

### **Valves**

- They prevent the backward flow of blood.

### **Types of valves**

- Aortic semilunar valves – found between the left auricle and the aorta.
- Tricuspid valves – found the right ventricle and the right auricle.
- Bicuspid valves – found between the left auricle and the left ventricle.
- Pulmonary valves – found between pulmonary artery and the right auricle.
- Coronary valves – found in coronary veins.

## **How the heart works**

-The heart works by contraction and relaxation of cardiac muscles.

-When the heart contracts, it squeezes blood out of the heart

-When the heart relaxes, it allows blood to enter it.

## **What term is used to describe the contraction and relaxation of cardiac muscles of the heart?**

- Systole

## **Mention the scientist who discovered blood circulation.**

- Sir William Harvey

## **Which instrument is used by doctors to measure the blood pressure of a person?**

- Sphygmomanometer

## **Name the instrument used by doctors to listen to the heart beat of a patient?**

- Stethoscope

## **What is the normal heart beat of a person?**

- 72 times per minute

## **Why is the left side of the heart thicker than the right side?**

- It pumps oxygenated blood with greater pressure through a longer distance to all body parts.

## **Why is the right hand side of the heart made up of thinner cardiac muscles?**

- It pumps deoxygenated blood with low pressure through a shorter distance to the lungs.

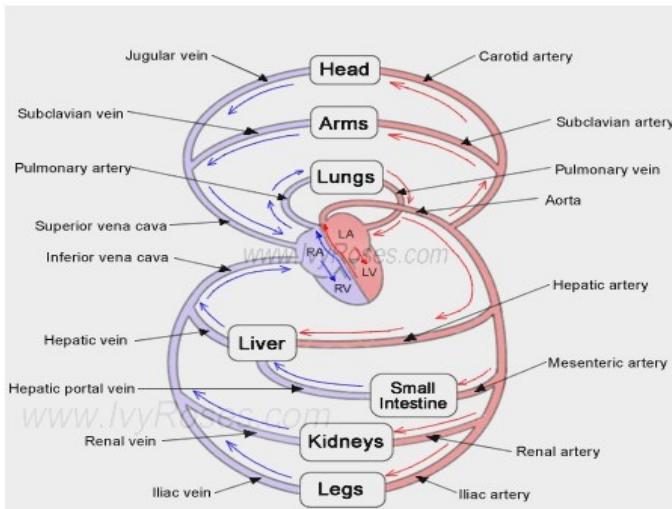
## **Why does blood flow to the lungs?**

- To drop carbon dioxide and pick oxygen

## **Why does the heart beat increase when a person is doing vigorous exercises?**

- The heart pumps more oxygenated blood to the body cells to generate more energy in the body.

## **Diagram showing blood circulation and gaseous exchange in the body.**



[www.IvyRoses.com/HumanBody/Blood/Systemic\\_Circulation.php](http://www.IvyRoses.com/HumanBody/Blood/Systemic_Circulation.php)

## Body organs involved in blood circulation.

### The heart

- It pumps blood to all body parts.

### The brain

- It controls the heart beat/pulse.
- It sends impulses to the kidneys to regulate the amount of salt and water in the body.

### The lungs

- They help in exchange of gases i.e. they enable oxygen to diffuse into blood.

### The kidneys

- The kidneys filter blood.

### The intestines

- They help to absorb digested food and pass it to the blood streams.

### The liver

- It helps in detoxification of harmful substances in the body.

## A table showing blood vessels that carry blood to various body organs

Body organ	Blood vessel that carries blood to.	Blood vessel that carries blood away.
• Kidneys	• Renal artery	• Renal vein
• Lungs	• Pulmonary artery	• Pulmonary vein
• Stomach	• Mesenteric artery	• Hepatic portal vein
• Liver	• Hepatic artery	• Hepatic vein
• Brain (head)	• Carotid artery	• Vena cava
• Trunk (back and legs)	• Iliac artery	• Iliac vein

### Blood vessels

-These are network of tubes running from the heart to all body parts transporting blood.

### Types of blood vessels

- Arteries
- Veins
- Capillaries

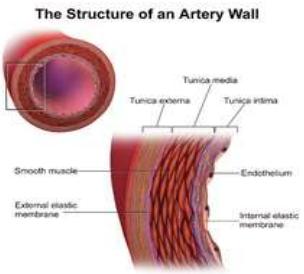
### Arteries

-They transport oxygenated blood from the heart to all body parts.

-The biggest artery in the body is the **aorta**.

-All arteries originate from the aorta of the heart.

## A structure of an artery



### Characteristics of arteries

- All arteries carry oxygenated blood except the pulmonary artery.
- Arteries carry blood away from the heart.
- Arteries have narrow lumen.
- Arteries have thick walls.
- Arteries have no valves.

### Why do arteries have no valves?

- They carry oxygenated blood with high pressure.

### Veins

- They transport deoxygenated blood from all body parts back to the heart.
- The vena cava is the biggest vein in the body.
- All veins originate from the vena cava of the heart.

### A structure of a vein

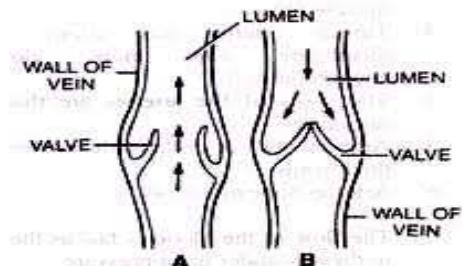


Fig. 18.18. Veins cut open to show the valves preventing the backward flow of blood.

### Characteristics of veins

- All veins carry deoxygenated blood except the pulmonary vein.
- Veins carry blood to the heart.
- Veins have wide lumen.
- Veins have thin walls.
- Veins have valves.

### What is the importance of valves in veins?

- Valves prevent the backward flow of blood.

### Why do veins have valves?

- Veins carry deoxygenated blood with a low pressure.

### Which part of a clinical thermometer has the same function as the valves found in veins?

- The kink/narrow bend/constriction

### How is a kink of a clinical thermometer similar to valves in veins?

- Both a kink and valves prevent the backward flow of liquids.

### The structural differences between arteries and veins

Arteries	Veins
—	—

-They have thick walls	-They have thin walls
-They have no valves	-They have valves

### Functional differences between arteries and veins

Arteries	Veins
-All arteries carry oxygenated blood except the pulmonary artery	-All veins carry deoxygenated blood except the pulmonary vein
-Arteries carry blood away from the heart	-Veins carry blood to the heart
-Arteries carry blood with high pressure	-Veins carry blood with low pressure

### Capillaries

- They are the smallest blood vessels that supply blood to all body cells in the body.
- They join arteries to veins.
- They carry both oxygenated blood and deoxygenated blood.
- They are thin walled to enable materials diffuse through easily.

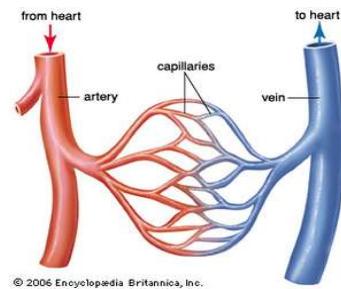
### How are capillaries important in the body?

- They transport digested food oxygen and mineral salts to all body parts.
- They carry waste products from body cells to excretory organs.

### How are capillaries adapted to their function of exchanging materials in the body?

- Capillaries are thin walled to enable materials to diffuse through easily.

### The structure of blood capillaries



### Blood

- Blood is a red liquid that flows in the body.

### Name the mineral salt needed in formation of blood in the body

- Iron

### Types of blood

-There are two types of blood, i.e.;

- Oxygenated blood
- Deoxygenated blood

### What is oxygenated blood?

- Oxygenated blood is blood that contains oxygen.
- It is light red in colour.
- It is carried by most arteries except the pulmonary artery.

### What is deoxygenated blood?

- Deoxygenated blood is blood without oxygen.
- It is dark red in colour.
- It is carried by most veins except the pulmonary vein.

### **Components/constituents of blood**

-There are four components of blood, these are;

- White blood cells
- Red blood cells
- Platelets
- Blood plasma

### **White blood cells**

-White blood cells are manufactured in;

- Bone marrows
- Lymph nodes
- Spleen

### **How are white blood cells important in the body?**

- They fight against disease-causing germs.

### **How are white blood cells able to fight against disease-causing germs?**

- By engulfing and digesting germs.
- By producing antibodies against disease-causing germs

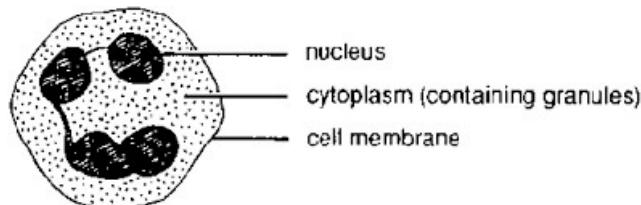
### **What are antibodies?**

- Antibodies are chemical substances produced by white blood cells to defend the body against disease-causing germs.

### **Characteristics of white blood cells**

- They have irregular shape
- They have nuclei

### **A structure of a white blood cell**



### **Red blood cells**

-Red blood cells form the highest number of blood cells in the body.

-Red blood cells are manufactured in the red bone marrow of;

- |            |          |
|------------|----------|
| • Sternum  | • Ribs   |
| • Scapula  | • Pelvis |
| • Vertebra |          |

### **How are red blood cells important in the body?**

- They help to transport oxygen to all body cells.

### **How are red blood cells adapted to their function?**

- Red blood cells contain a red pigment called haemoglobin.

### **In which way is haemoglobin useful to red blood cells?**

- Haemoglobin enables red blood cells to pick and transport oxygen to all body cells.

Name the protein compound that is formed when oxygen combines with haemoglobin.

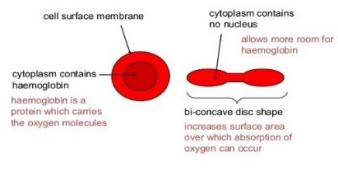
- Oxy-haemoglobin

### Characteristics of red blood cells

- They have regular shape (disc shaped)
- They have no nuclei
- They have haemoglobin

### A structure of a red blood cell

Red blood cells transport oxygen



Biology

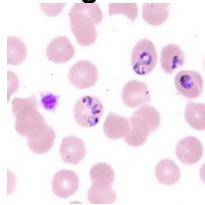
### Platelets

- They are made from red bone marrow.
  - They help in blood clotting
  - They form a network of a fibre around the wound to prevent further loss of blood.
- Food rich in vitamin K helps in formation of platelets eg cabbage.  
-Blood clotting occurs in the presence of vitamin K and calcium.

### How are platelets able to prevent excess loss of blood from a cut?

- They form a network of fibre around the cut.

### A diagram showing platelets



### Bloodplasma

- Plasma is the liquid part of blood.
- Plasma is the watery part of blood.
- It is the largest component of blood.

### What is plasma made up of?

- |                  |                  |
|------------------|------------------|
| • Dissolved food | • Uric acid      |
| • Blood proteins | • Adrenalin      |
| • Water          | • Ammonia        |
| • Carbon dioxide | • Mineral salts  |
| • Insulin        | • Glucose/sugars |
| • Urea           |                  |

### Importance of blood plasma

- It transports digested food in the body.
- It transports waste products from body cells to excretory organs.

- It transports hormones from the glands to their target areas.
- It transports medicines to different body cells.
- It regulates body temperature.
- It distributes heat around the body.

### **Functions of blood in the body**

- It helps to fight against disease-causing germs.
- It helps in clotting of blood.
- It transports oxygen to all body cells.
- It transports digested food in the body.
- It transports medicine to resist germs in the body.
- It transports waste products from body cells to excretory organs.
- It transports hormones from the glands to their target areas.
- It helps to regulate body temperature.
- It distributes heat around the body.

### **Examples of materials carried by blood in the body**

- |                                       |                 |
|---------------------------------------|-----------------|
| • Oxygen                              | • Digested food |
| • Carbon dioxide                      | • Urea          |
| • Heat                                | • Uric acid     |
| • Hormones like insulin and adrenalin | • Medicines     |

### **Ways of increasing the volume of blood in circulation**

- Eating foodstuffs rich in iron e.g. meat, liver, eggs, peas, beans and green vegetables
- Drinking enough fluids
- Blood transfusion

### **Blood groups**

- |                 |                  |
|-----------------|------------------|
| • Blood group A | • Blood group AB |
| • Blood group B | • Blood group O  |

### **Who is a blood donor?**

- A blood donor is a person who gives blood to another person to save life.

### **Who is a blood recipient/receiver?**

- A blood recipient is a person who receives blood from a donor.

### **A table showing blood groups and how they donate blood**

Donor	Recipient
A, O	A
B, O	B
A, B, O	AB
O	O

### **Why is a person with blood group O called a universal donor?**

- She/he can donate blood to all other blood groups.

### **Why is a person with blood group AB called a universal recipient?**

- She/he can receive blood from all other groups.

### **Name the scientist who discovered blood groups**

- Sir Karl Landsteiner.

### **What is blood transfusion?**

- Blood transfusion is the transfer of screened blood from one person to another as long as the blood groups agree.

### **Why is it important to screen blood before transfusion?**

- It helps to prevent the easy spread of diseases from a donor to a recipient like HIV AIDS, sickle cells and leukaemia.

### **Disorders of the circulatory system**

- Artiosclerosis (blockage of arteries)
- Defective valves
- D-transposed great arteries

### **Diseases of the circulatory system**

Diseases of blood	Diseases of the heart	Hereditary diseases
<ul style="list-style-type: none"><li>• Leukaemia/blood cancer</li><li>• Haemophilia</li><li>• Hypertension (high blood pressure).</li><li>• Sickle cell anaemia</li><li>• Anaemia</li><li>• HIV AIDS</li><li>• Malaria</li></ul>	<ul style="list-style-type: none"><li>• Coronary heart disease</li><li>• Heart attack/cardiac arrest</li><li>• Heart stroke</li></ul>	<ul style="list-style-type: none"><li>• Haemophilia</li><li>• Sickle cell anaemia</li></ul>

### **Heart attack (cardiac arrest)**

- It is caused by formation of clots in the either branches of the pulmonary artery making pumping of blood very difficult.

### **High blood pressure and low blood pressure**

- This is caused by abnormal high or low rate at which the heart pumps blood.

### **Anaemia**

- It is caused by reduction in the number of red blood cells in the body.
- Anaemia is caused by lack of iron in the body.

### **Sickle cell anaemia**

- This is an abnormal growth of red blood cells containing defective haemoglobin.

### **Leukaemia (blood cancer)**

- This is a condition when a person has a large number of immature white blood cells in the body.
- These immature blood cells prevent production of normal blood cells causing severe anaemia.

### **Haemophilia (poor blood clotting)**

- This is a condition when blood cannot clot easily.
- It is caused **by lack of vitamin K** in the diet.

### **Malaria**

- It is caused by **plasmodia parasites** transmit through **an infected female anopheles mosquito**.
- It attacks and destroys the red blood cells which makes the body lose iron and makes a person become anaemic.

### **HIV AIDS**

- It is a sexually transmitted disease (**STD**) spread through unprotected sex with an infected person.
- It is caused by a virus called **Human Immunodeficiency Virus (HIV)**.
- The HIV virus attacks and destroys the **white blood cells**.

### **Write AIDS in full**

- Acquired Immune Deficiency Syndrome

### **How can a p.6 pupil protect herself against HIV AIDS?**

- By abstaining from sex/through abstinence

### **Bad life styles that lower the efficiency of the circulatory system**

- Alcoholism
- Smoking
- Prostitution

### **Ways of promoting the proper functioning of the circulatory system**

- Performing regular physical exercises
- Eating food rich in a balanced diet
- Eating meals which contain low animal fats
- Avoid smoking and alcoholism.

### **Importance of performing physical exercises**

- They make joints flexible.
- They reduce the level of fats in the body.
- They reduce the risk of heart diseases.
- They make heart muscles to grow stronger and larger.
- They make digestion of food quick and easy.
- They strengthen tendons and ligaments in the body.

**THEME: HUMAN HEALTH****TOPIC: ALCOHOL, SMOKING AND DRUGS****What is alcohol?**

- Alcohol is a liquid substance which makes people drunk when taken in excess.

**Why is alcohol called a drug?**

- It can decrease or increase the body functioning.

**Types of alcohol**

-There are two types of alcohol, these are;

- Methanol (methyl)
- Ethanol (ethyl)

**Methanol alcohol**

-This type of alcohol is very poisonous to human health.

-It can cause death and blindness when it comes into contact with the eyes.

-Methanol is contained in;

- |                     |            |
|---------------------|------------|
| • Petrol            | • Glue     |
| • Diesel            | • Jet fuel |
| • Methylated spirit |            |

**Ethanol alcohol**

-This is a toxic substance contained in alcoholic drinks like;

- |         |           |
|---------|-----------|
| • Wines | • Spirits |
| • Beers |           |

**Methods of making alcohol**

-There are two methods of alcohol, these are;

- Fermentation method
- Distillation method

**Fermentation method**

-This is a process by which sugar in juice from is turned into alcohol by the help of yeast.

-Yeast helps to produce an enzyme called **zymase** which speeds up the reactions.

**Equation of fermentation**

-Yeast +sugar = alcohol +carbon dioxide + energy

-The alcohol processed by this method is not too concentrated like that of distillation method.

-This method is used to process drinks like;

- |         |             |                |
|---------|-------------|----------------|
| • Malwa | • Munanansi | • Bell lager   |
| • Kwete | • Wine      | • Club         |
| • Tonto | • Pilsner   | • Nile special |

**Cereals used in production of yeast locally**

- |           |          |
|-----------|----------|
| • Millet  | • Barley |
| • Sorghum | • Maize  |

**Distillation method**

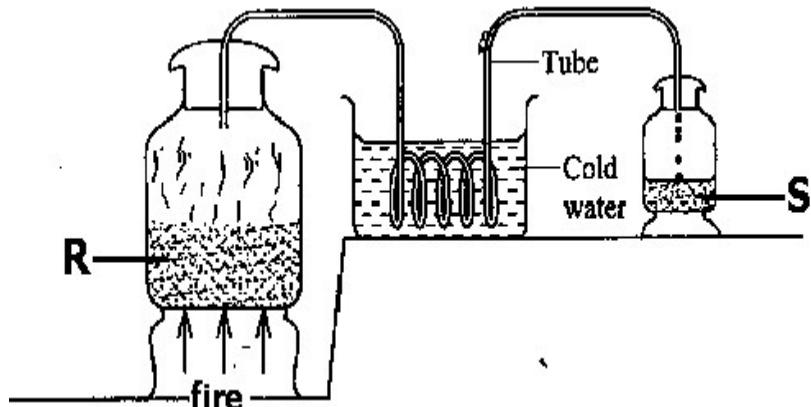
-This is a process of obtaining alcohol by boiling, evaporating the mixture containing alcohol and condensing the vapour.

This method is used to obtain more concentrated alcohol.

**Examples of distilled alcoholic drinks**

- Coffee spirit
  - Royal whisky
  - Waragi/enguli
  - Empire
  - Royal
- vodka

### Diagrams showing distillation method



**State the importance of cold water in distillation of alcohol.**

- It helps to condense alcohol vapour to form a distillate.

**Why is the delivery tube coiled?**

- To increase the surface area for condensation

**Why is locally distilled alcohol not good for drinking?**

- Its concentration is not controlled as it may contain a lot of methyl which is poisonous.

Alcoholic drink	Raw material from which it is made
• Kwete	• Maize
• Malwa	• Millet
• Muramba	• Sorghum
• Munanansi	• Pineapples
• Tonto	• Sweet bananas
• Enguli or waragi	• Sweet bananas, cassava or maize
• Banapo wine	• Bananas and pineapples
• Beer	• Barley
• Wine	• Fruits
• Uganda waragi	• Bananas, molasses, cassava and potatoes

**Uses of alcohol**

- It is a source of income.
- It is a source of government revenue.
- It provides employment opportunities to people.
- It is used for making cosmetics and perfumes.
- It is used for making soap.
- It is mixed with petrol to make gasohol fuel.
- It is used in Six's thermometers to show readings.
- It is used in hospitals to sterilize medical tools and instruments.
- It is used in hospitals to sterilize areas on the body where injections are to be taken.

- It is used as a solvent to dissolve oils and fats on clothes.
- It is used in cultural functions in some tribes as part of the dowry.
- It is used for making some drugs.

### **Reasons why people drink alcohol**

- |  |  |
|--|--|
| <ul style="list-style-type: none"> <li>• To quench thirst</li> <li>• To forget their problems</li> <li>• To kill boredom</li> <li>• To feel confident</li> <li>• To fit in groups</li> </ul> | <ul style="list-style-type: none"> <li>• To feel happy and excited</li> <li>• To feel mature if still young</li> <li>• To improve on their mental performance</li> </ul> |
|--|--|

### **Alcoholism**

- Alcoholism is a condition where a person totally depends on alcohol for normal body functioning.
- This is a state of depending on alcohol constantly for normal body functioning.

### **Who is an alcoholic?**

- An alcohol is a person who totally depends on alcohol for his/her normal body functioning.

### **Causes of alcoholism/factors that lead to alcoholism**

- Idleness
- Frustrations
- Peer influence
- Attractive advertisements/misleading adverts on TV, radios and Newspapers
- Bad example from parents
- Poor family background
- Poor social environment like slums

### **Mention the body organs damaged by excessive taking of alcohol.**

- The liver
- The brain
- The kidneys

### **Which body organ is greatly damaged by excessive taking of alcohol?**

- The liver

### **Where in the digestive system of man does absorption of alcohol take place?**

- In the stomach

### **Effects of alcoholism to an individual**

- It damages body organs like liver, brain and kidney.
- It leads to self -neglect.
- It leads to loss of appetite.
- It leads to loss of respect.
- It leads to liver disease called liver cirrhosis
- It leads to poor job performance.
- It leads to loss of body balance due damage of the nervous system.

### **Qn. State any one effect of alcoholism to a school pupil.**

- It leads to school dropout.
- It leads to loss of respect for elders
- It leads to poor performance in his/her studies.

### **Effects of alcoholism to a family**

- It leads to family neglect.
- It leads to divorce.
- It leads to poverty.
- It leads to violence
- It leads to child abuse
- It leads to moral decay among children in a family
- It leads to destruction of household property.

### **Effects of alcoholism to a community**

- It leads to job neglect.
- It leads to increase in crime rates.
- It leads to low community development.
- It leads to traffic accidents in a community like from drunken drivers.
- Alcoholics become public nuisance in a community

### **Ways of avoiding alcoholism**

- Always avoid bad peer groups.
- Make a decision one day to leave alcohol.
- Join good social groups of those who do not drink alcohol.
- Keep yourself busy during your leisure time in activities like games and sports.
- Never taste any alcoholic drink for pleasure.
- Learn more facts about alcohol and its side effects before tasting it.
- Learn how to cope up with stress and problems by not deciding to drink alcohol to forget them.

### **Ugandan laws related to alcohol**

- All forms of home distillation are not allowed.
- No person is allowed to drive a vehicle under the influence of alcohol (Don't drink alcohol and drive).
- Persons below 18 years of age are not allowed to drink alcohol.
- Bars with proper licences are required to maintain certain standards as laid down by the law during operations.
- Customers are not allowed to drink from in off licensed bars.

**Qn.A policeman found Wanyama, a p.6 boy drinking alcohol and arrested him.  
State the Ugandan law a policeman based on to arrest him?**

- Persons below 18 years of age are not allowed to drink alcohol.

## **SMOKING**

### **What is smoking?**

- Smoking is the regular/frequent use of tobacco.

### **Types of smoking**

-There are two types of smoking, these are;

- Active smoking
- Passive smoking

### **What is active smoking?**

- Active smoking is the act of inhaling tobacco smoke directly from a cigarette or a smoking pipe.

### **What is passive smoking?**

- Passive smoking is the type of smoking in which a non-smoker indirectly inhales tobacco smoke from an active smoker.

### **Who is a smoker?**

- A smoker is a person who inhales tobacco smoke.

### **Types of smokers**

-There are two types of smokers, these are;

- Active smokers
- Passive smokers

### **Who is an active smoker?**

- An active smoker is a person who inhales tobacco smoke directly from a cigarette or a smoking pipe.

### **Who is a passive smoker?**

- A passive smoker is a person who inhales tobacco smoke indirectly from an active smoker.

### **Why is passive smoking said to be more dangerous than active smoking?**

- It affects all people around an active smoker.

### **Ways tobacco is taken into the body**

- By chewing tobacco leaves
- By sniffing tobacco powder
- By inhaling tobacco smoke set on fire.

### **Poisonous substances found in tobacco**

- Tar
- Nicotine

### **Name the addictive substance found in tobacco.**

- Nicotine

### **Mention the poisonous gas found in tobacco.**

- Carbon monoxide

### **What is tar?**

- Tar is a sticky brownish liquid given off when tobacco is burnt.

### **What is addiction?**

- Addiction is a strong desire to continue using a particular drug.

### **Why do people smoke?**

- To pass time
- To feel warm
- To relax and feel at ease
- To feel confident
- To fit in groups
- To concentrate on what they are doing
- To appear mature and important in case they are young
- They admire those smoking

### **Effects of smoking to an individual**

- It causes respiratory diseases like lung cancer, emphysema and chronic bronchitis.

- It leads to self-neglect.
- It leads to unemployment.
- It leads to loss of respect.
- It leads to loss of appetite for food.
- It leads to loss of friends.
- It leads to discolouring of the teeth and lips.
- It worsens respiratory diseases like tuberculosis, diphtheria, pertussis and asthma.
- It lowers the life span of an individual because it damages body organs like the lungs.

### **Effects of smoking to a family**

- It causes respiratory diseases to family members due to passive smoking.
- It leads to family neglect.
- It leads to poverty in a family.
- It leads to anti-social behaviours in a family.

### **Effects of smoking to a community**

- It leads to fire breakouts.
- It causes air pollution.
- It increases crimes in the community like stealing.

### **Effects of smoking to pregnant women**

- It leads to low birth weight.
- It leads to still births.
- It leads to premature births.
- It leads to abortion and miscarriages.
- It makes a mother lose appetite for food which leads to poor health of the unborn baby.

### **Effects of smoking to non-smokers**

- It leads to passive smoking.
- It leads to health problems to the unborn babies.

### **Diseases caused by smoking**

- |  |  |
|--|--|
| <ul style="list-style-type: none"> <li>• Lung cancer</li> <li>• Emphysema</li> </ul> | <ul style="list-style-type: none"> <li>• Chronic bronchitis</li> <li>• Coronary heart disease</li> </ul> |
|--|--|

### **Diseases worsened by smoking**

- |  |  |
|--|--|
| <ul style="list-style-type: none"> <li>• Asthma</li> <li>• Tuberculosis</li> <li>• Diphtheria</li> </ul> | <ul style="list-style-type: none"> <li>• Whooping cough (Pertussis)</li> <li>• Bronchitis</li> </ul> |
|--|--|

### **Body organs damaged to smoking**

- The lungs
- The brain

### **Which body organ is greatly damaged by tobacco smoking?**

- The lungs

### **Ways of avoiding smoking**

- Avoid peer groups like those who smoke.

- Keep yourself busy during your free time in activities like games and sports.
- Always find out the bad effects of smoking before starting to smoke.
- Make a decision for yourself one day never to smoke.
- Never taste any substance related to smoking.
- Join good peer groups of those who don't smoke.
- Destroy all substances related to smoking.

### **How has the government of Uganda discouraged tobacco smoking?**

- By putting strict laws against public smoking
- By imposing high taxes on tobacco products like cigarettes
- By providing employment opportunities to people who seem to be idle to run away from smoking
- By sensitizing the public about the dangers of smoking through Health Public Education
- By forcing tobacco companies to write the dangers of smoking on cigarette packets

### **Why has the government of Uganda failed to completely stop the habit of tobacco smoking?**

- It has failed to abolish tobacco companies because of the taxes it gets from tobacco manufacturing companies like British American Tobacco (BAT)
- It has failed to get a substitute crop for tobacco growers.

## **DRUGS**

### **What is a drug?**

- A drug is a chemical substance which affects the way one's mind and how the body works.
- A drug is a chemical substance which can affect the physical and mental functions of the body.

### **Ways drugs are taken into the body**

- |   |   |
|---|---|
| <ul style="list-style-type: none"> <li>• By sniffing</li> <li>• By chewing</li> </ul> | <ul style="list-style-type: none"> <li>• By injection</li> <li>• By inhaling smoke</li> </ul> |
|---|---|

### **Types of drugs**

-There are two types of drugs, these are;

- Drugs of dependence/Addictive drugs/Narcotics
- Essential drugs

### **Drugs of dependence**

#### **What are drugs of dependence?**

- These are drugs which cause addiction after prolonged use.

#### **What is drug dependency or drug addiction?**

- This is a condition that results from prolonged use of a drug for normal body functioning.
- It leads to drug abuse in the society.

#### **What is drug abuse?**

- Drug abuse is the use of a drug in a way that is harmful to the body.

#### **Examples of drugs commonly abused (examples of drugs of dependence).**

- |   |   |   |
|---|---|---|
| <ul style="list-style-type: none"> <li>• Tobacco</li> </ul> | <ul style="list-style-type: none"> <li>• Cocaine</li> </ul> | <ul style="list-style-type: none"> <li>• Alcohol</li> </ul> |
|---|---|---|

- Marijuana
- Herion
- Caffeine
- Glue
- Aviation fuel (jet fuel)
- Mira
- Petrol
- Shisha
- Opium

### **Factors that lead to drug abuse/drug dependency**

- Peer influence
- Idleness
- Frustration
- Family background and social environment
- Desire to stay awake
- Desire to be strong and bold

### **Why do people abuse drugs?**

- To feel warm
- To keep awake or asleep
- To relax and feel at ease
- To forget their problems
- To fit in groups
- To feel confident
- To relieve pain
- To feel sophisticated

### **Effects of drug abuse to an individual**

- It leads to self-neglect.
- It leads to loss of appetite.
- It leads to brain damage.
- It leads to job neglect.
- It leads to insomnia (inability to sleep).
- It leads to intensive sleepiness.
- It leads to low immunity to diseases.

### **Effects of drug abuse to a family**

- It leads to family neglect.
- It leads to child abuse.
- It leads to spouse abuse.
- It leads to poverty in a home.
- It leads to criminal behaviours like rape and defilement.
- It sets a bad example to the children.

### **Effects of drug abuse to a community**

- It leads to increased crime rates.
- It leads to poor job performance.
- It may lead to accidents due to loss of body balance.

### **Ways of avoiding drug abuse/drug dependency**

- Avoid bad peer groups.
- Keep yourself busy during your leisure time in productive activities like games and sports.
- Join good peer groups of those who don't abuse drugs.
- Drug addicts should be taken to hospitals for rehabilitation.
- Encourage drug addicts to attend seminars organised in villages on health education.

### **Life skills to safe guard against alcoholism, smoking and drug dependency**

- Ability to cope up with stress.
- Good decision making.
- Having a skill of self-awareness.
- Having a skill of self-esteem.
- Having a skill of problem solving.
- Having a skill of assertiveness.

## **Essential drugs**

### **What are essential drugs?**

- Essential drugs are drugs that meet people's health needs.

### **Qualities of essential drugs**

- They should be **affordable** to make the cost of treatment manageable.
- They should be **accessible and available** whenever needed.
- They should be **effective** to cure, prevent and control diseases.
- They should be **safe** when the correct dosage is used.
- They should have a **satisfactory value for money**.

### **Examples of essential drugs**

- |               |                 |                  |
|---------------|-----------------|------------------|
| • Aspirin     | • Cough mixture | • Indocid        |
| • Panadol     | • Tetracycline  | • Zental         |
| • Fansidar    | • ARVs          | • Penicillin     |
| • Chloroquine | • ORS           | • Contraceptives |
| • Quinine     | • Hedex         | • Coaterm        |
| • Paracetamol | • Action        | • Vaccines       |
| • Flagyl      | • Amoxilin      | • Magnesium      |
| • Mabendazole | • Ibrufen       |                  |

### **Storage of essential drugs**

- Drugs should be protected from moisture, sunlight and dirt.
- They should be stored in cool dry and dark places such as cupboards.
- Drugs should be kept out of children's reach.
- Vaccines should be kept under cool conditions like in refrigerators.
- Polio vaccine and measles vaccine must be frozen.

### **Why should drugs be kept in clean cool dry places?**

- To prevent drugs from getting spoilt
- To maintain their effectiveness
- To maintain their curative value

### **Why should vaccines be kept under cold conditions especially in refrigerators?**

- To prevent them from getting spoilt.
- To maintain their effectiveness.
- To maintain their curative value.

### **Why should drugs be kept out of children's reach?**

- To prevent drug poisoning.
- To prevent them from damage.

### **Uses of essential drugs**

-Essential drugs are classified according to **their uses**. These are;

- Pain killers
- Curative drugs
- Preventive drugs
- Contraceptives

### **Pain killers**

- These are essential drugs used to reduce pain.

### **Examples of pain killers**

- Panadol
- Action
- Flagyl
- Hedex

### **Curative drugs**

- These are essential drugs that cure common diseases

### **Examples of cure drugs**

- Coaterm
- Fansidar
- Quinine
- Mabendazole
- Chloroquine

### **Preventive drugs**

- These are essential drugs used to prevent common diseases

### **Example of preventive drug**

- Vaccines

### **Contraceptives**

-These are essential drugs used in family planning to space children and control unwanted pregnancies.

-Contraceptives help to control frequent pregnancies in a family and over population in a country.

### **Examples of contraceptives**

- Birth control pills
- Birth control injections
- Spermicides

### **Types of essential drugs**

-There are two types of essential drugs, these are;

- Laboratory manufactured drugs
- Traditional prepared drugs

### **What are laboratory manufactured drugs?**

- These are drugs made by physicians in laboratories.

### **Examples of laboratory manufactured drugs**

- |            |               |               |
|------------|---------------|---------------|
| • ARVs     | • Action      | • Hedex       |
| • Panadol  | • Indocid     | • Mabendazole |
| • Zental   | • Fansidar    | • Ibrufen     |
| • Aspirin  | • Coaterm     | • Paracetamol |
| • Quinine  | • Chloroquine |               |
| • Amoxilin | • Vaccines    |               |

### **Characteristics of laboratory manufactured drugs**

- They have expiry and manufacturing dates.
- They are well prescribed.
- They are well packed.
- They are well tested.
- They are well labelled.
- They are made under good hygienic conditions.
- Their strength and stability is known.
- Their effect on human health is well known.

### **What is expiry date?**

- This is a date at which a drug becomes too old and useless for human use.

### **What is the danger of taking expired drugs?**

- It leads to drug poisoning

### **What are traditional prepared drugs?**

- These are drugs locally made from available materials from the environment like plant materials, animal wastes and soil.

### **Examples of traditional prepared drugs**

- Omuluza
- Ebombo
- Enkejje
- Black jack
- Ekiggagi

### **Characteristics of traditional prepared drugs**

- They don't have expiry and manufacturing dates.
- They are not well prescribed.
- They are not well packed.
- They are not well tested.
- They are not well labelled.
- They are made under poor hygienic conditions.
- Their strength and stability is unknown.
- Their effect on human health is unknown.

### **Drug misuse**

- Drug misuse is the use of a drug without or against the doctor's advice.

### **Factors that lead to drug misuse**

- Severe pain
- Failure to interpret the doctor's prescription
- Ignorance
- Poverty
- Sharing prescribed drugs for one patient by many patients

### **Ways in which drugs are misused**

- Failure to use the given prescription
- Self-medication
- Buying drugs from unqualified people like shopkeepers, vendors and hawkers
- Sharing prescribed drugs for one patient by many patients

### **What is drug overdose?**

- This is the act of taking more drugs than those prescribed by a doctor.

### **Causes of drug overdose**

- Ignorance
- Poor interpretation of the doctor's prescription

### **Effects/dangers of drug overdose**

- It leads to drug poisoning
- It leads to brain and liver damage

### **What is drug under dose?**

- This is the act of taking fewer drugs than those prescribed by a doctor.

### **Causes of drug under dose**

- Fear of drugs
- Poverty
- Side effects of a drug
- Poor interpretation of the doctor's prescription

### **Dangers of drug under dose**

- It worsens the disease.
- It makes germs resistant to the drug.
- It leads to prolonged illness.

### **What is drug prescription?**

- Drug prescription is the doctor's written advice to a patient on how to use a drug.

### **Factors considered when prescribing drugs for the patient**

- Age of the patient
- Weight of the patient
- Disease the patient is suffering from

### **State the importance of drug prescription/why should drugs be prescribed?**

- It avoids drug misuse
- It avoids drug under dose
- It avoids drug overdose
- It enables a patient to know when to take the drug

### **Why is it dangerous to buy drugs from shopkeepers, hawkers and market vendors?**

- Such drugs are not well prescribed.
- Such drugs may be expired.
- Such drugs may be fake drugs.
- Such drugs are kept under poor hygienic conditions.

**Qn. Babinawent to a clinic and was given an envelope with drugs as shown below:**

**2x3  
Panadol**

**a). What scientific term is used to describe the doctor's advice '2x3'?**

- Drug prescription

**b). What does figure 2 represent?**

- Number of tablets to be swallowed each time in a day.

**c). What does figure 3 represent?**

- Number of times he is supposed to swallow the tablets.

**d). How many tablets is she supposed to swallow in a day?**

- $2 \times 3 = 2+2+2$

= 6 tablets

# THE WORLD OF LIVING THINGS.

## TOPIC: CLASSIFICATION OF PLANTS.

### What are plants?

- Plants are green growing living things on the earth's surface.
- Plants are one of the major components of living things in the environment.
- Plants are primary sources of food to animals in the environment.

### Why are plants regarded as primary sources of food in the environment?

- Plants are capable of making their own food.

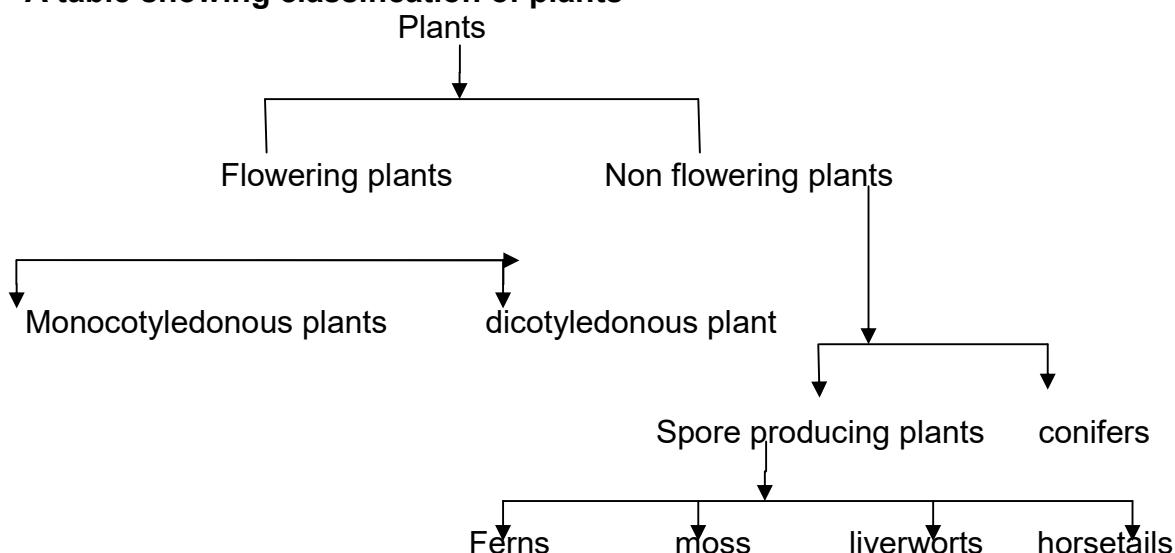
### Give any six reasons why plants are grouped under living things.

- Plants grow
- Plants reproduce
- Plants excrete
- Plants feed
- Plants respond to stimuli
- Plants breathe
- Plants respire

### What does classification of plants mean?

- Classification of plants means grouping plants according to their different characteristics.

### A table showing classification of plants



### Groups of plants

There are two groups of plants in the environment, these are;

- Flowering plants
- Non flowering plants

### What are flowering plants?

-Flowering plants are plants that bear flowers.

### Give any five examples of flowering plants

- Mango plants
- Bean plants
- Passion fruit plants
- Black jack plants
- Maize plants, etc.

### Why are ground nuts classified as flowering plants?

-Ground nuts bear flowers

### How do flowering plants reproduce?

-Flowering plants reproduce by means of seeds.

### Groups of flowering plants

- Dicotyledonous plants

- Monocotyledonous plants

### **What are monocotyledonous plants?**

-These are plants whose seeds have one cotyledon.

-They are also known as monocots.

-Monocotyledonous plants are mostly cereal crops and grasses.

### **Mention any eight examples of monocotyledonous plants**

- |  |  |
|--|--|
| <ul style="list-style-type: none"> <li>• Maize</li> <li>• Millet</li> <li>• Sorghum</li> <li>• Barley</li> </ul> | <ul style="list-style-type: none"> <li>• Wheat</li> <li>• Rice</li> <li>• Oats</li> <li>• Rye</li> </ul> |
|--|--|

### **Characteristics of monocotyledonous plants**

- They have fibrous root system.
- Their leaves have parallel venation.
- Their seeds have one cotyledon.
- Their seeds undergo hypogeal germination.

### **What are dicotyledonous plants?**

-These are plants whose seeds have two cotyledons.

-They are also known as dicots.

-Dicotyledonous plants are mostly legumes or leguminous plants and woody plants.

### **Give any six examples of dicotyledonous plants**

- |  |  |
|--|--|
| <ul style="list-style-type: none"> <li>• Beans</li> <li>• Ground nuts</li> <li>• Peas</li> <li>• Simsim</li> <li>• Soya beans</li> </ul> | <ul style="list-style-type: none"> <li>• Oranges</li> <li>• Avocado</li> <li>• Lemons</li> <li>• Bambara nuts</li> <li>• Oil nuts</li> </ul> |
|--|--|

### **Characteristics of dicotyledonous plants**

- They have tap root system.
- Their leaves have network venation/.
- Their seeds have two cotyledons.
- Their seeds undergo epigeal germination.
- They form true wood.

### **What are legumes?**

-Legumes are plants that have nodules on their roots and store food in pods.

### **Examples of legumes**

- |  |  |
|--|--|
| <ul style="list-style-type: none"> <li>• Beans</li> <li>• Soya beans</li> <li>• Ground nuts</li> <li>• Peas</li> </ul> | <ul style="list-style-type: none"> <li>• Simsim</li> <li>• Cowpeas</li> <li>• Pigeon peas</li> <li>• Bambala nuts</li> </ul> |
|--|--|

### **Characteristics of legumes**

- They have nodules on their roots.
- Their seeds are found in pods

### **The root system of a legume**

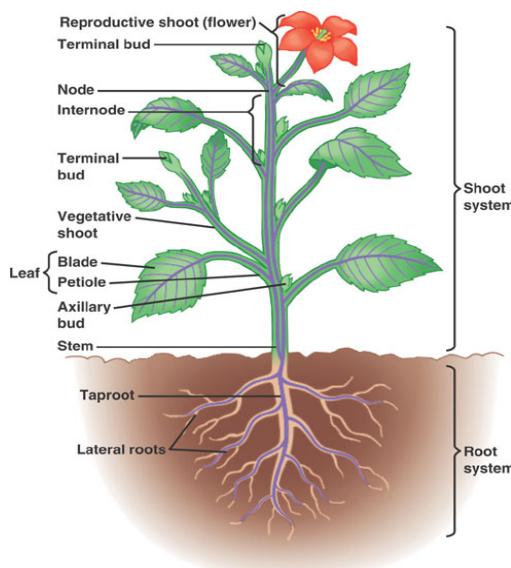
**What is the importance of nodules found on roots of leguminous plants?**

-They store nitrogen fixing bacteria/rhizobia.

**Give the function of the nitrogen fixing bacteria to the soil**

-They fix nitrogen into the soil.

**A diagram showing parts of a flowering plant**



### **Systems of a flowering plant**

-A flowering plant has two systems;

- Root system
- Shoot system

#### **The root system**

-This is a part of a flowering plant that grows in the soil.

-The root system is a part of a flowering plant that develops from the radicle of a seed.

#### **Parts that make up the root system**

- Tap root (main root)

-It holds a plant firmly in the soil.

- Lateral roots

-They provide extra support.

- Root hairs

-They absorb water and mineral salts for the plant.

- Root cap

-It protects the growing root from mechanical injuries or damage.

#### **Functions of roots to plants**

1. They absorb water and mineral salts from the soil for the plant
2. They hold/anchor the plant firmly in the soil
3. Some roots store food for the plants e.g. Cassava, sweet potatoes, carrots
4. Prop roots give extra support to plants during flowering stages
5. Breathing roots help to absorb oxygen
6. Some roots have nodules that store nitrogen fixing bacteria which help to improve on soil fertility

#### **Importance of roots to people**

- Some roots are sources of food to people e.g. Cassava
- Some roots are sources of herbal medicine

## **Types of root systems**

There are two types of root systems, i.e.

- Fibrous root system
- Tap root system

### **Tap root system**

-This is a root system that develops from a radicle of an embryo and grows into a network of lateral branches of roots

### **Which group of flowering plants has tap root systems?**

-Dicotyledonous plants

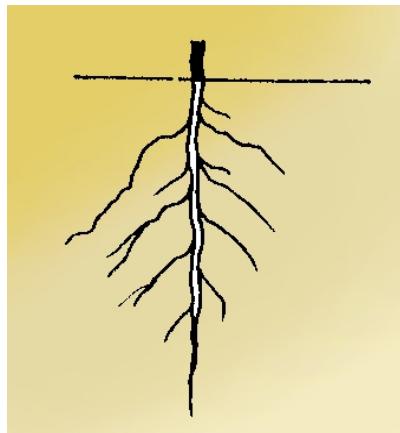
### **Mention any five examples of plants with tap root systems**

- Beans
- Ground nuts
- Oranges
- Mangoes
- Soya beans

#### **Note:**

-All dicotyledonous plants have a tap root system.

### **A diagram showing a tap root system**



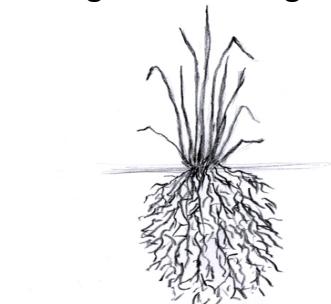
### **Fibrous root system**

-This is a root system where there are many roots growing randomly having the same size and length

### **Identify the group of flowering plants that have fibrous root system**

-Monocotyledonous plants

### **A diagram showing a fibrous root system**



### **Name any five examples of flowering plants with fibrous root system**

- Maize
- Rice
- Sorghum
- Millet
- Sugar cane
- Wheat

### **Types of roots**

There are two types of roots, namely;

- Primary roots
- Secondary roots

### **Primary roots**

-Primary roots are roots that develop from the radicle of a seed

### **Examples of primary roots**

- Tap roots
- Fibrous roots

### **Secondary roots**

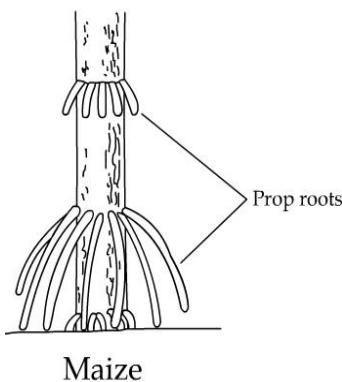
-Secondary roots are roots that develop from the stem or leaves of a plant

### **Examples of secondary roots**

- |  |  |
|--|--|
| <ul style="list-style-type: none"> <li>• Prop roots</li> <li>• Breathing roots</li> <li>• Buttress roots</li> <li>• Clasping roots</li> <li>• <b>Prop roots</b></li> </ul> | <ul style="list-style-type: none"> <li>• Adventitious roots</li> <li>• Aerial roots</li> <li>• Stilt roots</li> <li>• Storage roots</li> </ul> |
|--|--|

-These are roots that grow from the node of most monocotyledonous plants during flowering stages

### **A diagram showing prop roots**



### **Examples of plants that develop prop roots during a flowering stage**

- |  |  |
|--|--|
| <ul style="list-style-type: none"> <li>• Maize</li> <li>• Sorghum</li> <li>• Millet</li> </ul> | <ul style="list-style-type: none"> <li>• Sugar canes</li> <li>• Wheat</li> </ul> |
|--|--|

### **How are prop roots important to a maize plant?**

-They provide extra support to a maize plant during a flowering stage

- **Buttress roots**

-These are roots which grow on bigger trees such as jack fruits

-They are triangular in shape which strengthens the base of a plant

-They give extra support to big trees to withstand strong wind

### **A diagram showing buttress roots**



- **Clasping roots**

- These roots are found on climbing plants
- They enable plants to hold themselves on other plants
- They are common on big trees in thick forests

**A diagram showing clasping roots**



- **Stilt roots**

- These are roots found on plants which grow in muddy areas in swamps
- They give extra support to plants

**A diagram showing stilt roots**



- **Breathing roots**

- These are only aerial roots because they grow upwards and act as breathing organs
- Such roots are found in many plants growing in water logged areas e.g. Mangroves.

**A diagram showing breathing roots**

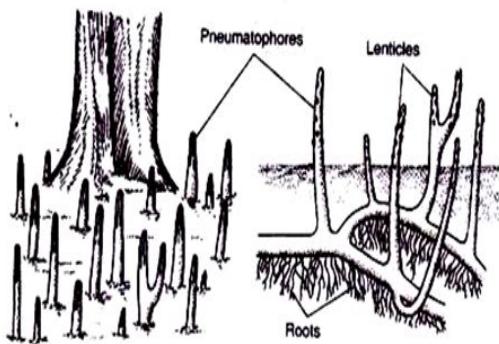


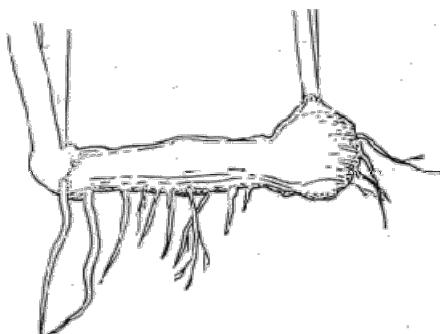
Fig. 10.1. Pneumatophores of mangrove plant.

- **Adventitious roots**

-They develop from stems and leaves of a plant

-They are common with stem tubers, bulbs, corms and rhizomes

**A diagram showing adventitious roots**



- **Storage roots**

-These are swollen adventitious roots which store food for the plant.

-The stored food is mainly **carbohydrates (starch)**.

-They are also known as **root tubers or root crops**.

**What are root crops?**

-Root crops are crops that store their food in the roots

**Examples of plants that store food in their roots**

- Cassava



- Sweet potatoes



- Carrots



- Root turnips



- Beet roots



- Parsnips



- Radishes



- Swedes



**Qn. Where does a cassava plant get its food from when all its leaves are dry?**

-From the roots

#### **Osmosis**

-Osmosis is the movement of water and mineral salts from a region of low concentration to a region high concentration across a semi permeable membrane.

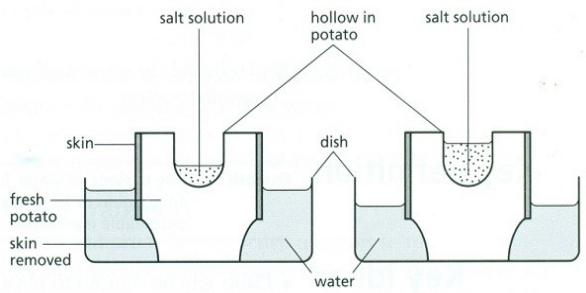
#### **An experiment to show osmosis in plants**

##### **Items needed**

- Sweet potato/ irish potato/paw paws
- Sugar or salt
- Containers e.g. beakers or glasses
- Water

##### **Steps taken**

- Get a potato and cut it into pieces.
- Make a hole in the middle of one piece.
- Put some salt or sugar in the hole you have made in the potato.
- Put the potato in a container with water and mark the water level.
- Leave the experiment stand for 6-8 hours.



### Observation

- The water in the container A has decreased while water will appear in the hole of a potato in the container B.

### Conclusion

- The potato contained living cells and the salt pulled water ie water moved from the glass to the potato the same way water moves from the soil to roots of a plant.

### Qn. How is osmosis important to plants?

-Osmosis enables plants to absorb water and mineral salts from the soil.

### Qn. By what process does water and mineral salts move through the plant stem to all parts of a plant?

-Through capillary attraction/capillarity.

### The shoot system

-This is a part of a flowering plant that develops from the plumule of a seed.

### Mention any nine parts that make up the shoot system of a flowering plant.

- |                |                |
|----------------|----------------|
| • Flowers      | • Branch       |
| • Fruits       | • Node         |
| • Leaves       | • Internode    |
| • Axillary bud | • Terminal bud |
| • Stems        |                |

### Stem

-The stem is the bigger part of a shoot system.

-It holds leaves, flowers, fruits, branches and terminal bud.

### Functions of stems to plants

- They hold and space out leaves to get sunlight.
- They transport water and mineral salts from the roots to the leaves.
- Green stems make starch for plants.
- Stems of some plants store food.
- Some stems have thorns for protection e.g. orange plants.

### Uses of stems to man

- Some stems are sources of food to people and animals
- Some stems are sources of herbal medicine
- Big stems provide timber and poles for building
- Big stems provide wood fuel to man.

### Types of stems

There are three types of stems, namely;

- Upright or erect stems
- Underground stems
- Weak stems

### Upright or erect stems

-These are strong stems that are able to stand upright without any support.

-They grow straight in space

-They are common in dicotyledonous and monocotyledonous plants  
**A diagram showing an upright stem**



**Mention any five examples of flowering plants with upright or erect stems**

- Oranges
- Mangoes
- Maize
- Pawpaw
- Jack fruit

**Weak stems**

-These are weak stems of plants that cannot support themselves upright.

**Examples of plants with weak stems**

- Passion fruits
- Pumpkins
- Water melons
- Tomatoes
- Cucumber
- Cowpeas
- Vanilla

**Name the two types of weak stems**

- Climbing stems
- Creeping stems

**Examples of plants with creeping stems**

- Pumpkins
- Sweet potatoes
- Water melons

**Examples of plants with climbing stems**

- Passion fruits
- Cucumber
- Cowpeas
- Vanilla
- Tomatoes

**Why do plants with weak stems climb?**

- To get support
- To get enough sunlight

**How do plants with weak stems climb others?**

- Use of tendrils



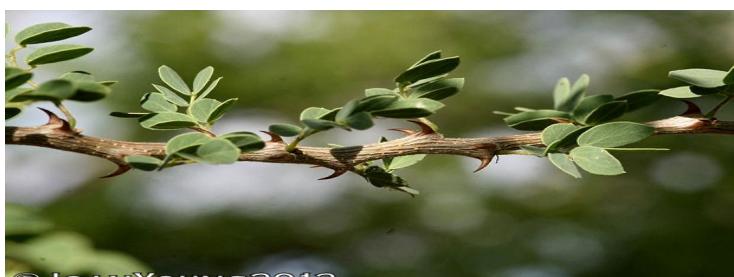
### Examples of plants that use tendrils to climb

- Passion fruits
- Pumpkins
- Water melons
- Cucumber

### How are tendrils useful to a pumpkin plant?

-Tendrils help a pumpkin to climb.

- **Use of hooks**



- **By clasping or twining**

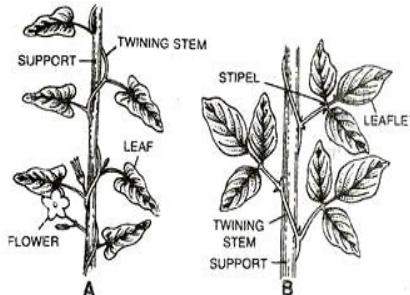


Fig. 5.29. Twiners. A, Sinistrorse twiner of *Convolvulus arvensis* (Hiran Khuri). B, dextrorse twiner of *Lablab* (Sem).

### Examples of plants with weak stem that clasp or twine

- Tomatoes
- Morning glory
- White yams
- Vanilla
- Some beans

### Underground stems

-These are stems that are found in the soil.

### Characteristics of underground stems

- They have scaly leaves at the nodes.
- They have buds (eyes) in the axil of scaly leaves.

### Types of underground systems

- Stem tubers
- Rhizomes
- Bulbs
- Corms

### Stem tubers

-These are swollen underground stems which store food.

-They have buds in the axil of scaly leaves.

## Examples of stem tubers

- Irish potatoes



## Which part of an Irish potato is eaten?

-The stem

- White yams



## Bulbs

-Bulbs are underground stems with small and fleshy leaves.

-Their stems do not store food.

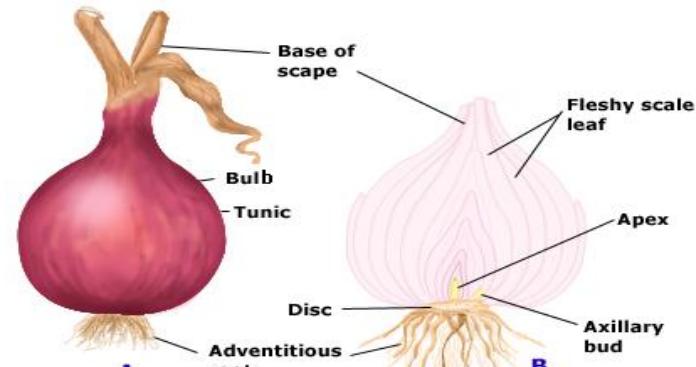
-They store food in the fleshy or storage leaves.

-They have adventitious roots

## Examples of bulbs

- Onions
- Garlic
- Spider lily

## Parts of an onion



A. Tunicated bulb of onion B. L.S. of bulb

## **Functions of each part of an onion**

- **Scaly leaves**

-They protect the fleshy leaves and buds.

- **Foliage leaves**

-They manufacture starch for an onion.

- **Fleshy leaves or storage leaves**

-They store food for an onion.

- **Axillary bud/lateral bud**

-It develops into a new bulb.

- **Terminal bud**

-It develops into new foliage leaves.

- **Stem**

-It holds the leaves and buds.

- **Adventitious roots**

-They suck water and mineral salts for the onion.

## **Exercise**

1. To which group of underground stems do we classify onions and garlic?
2. Where do bulbs store their starch?
3. Which part of an onion is eaten by pupils?
4. Identify the food value obtained from eating onions.
5. What type of roots do bulbs have?
6. How are foliage leaves useful to an onion?
7. How are onions propagated?

## **Rhizomes**

-Rhizomes are horizontal underground stems.

-They have adventitious roots growing from the stem at the nodes.

-Most rhizomes are swollen with stored food.

## **Examples or rhizomes**

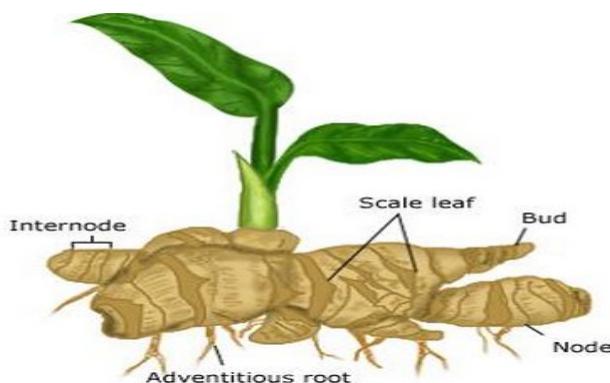
- Ginger

- Cana lily

- Turmeric

- Zoysia grass

## **A diagram showing ginger**



## **Corms**

-Corms are vertical underground stems, swollen with stored food.

-They have scaly leaves, buds and adventitious roots.

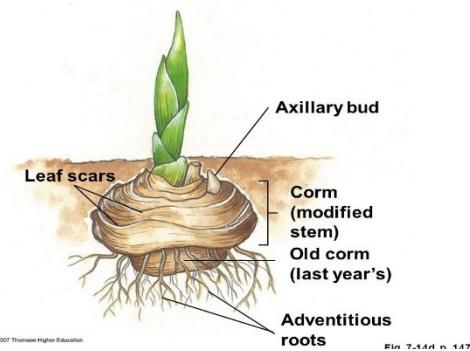
## **Examples of corms**

- Coco yams

- Gladiolus

- Crocus

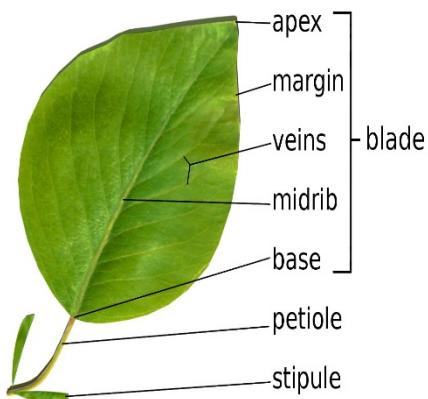
## A diagram of a corm



## Leaves

- Leaves are parts of a flowering plant that help it to make starch.
- Leaves form part of the shoot system.

## Parts of a leaf



## Functions of each part of a leaf

- **Apex**
    - For protection
  - **Stomata**
    - They help in exchange of gases (help in breathing).
    - They also help in transpiration.
  - **Leaf blade (lamina)**
    - It has a surface area for easy trapping of sunlight energy by the help of chlorophyll.
    - It is where stomata are found.
    - It helps in making of starch.
  - **Veins**
    - They allow distribution of water and nutrients within the leaf.
  - **Leaf stalk**
    - It provides attachment of a leaf to a branch or stem.
- Leaf venation**
- Leaf venation is the arrangement of veins in a leaf.
- Types of leaf venation**
- Network venation
  - Parallel venation

## What is network venation?

- This is the type of venation where veins are scattered and run from the midrib to the margin forming a net-like structure.

**In the space below, draw a leaf with network leaf venation.**

**Which group of flowering plants has leaves with network venation?**

-Dicotyledonous plants

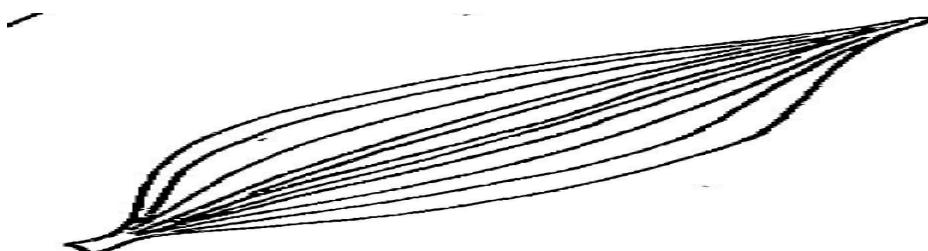
**Give any five examples of plants with network leaf venation**

- Beans
- Oranges
- Mangoes
- Peas
- Simsims

**What is parallel leaf venation?**

-This is the arrangement of veins from the apex to the leaf stalk without crossing each other.

**In the space below, draw a leaf with parallel venation.**



**Which group of flowering plants has leaves with parallel venation?**

-Monocotyledonous plants

**Give any five examples of plants with parallel venation.**

- Maize
- Millet
- Rice
- Sugar canes
- Wheat

**Types of leaves**

There are two types of leaves, namely;

- Simple leaves
- Compound leaves

**What are simple leaves?**

-Simple leaves are leaves with one leaf blade on one leaf stalk.

**Examples of simple leaves**

- Simple entire



- Simple serrated



Elizabeth Morales

- Simple lobed



- Simple divided



- Simple palmate e.g. Pawpaw and castor oil leaves



## **What are compound leaves?**

- Compound leaves are leaves with many leaf blades on one leaf stalk.
- The leaflets are divided at the original leaf stalk.
- Each leaflet has its own small stalk called **a rachis**.

## **Examples of compound leaves**

- Compound trifoliate e.g. bean leaf



- Compound pinnate



- Compound bi-pinnate



- Compound digitate e.g. cassava leaves



### **Functions of leaves to plants**

- They make starch for a plant.
- They contain stomata used for breathing and transpiration.
- Some leaves store food for a plant e.g. bulbs.
- Some leaves are used for propagation e.g. bryophyllum leaves

### **Importance leaves to man**

- Some leaves are eaten as food.
- Some leaves are sources of herbal medicine.
- Dry leaves can be used as mulches in gardens.

### **Plant processes that occur in plant leaves.**

- Transpiration
- Photosynthesis

### **What is photosynthesis?**

-Photosynthesis is the process by which plants make their own food called starch.

### **What do the following words mean?**

**-Photo** – means light.

**-Synthesis** – means to make or build up.

### **Raw materials needed during the process of photosynthesis.**

- **Carbon dioxide**

-It is synthesized to make carbon.

-Both water and carbon combine to make glucose stored in the plant leaves as starch.

- **Water**

-It dissolves the mineral salts in a leaf.

-It also softens the plant leaf for easy diffusion of starch.

### **Conditions necessary for photosynthesis**

- **Chlorophyll**

-Chlorophyll is the green colouring matter in plants.

-It helps to trap light energy from the sun (it traps sun light).

-Plant leaves make starch and store it as **chemical energy**.

- **Sunlight**

-It provides energy for photosynthesis to take place.

-It helps in the breaking of water into hydrogen to speed up the formation of starch.

### **Adaptation of the leaves to the process of photosynthesis**

- They have broad flat shape that make a large surface area for absorption of sunlight and carbon dioxide.
- They are thin to allow carbon dioxide reach the cells easily.
- They have many veins that transport water and mineral salts to the plant.

- They have stomata that allow entry of carbon dioxide and exit of oxygen.
- They are arranged on the stems in a way that allows them to receive sunlight.

### **Exercise**

1. Name the main product of photosynthesis
2. Why can't plants carryout photosynthesis at night?
3. Which part of air is needed during photosynthesis?
4. Identify the part of air given off during photosynthesis.
5. Identify the form of energy needed during the process of photosynthesis.
6. How do animals benefit from the process of photosynthesis?
7. How do plants benefit from animals for photosynthesis?
8. State the importance of chlorophyll to plants during photosynthesis.
9. Why can't fungi like mushrooms and toadstools make starch?
10. State the two raw materials needed during photosynthesis
11. Mention the two conditions needed for photosynthesis to take place.
12. How sunlight useful during photosynthesis?

### **Transpiration**

-Transpiration is the process by which plants lose water as vapour into the atmosphere.

-It occurs in leaves of plants through the stomata.

### **An experiment to show that transpiration occurs in plant leaves.**

#### **Items needed**

- Polythene paper
- Growing plant
- A string

#### **Steps taken**

-Get a transparent polythene paper without a hole

-Look for a plant which is placed in sunlight

-Tie the polythene paper tightly around the branches or stem for at least 2 hours as shown below;

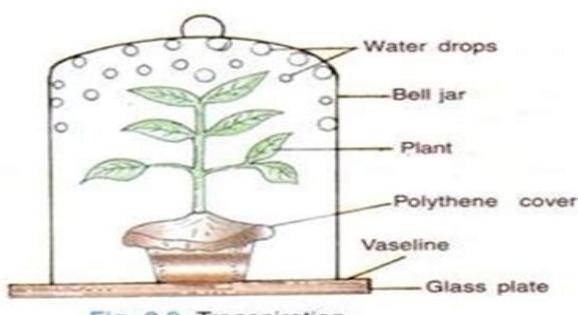


Fig. 2.9. Transpiration.

#### **Observation**

-Droplets of water appear around the polythene paper.

#### **Conclusion**

-Plants lose water through their leaves on a hot day.

#### **How is transpiration important to plants?**

- It cools plants on hot days
- It enables plants to pull more water and mineral salts through the root hair by the help of osmosis.

#### **How is transpiration important in nature?**

- It helps in rain formation

## **Dangers of transpiration to plants**

- It lowers the crop yield due to less water left in the crop.
- It may make plants to wilt since water is lost during a dry season.

## **Factors that affect the rate of transpiration**

- **Wind**

-Wind blows off water molecules on a leaf giving chance for more vapour to escape; this increases the rate of transpiration.

- **Humidity**

-Humidity is the amount of water vapour in the atmosphere.

-High rate of humidity lowers the rate of transpiration.

- **Temperature**

-High temperature during hot days makes stomata to open up causing leaves to lose a lot of water than cold days.

- **Heat from the sun**

-Heat from the sun the opening of the stomata hence creating more chance of losing water.

- **Surface area of a leaf**

-Plants with small surface area of their leaves lose water at a lower rate than those with larger surface area.

- **Number of stomata**

-Plants leaves with fewer stomata have a low rate of transpiration.

-The higher the number of stomata, the higher the rate of transpiration.

## **How do some plants reduce on the rate of transpiration?**

- By shedding their leaves during a dry season
- By producing a waxy layer to cover their stomata
- By modifying their leaves to form thorns eg cactus plants
- By having leaves with small surface areas

## **Exercise**

1. What is transpiration?
2. State any four factors that affect the rate of transpiration
3. Why do some plants shed their leaves during a dry season?
4. How do cactus plants reduce on the rate of transpiration?
5. Name the activity farmers can do to reduce on the rate of transpiration from their crops.
6. Why does a farmer cut off all leaves from a banana sucker before planting?

## **Flowers**

### **What is a flower?**

-A flower is a reproductive part of a flowering plant.

-It is where reproduction takes place in a plant.

-A flower has both female and male gametes.

**-A gamete** is a reproductive cell of an organism.

-Pollen grains are male gametes while ovules are female gametes in plants.

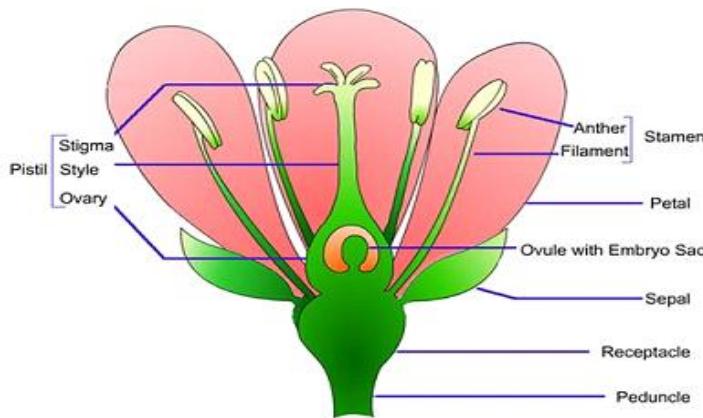
### **How are flowers useful to plants?**

- Flowers produce seeds and fruits for plants.
- Some flowers store food for plants e.g. cauliflower

### **Give any four ways in which flowers are useful to man.**

- Flowers are used for decoration.
- Some flowers are used for making perfumes and pesticides.
- Flowers are used to show love
- Some flowers are eaten as food.

## A diagram showing a flower and its parts



### Functions of each part of a flower

- **Petal**

- It protects the inner parts of a flower
- Brightly coloured petals attract insect agents of pollination like bees.
- A group of petals is called **corolla**.

- **Sepals**

- They protect the flower when still in a bud stage.
- Green sepals help to make starch for a plant.
- A group of sepals is called **calyx**

- **Stigma**

- It receives pollen grains during pollination

- **Style**

- It acts as a passage of pollen grains to the ovary.
- It also holds the stigma in position.

- **Ovary**

- It produces ovules
- It is where fertilization occurs in plants
- An ovary develops **into a fruit** after fertilization.

- **Ovules**

- Ovules are female gametes in plants
- Ovules develop **into seeds** after fertilization.

- **Anthers**

- They produce and store pollen grains

- **Filament**

- It holds the anther in position.

- **Receptacle**

- It protects the ovary and ovules.
- It develops into a fruit in pomes like apples

- **Flower stalk**

- It attaches a flower to a branch.

### Main parts of a flower

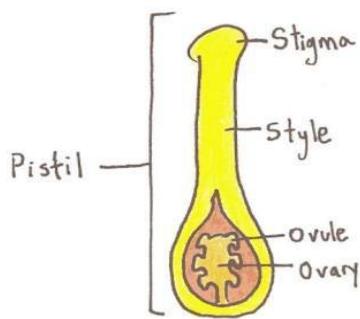
- A flower has two main parts, namely;

- Pistil
- Stamen

### What is a pistil?

- A pistil is a female part of a flower.

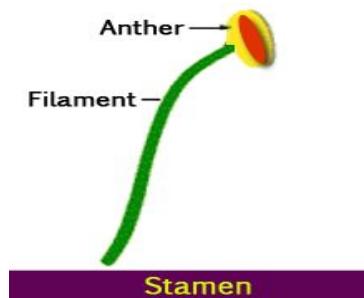
## A diagram showing a pistil



## What is a stamen?

-A stamen is a male part of a flower.

## A diagram showing a stamen



## Pollination

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

-It allows fertilization to occur in plants.

## Agents of pollination

-Agents of pollination refer to the factors that are responsible or cause pollination to take place.

### They include:

- Running water
- Wind
- Sunbirds
- Humming birds
- Bees
- Moths
- Butterflies

### Note

- Moths are nocturnal insects and have a high sense of smell.
- Bees have hairy bodies and pollen baskets on their hind legs e.g. worker bees.
- Sunbirds have long slender slightly curved beaks to enable them suck nectar at the base of a flower

## Types of pollination

There are two types of pollination, these are;

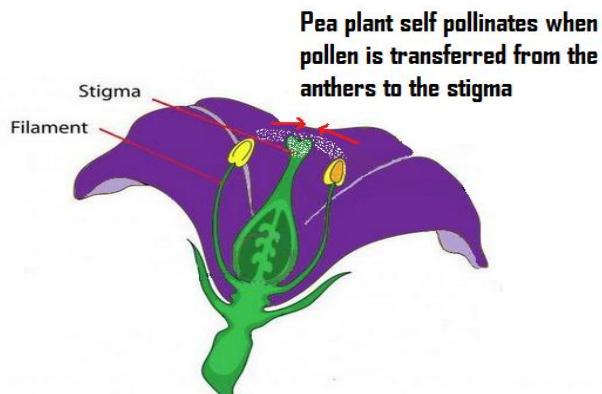
- Self pollination
- Cross pollination

## **What is self pollination?**

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

- Flowers that undergo self pollination have filaments taller than their styles.

### **A diagram showing self pollination in plants**



## **Adaptations of plants to self pollination**

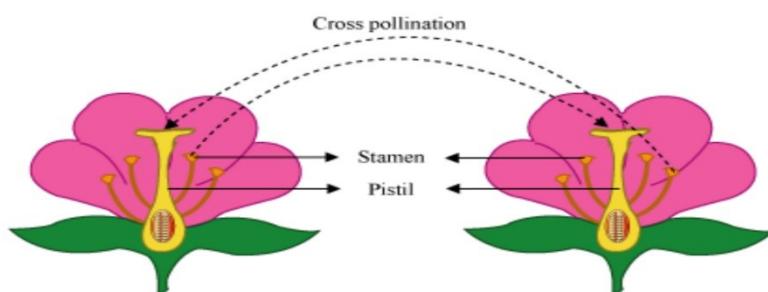
- The anthers and stigma mature at the same time e.g. tomatoes
- The flower remains closed until self pollination takes place
- The plant is a hermaphrodite i.e. it has male and female parts e.g. maize plant

## **What is cross pollination?**

-Cross pollination is the transfer of pollen grains from the anther of one flower to the stigma of another flower but of the same kind or species.

-Flowers that undergo cross pollination have filaments shorter than their styles.

### **A diagram showing cross pollination in plants**



## **Adaptations of plants to cross pollination**

- Maturing of anthers and stigma at different times e.g. maize and coconuts.
- The male and female flowers occur on separate plants e.g. pawpaw
- Pollen grains can't germinate on the stigma of the same flower and if they do, fertilization can't occur e.g. passion fruits.

## **What is fertilization?**

-Fertilization is the union of mature male and female gametes to form a zygote.

## **Where does fertilization occur in a flower?**

-Ovary

## **After fertilization, what do the following develop into?**

- a) ovules – seeds
- b) ovary \_ a fruit

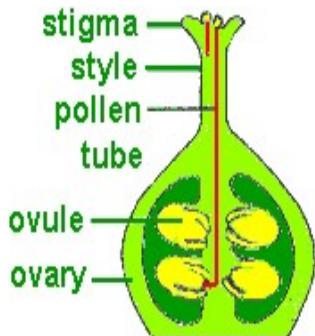
**What happens to pollen grains immediately they land onto the stigma of a flower?**

-Pollen grains germinate and form pollen tubes.

**What happens to the style of a flower after fertilization?**

-It dries and falls off.

**A diagram showing germination of pollen tubes**



**Importance of pollination**

- It allows fertilization to take place in plants.
- It allows high yields in farmer's harvests.

**Characteristics of flowers pollinated by insects**

- They are well scented (have a good smell).
- They have brightly coloured petals.
- They produce few pollen grains.
- They are large and easily seen.
- They have nectar.
- They have sticky stigmas.
- They have large rough and heavy pollen grains.

**Why do some flowers have brightly coloured petals?**

-To attract pollinators like bees

**Characteristics of flowers pollinated by wind**

- They are not scented.
- They have dull petals.
- They produce a lot of pollen grains.
- They are small and not easily seen.
- They do not have nectar.
- They have long feathery stigmas.
- They produce light pollen grains.

**Seeds**

**What is a seed?**

-A seed is a mature fertilized ovule.

-A seed develops into a new plant called a seedling.

**Types of seeds**

-There are two types of seeds, namely;

- Monocotyledonous seeds
- Dicotyledonous seeds

**What are monocotyledonous seeds?**

-Monocotyledonous seeds are seeds with one cotyledon.

-These seeds also known as grains or cereals

## Examples of monocotyledonous seeds

- Sorghum
- Maize
- Millet
- Wheat
- Rice
- Oats
- Barley
- Rye

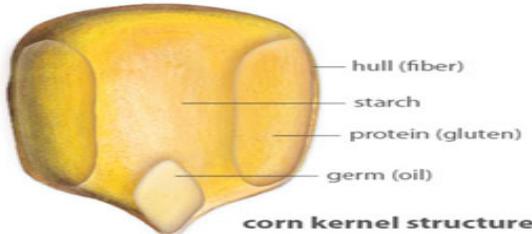
### A maize grain

-A maize grain is not a seed but a fruit.

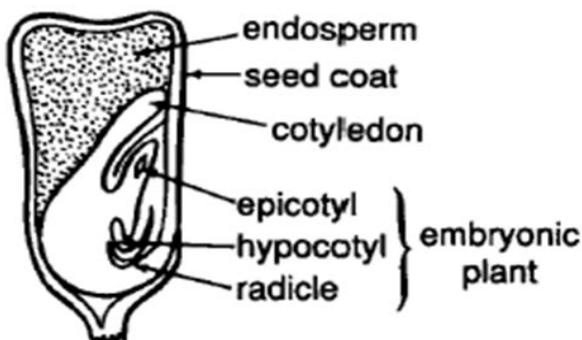
### Why is a maize grain classified as a fruit?

-It has two scars i.e. the cob scar and the style scar.

### External parts of a maize grain



### Internal parts of a maize grain



### Functions of each part of a maize grain

#### • Testa (seed coat)

-It protects the inner delicate parts of a maize grain.

#### • Endosperm

-It stores food for the embryo in monocots.

#### • Cotyledon

-It absorbs food from the endosperm and supplies it to the embryo during germination.

#### • Style scar

-It is a part where the style was attached.

#### • Stalk scar (cob scar)

-It is a part where the fruit was attached to the cob.

-It attaches a grain to a cob

#### • Embryo

-It grows into a new plant called a seedling.

-It consists of two parts i.e.;

#### • Plumule

-It develops into a shoot system.

#### • Radicle

-It develops into a root system

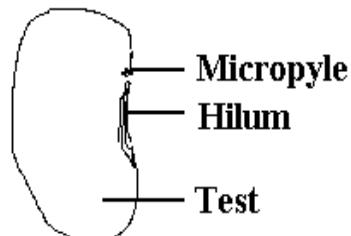
## **What are dicotyledonous seeds?**

-Dicotyledonous seeds are seeds with two cotyledons

### **Examples of dicotyledonous seeds**

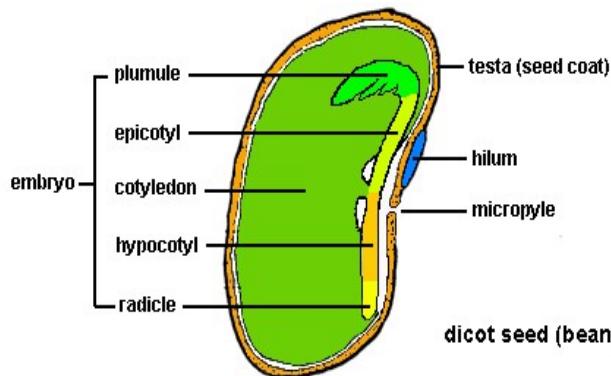
- Beans
- Ground nuts
- Soya beans
- Peas
- Bambara nuts
- Cowpeas
- Simsim
- Oranges
- Oil nuts

### **External parts of a bean seed**



**Bean Seed**

### **Internal parts of a bean seed**



### **Functions of each part of a bean seed**

- **Hilum**  
-It is a scar left behind attached which attached the seed to a pod, ovary or fruit.
- **Cotyledon**  
-It stores food for the embryo in dicots
- **Micropyle**  
-It allows air and water into a seed during germination

**Note:** Other parts of a bean seed play the same role as those of a maize grain.

### **Exercise**

1. State any three difference between monocotyledonous and dicotyledonous seeds
2. How is the function of a cotyledon in a maize grain different from that of a bean seed?
3. Mention any two uses of seeds to people
4. How is the function of a cotyledon of a bean seed similar to that of an embryo of a maize grain?

### **Germination**

-Germination is the development of a seed into a seedling.

-During germination, the radicle grows into the root system **to support the seedling firmly into the soil**.

-The radicle also grows root hair **to absorb water and mineral salts from the soil for the seedling**.

## **Types of germination**

-There are two types of germination, namely;

- Epigeal germination
- Hypogeal germination

### **Epigeal germination**

-Epigeal germination is the type of germination where the cotyledons come out of the ground.

-It is common in dicotyledonous seeds

### **Examples of seeds that undergo epigeal germination**

- Beans
- Soya beans
- Peas
- Bambara nuts
- Ground nuts
- Cowpeas
- Oil nuts

### **Diagrams showing epigeal germination**

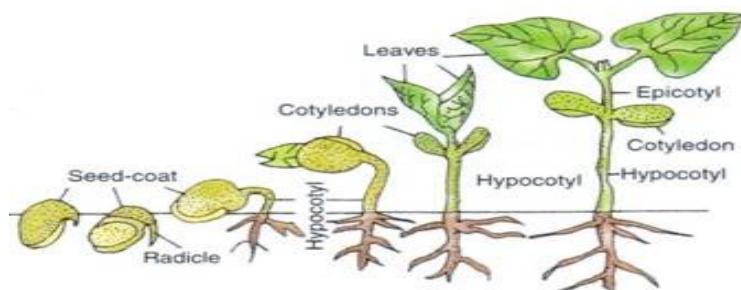


Fig. 3.8. Bean seed germination.

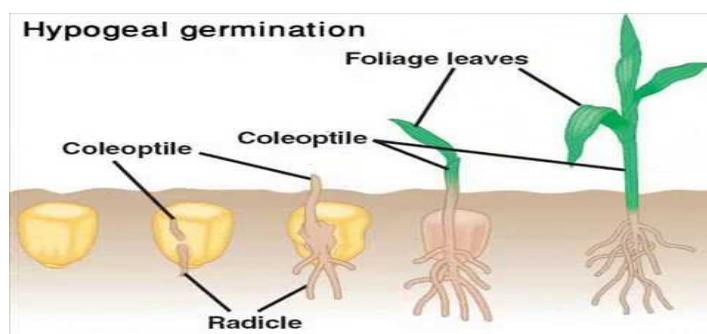
### **Hypogeal germination**

-Hypogeal germination is the type of germination where the cotyledon remains underground.

-It is common in monocotyledonous seeds

### **Examples of seeds that undergo hypogeal germination**

- Sorghum
- Wheat
- Millet
- Maize
- Oats
- Rice
- Barley
- Rye



### **Conditions necessary for germination**

- **Moisture**

-It swells the cotyledon hence bursting the testa.

-It dissolves food in the cotyledon

- **Oxygen**

-It helps in respiration (it burns starch to release energy)

- **Warmth**

-It provides right temperature for a seed to germinate.

**NB:** An experiment to show that seeds cannot germinate without oxygen, moisture and warmth. (**Refer to comprehensive pupils' book 4, page 47-48**)

### **Seed viability**

-Seed viability is the ability of a seed to germinate when necessary conditions are present.

### **What are viable seeds?**

-Viable seeds are seeds that are able to germinate when necessary conditions are present.

### **Qualities of viable seeds**

- They should be mature and dry.
- They should be healthy and of good variety.
- They should not have holes.
- They should be of good variety.
- They should not be broken.
- They should not be rotten.

### **What is seed dormancy?**

-Seed dormancy is the inability of a seed to germinate when necessary conditions are present.

### **Factors that lead to seed dormancy**

- Holes in seeds
- Premature seeds
- Unhealthy seeds/deceased seeds
- Damaged seeds
- Broken seeds

## **Fruits**

### **What is a fruit?**

-A fruit is a mature fertilized ovary.

-A fruit is a structure on a flowering plant which contains mature fertilized ovules.

-A fruit **has two scars** i.e. the style scar and the stalk scar.

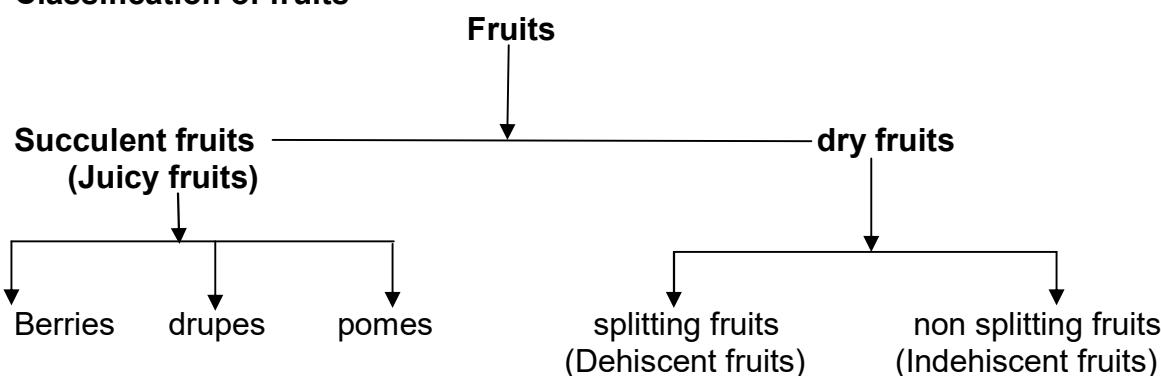
### **Importance of fruits to plants**

- They protect seeds.
- They help in scattering of seeds when ripe.

### **Importance of fruits to man**

- They are eaten as food
- They are sold for money

### **Classification of fruits**



### **What are succulent fruits?**

-Succulent fruits are fruits whose pericarp becomes juicy and can be eaten.

## A diagram showing different parts of a succulent fruit A mango

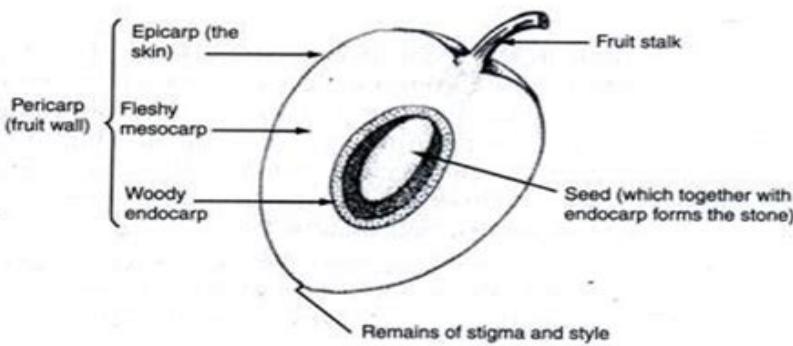
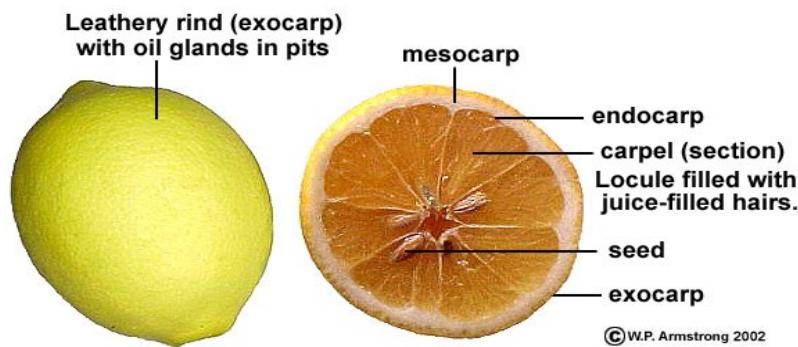


Fig. 16.13. Parts of a fruit

## An orange



Hesperidium (berry with a leathery rind)  
e.g. lemon (*Citrus lemon*)

## Classes of succulent fruits

### Berries

-Berries are succulent fruits with many seeds inside.

-Its pericarp is divided into three layers i.e. epicarp, mesocarp and endocarp.

### Examples of berries

- Guavas
- Oranges
- Passion fruits
- Lemons
- Pawpaw
- Water melons
- Bananas
- Tangerines
- Jackfruit

### Drupes

-Drupes are succulent fruits with only one seed inside.

### Examples of drupes

- Avocados
- Mangoes

### Pomes

-Pomes are succulent fruits which develop from the receptacle of a flower.

-The receptacle turns juicy and it is eaten.

### Examples of pomes

- Apples
- Pears

### Why is an avocado fruit classified as a drupe?

-An avocado fruit has only one seed inside.

### Dry fruits

-Dry fruits are fruits whose pericarp is usually dry, hard and woody.

### Classes of dry fruits

- Splitting fruits (dehiscent fruits)
- Non splitting fruits (indehiscent fruits)

### Splitting fruits

-These are dry fruits with a capsule or pod that split to disperse seeds when dry.

### **Examples of dehiscent fruits**

- Beans
- Peas
- Castor oil
- Ground nuts
- Soya beans

### **Non splitting fruits**

-These are dry fruits whose dry pericarp does not split to disperse seeds but have structures for their own dispersal.

-They have only one seed inside.

### **Examples of indehiscent fruits**

- Black jack
- Tridax
- Jacaranda
- Coconut
- Sun flower

### **Note**

-Fruits that develop from one flower are called **simple fruits**.

-Fruits that develop from many flowers on one stalk are called **compound or multiple fruits**.

-Fruits that are not formed from the ovary of a flower but develop from other parts of a flower are called **false fruits** e.g. apples.

## **Seed or fruit dispersal**

### **What is seed dispersal?**

-Seed dispersal is the scattering of seeds away from the mother plant over a wide area.

### **What is fruit dispersal?**

-Fruit dispersal is the scattering of seeds away from a parent plant to other areas.

### **Importance of seed dispersal**

- It enables plants to colonize new areas
- It reduces competition for food nutrients, sunlight and space among plants
- It prevents overcrowding of plants
- It increases the chances of survival of plant species (it prevents plant extinction)
- It minimizes diseases among crowded seedlings.

### **Disadvantages of seed dispersal**

- It leads to low harvest in case of self dispersal e.g. simsim and soya beans.
- It leads to easy spread of weeds in an area.

### **Agents of seed dispersal**

- Wind
- Animals
- Running water

### **Types of seed dispersal**

- Wind dispersal
- Animal dispersal
- Water dispersal
- Self dispersal (explosive mechanism)

### **Characteristics of seeds dispersed by animals.**

- They have juicy mesocarps e.g. mangoes, oranges, avocados
- They have hard seed coats to protect them from the digestive juices e.g. guavas and passion fruits.
- They have brightly coloured epicarps when ripe e.g. mangoes, tomatoes, guavas
- They produce a nice scent when ripe e.g. jack fruits and pineapples
- They have hooks on their seed coats which enable them to be attached to the body of the animals e.g. black jack (**see diagram below**)



- They have sticky hair e.g. boehavia seeds.



### **Characteristics of seeds dispersed by wind**

- They are small and light to be carried by wind easily
- They have wing-like structures for floating in air e.g. jacaranda seeds
- They have a parachute hair structure to enable them float in air e.g. dandelion seeds
- Some seeds have a tuft of hair e.g. cotton seeds

#### **Illustrations**

##### **Cotton seed**



##### **Jacaranda seed**



## Dandelion



## Tridax

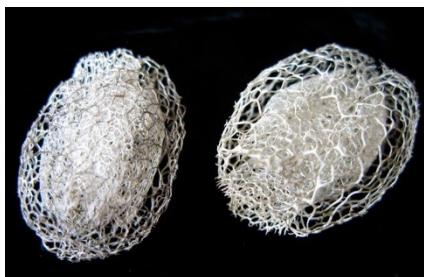


### Characteristics of seeds dispersed by water

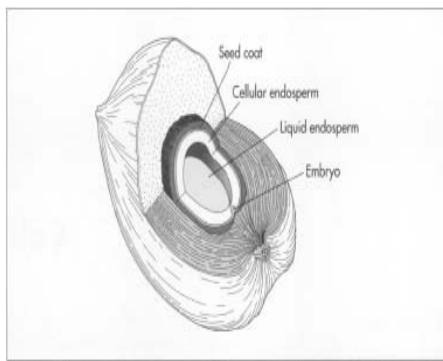
- They have many air spaces trapped inside them to enable them float on water
- They are light with waterproof pericarps

### Examples of seeds dispersed by water

- Water lily seeds



- Coconut fruit



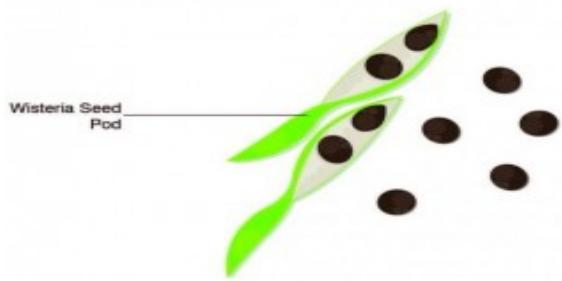
### Self dispersal

-They split their pods when ripe and disperse their seeds.

### Examples seeds that are self dispersed

- Beans
- Peas
- Castor oil

### Dispersal of Seeds by Explosion



## Asexual reproduction in flowering plants

### What is asexual reproduction?

-Asexual reproduction is a type of reproduction in which reproductive cells are not involved.

-Asexual reproduction in flowering plants is also called **vegetative propagation**

-It does not involve male cells, female cells or seeds

### What is propagation?

-Propagation is a way of developing new plant from a part of the older plant.

### What is vegetative propagation?

-This is the development of a new plant from a part of an old plant without using reproductive cells.

### Types of vegetative propagation

-There are two types of vegetative propagation, viz;

- Natural vegetative propagation
- Artificial vegetative propagation

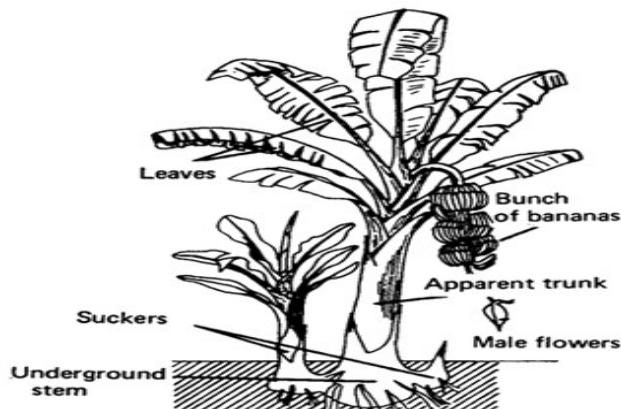
### What is natural vegetative propagation?

-This is the development of a new plant from a part of an old one without the activity of man.

### Examples of natural vegetative propagation

- Use of rhizomes e.g. ginger, cana lily, turmeric
- Use of corms e.g. coco yams, crocus, gladiolus
- Use of tubers e.g. Irish potatoes
- Use of bulbs e.g. onions, garlic, spider lily
- Use of suckers e.g. bananas, pineapples, sisal
- Use of leaves e.g. bryophyllum

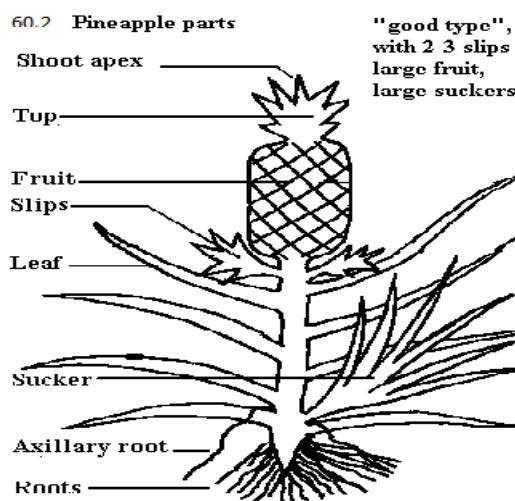
### A diagram showing a banana sucker



## State any three ways in which pineapples are propagated

- By use of suckers
- By use of a crown
- By use of a slip

## A diagram a pineapple and its parts



## Artificial vegetative propagation

-This is the development of new plants from parts of old plants by man.

### Examples of artificial vegetation propagation

-**Use of stem cuttings** e.g. cassava

-**Use of vines** e.g. sweet potatoes

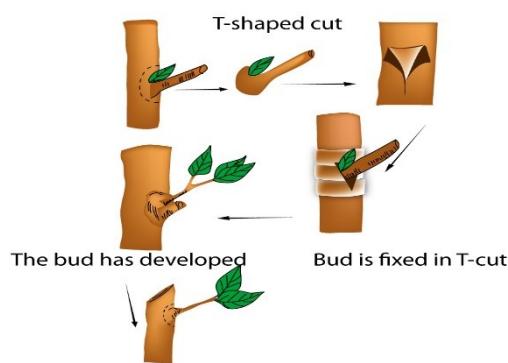
### Budding

-This is a method where a dormant bud from one plant is joined to another plant with well-established root system.

-**A scion** is a plant from which the axillary bud has been got from.

-**A stock** is a plant to which the axillary bud has been joined to.

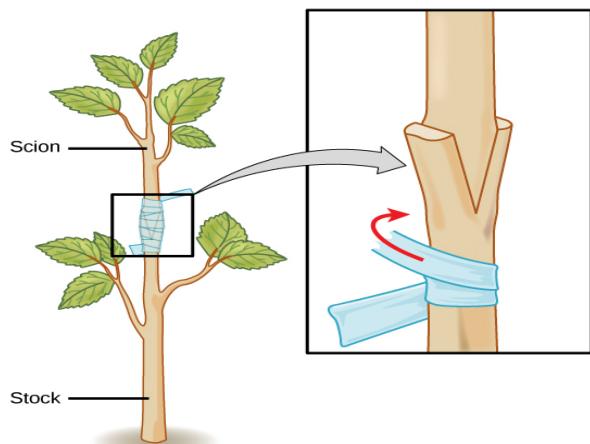
-Budding is commonly done in citrus plants like oranges and lemons rose plants



### Grafting

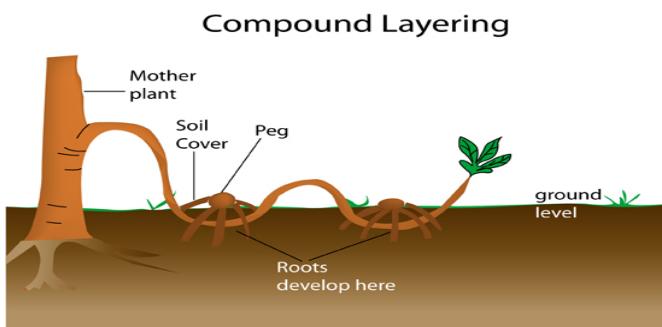
-It involves joining part of one plant to another plant of the same species.

-Grafting is used in the growing of citrus fruits e.g. oranges, grapes, lemons and limes



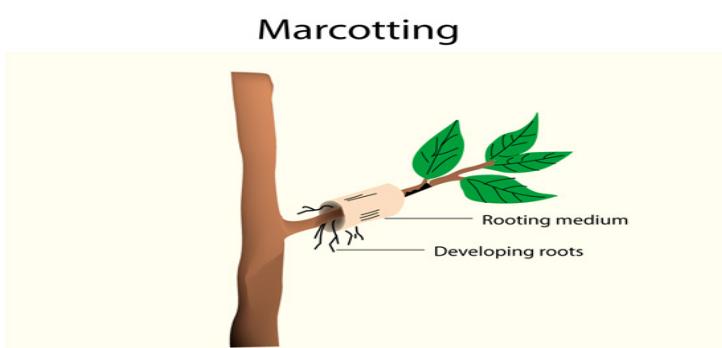
### **Layering**

- This is a method where by a branch from the mother plant is bent into the soil using pegs until adventitious roots develop from the nodes.
- Roses are propagated using this method.



### **Marcotting**

- This is the development of a new plant by tying fertile soil on the branch of an old plant from which the bark has been cut at the node.
- This is carried out on plants like mangoes trees.



### **Advantages of artificial vegetative propagation.**

- It improves on the plant species.
- It prevents plant extinction.
- It leads to development of a new variety of plants.

### **Disadvantages of artificial vegetative propagation**

- It requires skilled labour.
- It is slow and time consuming.

## **Advantages of asexual reproduction**

- The new plant uses food of the plant as it becomes established.
- The growth of a new plant is rapid as there is no resting period as in seeds.
- Only one plant is needed to produce the off-springs.
- Same characteristics are maintained as the off-spring is identical to the parent plant.

## **Disadvantages of asexual reproduction**

- No new varieties are produced
- Off-springs and the parent plant compete for light and nutrients
- Many individual plants may be destroyed by disasters like fire, floods and diseases
- Lack of variety leads to reduced resistance to diseases and climate changes

## **Tropisms**

### **What is tropism?**

-Tropism is the plant response towards stimuli.

-Tropism is the growth movement of a plant in response to a stimulus.

### **What is a stimulus?**

-A stimulus is any change in the environment to which a plant is sensitive to.

### **Examples of stimuli to which plants are sensitive to**

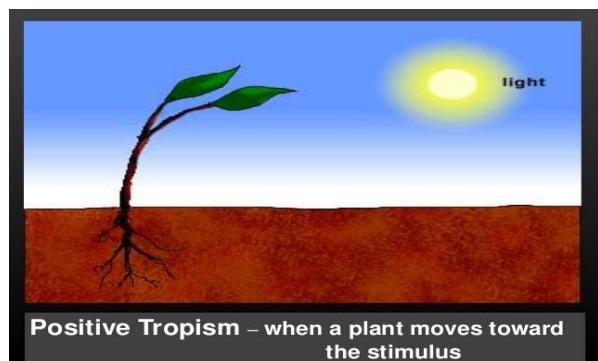
- Gravity
- Light
- Chemicals
- Touch
- Water

## **Types of tropisms**

### **Phototropism**

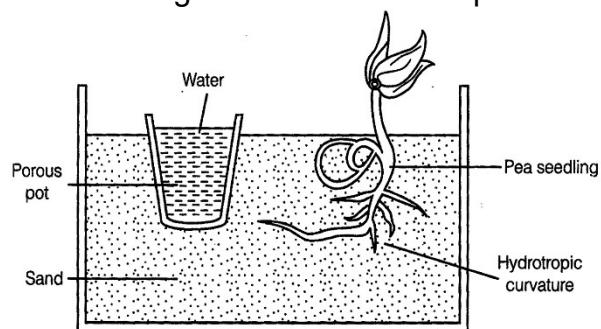
-This is the growth movement of a plant shoot towards light.

-This is the plant response towards light.



### **Hydrotropism**

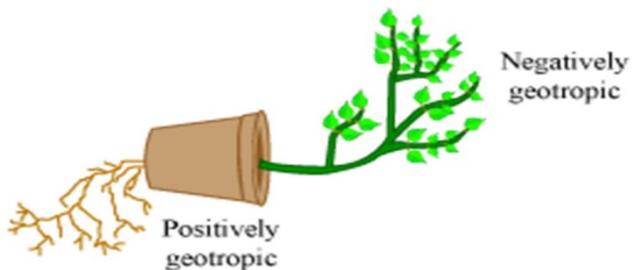
-This is the growth movement of plant roots towards water or moisture.



## **Geotropism**

-Geotropism is the growth movement to plant roots towards direction of force of gravity.

### **Diagrams showing roots of a seedling responding to force of gravity**



## **Thigmotropism or haptotropism**

-This is the plant response towards touch

## **Chemotropism**

-Chemotropism is the plant response towards chemicals.

## **Non flowering plants**

-Non flowering plants are plants that do not bear flowers.

### **Classes of non flowering plants**

- Spore producing plants
- Conifers (coniferous plants)

### **What are spore producing plants?**

-Spore producing plants are non flowering plants that reproduce by means of spores.

### **What is a spore?**

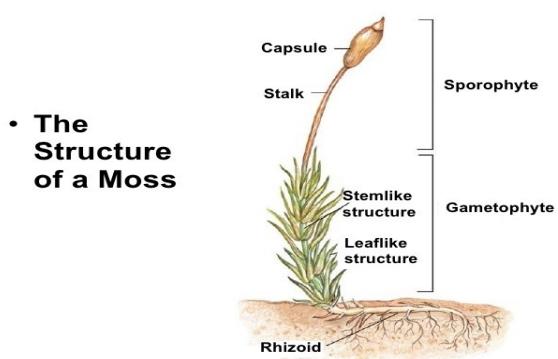
-A spore is a single cell which can develop into a plant under favourable conditions

-Spores are stored in special cases called **sporangia**.

### **Examples of spore producing plants**

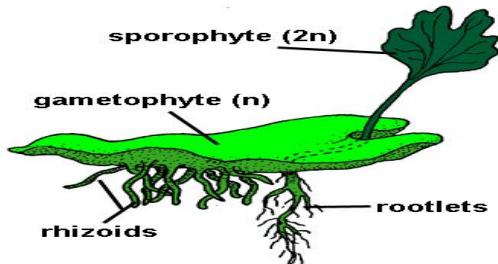
- Moss
- Ferns
- Liverworts
- Horsetails

### **Diagrams to show spore producing non flowering plants**

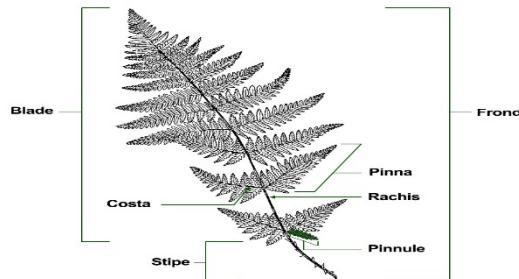


### **• The Structure of a Moss**

## Liverworts



## Parts of a Fern



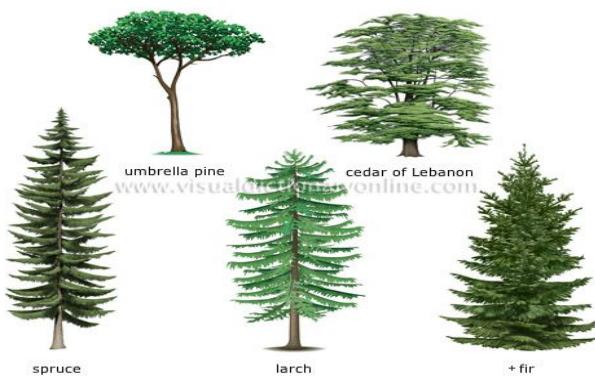
## Coniferous plants (conifers)

- Conifers are non flowering plants that reproduce by means of seeds.
- The seeds of conifers are protected by hard structures called **cones**.
- Conifers have roots, stems and needle shaped leaves.
- The small needle shaped leaves help conifers **to reduce the rate of transpiration**.

## Examples of conifers

- |         |          |              |
|---------|----------|--------------|
| • Pine  | • Podo   | • Cypress    |
| • Fir   | • Ginkgo | • Eucalyptus |
| • Cedar | • Cycar  |              |

## Illustrations



## Importance of conifers

- They provide man with soft wood timber.
- They are planted around homes as live fences and act as wind brakes
- They provide pulp for making paper, match sticks, tooth picks, etc.

## Exercise

1. How are mosses, liverworts and ferns similar?
2. Give one way conifers are different from other non flowering plants
3. State any two ways coniferous plants are useful to man.

4. How is the reproduction of conifers similar to that of beans?
5. In which way is the reproduction of mushrooms similar to that of ferns and mosses?
6. How is a sporangium useful to fern plants?
7. Why are liverworts able to make starch?
8. State any one in which algae is similar to plants.

## **THEME: SCIENCE IN HUMAN ACTIVITIES AND OCCUPATIONS**

### **TOPIC: KEEPING CATTLE**

#### **What is animal husbandry?**

-Animal husbandry is the act of keeping farm animals or livestock.

#### **Examples of livestock**

- Cattle
- Goats
- Sheep
- Rabbits
- Pigs
- Poultry

#### **What is cattle keeping?**

-Cattle keeping is the act of rearing cows, bull, bullocks, heifers, oxen on a farm.

#### **What does the term cattle refer to?**

-Cattle refers to cows, bull, heifers, bullocks, oxen and calves.

#### **Define the following terms**

- **Cow**

-A cow is a mature female cattle

- **Bull**

-A bull is a mature male cattle

- **Heifer**

-A heifer is a young female cow that has not yet given birth.

- **Bullock**

-A bullock is a young male cattle.

- **An ox**

-An ox is a castrated bull reared for doing work.

- **Calf**

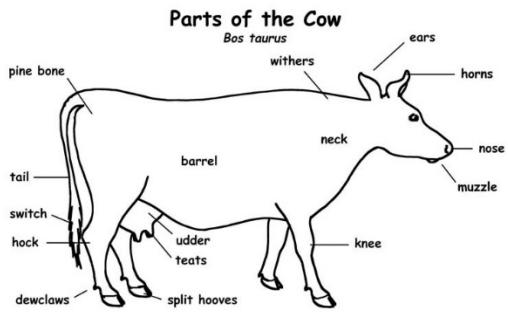
-A calf is a young one of a cow.

- **An incalf**

-An in-calf is a pregnant cow.

#### **Importance of keeping cattle**

- For meat production
- For milk production
- For employment
- For income generation
- For provision of labour e.g. oxen
- For hides which are used to make leather items
- For cultural purpose like paying dowry
- For their dung which is used as manure and to make biogas
- Their hooves are used to make glue
- Horns are also used to make buttons
- Their blood and bones are used as human food and in the making of poultry feeds respectively.



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## Functions of each part of a cow

- **Eyes**

-They enable the animal to see.

- **Ears**

-They are used for hearing

-They are also used to beat insects like tsetse flies around its head

- **Udder**

-It stores milk produced in the mammary glands.

- **Tail**

-It keeps swinging to beat the flies off disturbing insects like tsetse flies.

- **Horns**

-They are used for protection

- **Hooves**

-They protect the feet (toes).

## Breeds of cattle

### What is a breed of cattle?

-A breed of cattle is a family of cattle having similar characteristics.

### Examples of characteristics shown by a breed of cattle

- Colour of cattle
- Size of cattle
- Shape of cattle
- Productivity of the animal (milk and meat yields)

### Breeds of cattle kept in Uganda

- Local breeds (indigenous breeds)
- Exotic breeds
- Cross breeds

### Local or indigenous breeds of cattle

-These are cattle that lived in Uganda or East Africa for a very long time.

-They are also called native breeds.

-They are kept for both milk and meat production.

### Examples of indigenous breeds of cattle

- |   |  |
|---|--|
| <ul style="list-style-type: none"> <li>• Boran cattle</li> <li>• Small East Africa zebu</li> <li>• Ankole long horned cattle</li> </ul> | <ul style="list-style-type: none"> <li>• Nsagala or sanga cattle</li> <li>• Karimojong cattle</li> </ul> |
|---|--|

### Characteristics of local breeds of cattle

- They are resistant to diseases.
- They are resistant to harsh weather.
- They take long to mature (they grow very slowly).
- They can survive on poor pasture and little water.
- They produce little milk and less meat.

- They have different colours.
- They have less reproductive problems.

### **Exotic breeds of cattle**

-These are cattle that have been imported from other countries because of their good quality products.

### **Characteristics of exotic breeds of cattle**

- They have specific colour.
- They produce a lot of milk and their meat is soft.
- They mature fast (they grow faster).
- They are not resistant to tropical diseases.
- They are not resistant to harsh weather.
- They need good pasture and plenty of water.
- They need a lot of care/ high managerial skills.
- They have reproductive problems due to the big size of the calf.

### **Examples of exotic breeds of cattle kept in Uganda**

- |                  |                   |
|------------------|-------------------|
| • Friesian       | • American Braham |
| • Jersey         | • Charolais       |
| • Guernsey       | • Sahiwal         |
| • Ayrshire       | • Galloway        |
| • Hereford       | • Santa Gertrudis |
| • Brown swiss    | • Short horn      |
| • Jamaica hope   | • Red Poll        |
| • Aberdeen Angus |                   |

### **Advantages of local breeds of cattle**

- They are resistant to diseases.
- They are resistant to harsh weather.
- They can survive on poor pasture and little water.
- They have less reproductive problems.
- Disadvantages of local breeds of cattle.
- They produce little milk and less meat.
- They take long to grow.

### **Advantages of exotic breeds of cattle**

- They grow fast
- They produce a lot of milk and meat.

### **Disadvantages of exotic breeds of cattle**

- They are not resistant to tropical diseases.
- They are not resistant to harsh weather.
- They cannot survive on poor pasture and little water.
- They need a lot of care (they need high managerial skills).

### **Cross breeds**

-This is a breed of cattle got after mating purely local breeds with purely exotic breeds.

### **Reasons why crossbreeding is carried out**

- To improve on the local breeds of cattle.
- To improve on the quantity and quality of milk and meat produced.
- To increase disease resistance in animals.

### **Types of cattle**

#### **What is a type of cattle?**

-A type of cattle is a group of cattle kept for a specific or particular purpose.

## **Types of cattle reared in Uganda**

- Dairy cattle
- Beef cattle
- Dual purpose cattle
- Draught cattle

### **Dairy cattle**

-These are cattle kept purposely for milk production.

#### **Examples of dairy cattle**

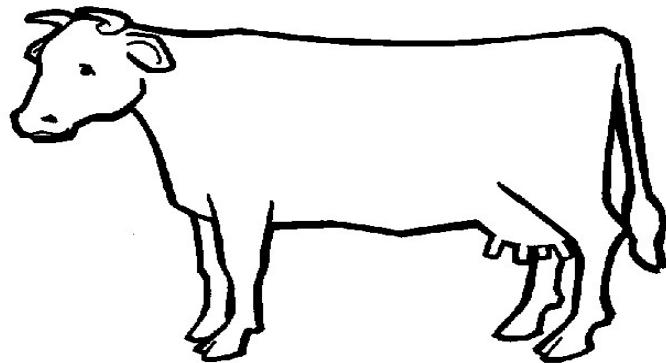
- Friesian
- Jersey
- Guernsey
- Jamaica hope
- Brown swish
- Ayrshire
- Sahiwal

**NB:** Friesians are the best producers of milk, with an average of 15-20 litres per day.

#### **Characteristics of dairy cattle**

- They are triangular in shape
- They have large well supported udders
- They have four long teats
- They have small long necks
- They have bigger hind quarters
- They produce much milk
- They have plenty of space between the hind legs

#### **The shape of dairy cattle**



### **Beef cattle**

These are cattle kept for meat production.

#### **Examples of beef cattle**

- Aberdeen Angus
- Hereford
- Galloway
- Boran
- Charolais
- American Brahman
- Santa Gertrudis

#### **Characteristics of beef cattle**

- They are rectangular in shape.
- They mature very quickly.
- They produce much meat.
- They have short legs with long broad bodies.
- They have small heads.
- They have ability to survive drought without losing weight.

## The shape of beef cattle



### Dual purpose cattle

-These are cattle kept for both meat and milk production.

#### Examples of dual purpose cattle

- Sahiwal
- Red Poll cow

### Draught cattle

-These are cattle usually kept for labour provision e.g. ploughing and pulling carts.

They are **mainly oxen**.

### Breeding in cattle

#### What is breeding?

-Breeding is the mating of selected animals in a planned manner to develop and maintain certain desired characteristics.

-Breeding is the maintaining of inherited characteristics in cattle.

#### Examples of inherited characteristics maintained include;

- Increased meat or milk production both quality and quantity
- Resistance to diseases
- Adaptability to harsh weather conditions
- Improved growth rate
- Colour and size

#### Types of breeding

- Inbreeding
- Line breeding
- Cross breeding
- Out breeding
- Upgrading

#### What is inbreeding?

-Inbreeding is the continuous mating of very closely related animals like brothers and sisters.

#### Disadvantages of inbreeding

- Weak animals will continue producing weak ones.
- There will be continuous production of animals with low meat and milk products.
- It leads to inheriting of poor qualities of animals.

#### How can the cattle farmer control inbreeding on the farm?

-By castration of male animals.

#### What is line breeding?

-This is the mating of closely related animals like cousins.

### **What is out breeding?**

-This is the mating of unrelated animals of the same breed.

### **What is upgrading?**

-This is the improving of the quality of animals by using a breed with superior qualities.

### **What is cross breeding?**

-This is the mating of unrelated animals of different breeds.

### **Advantages of cross breeding**

- It improves on the quality of local breeds.
- It improves the meat milk production.
- Cross breeds are more resistant to diseases than exotic breeds.
- Cross breeds are more resistant to harsh weather conditions than exotic breeds.
- Cross breeds grow faster than local breeds.

### **Note**

-Cross breeding is done to **improve on the quality of local breeds**.

-**A cross breed or hybrid** is obtained after cross breeding.

### **Reproduction in cattle**

#### **What is reproduction?**

-This is the ability for a living thing to produce and increase in number.

-Reproduction is the process by which living things produce other organisms similar to themselves.

-Cattle undergo sexual reproduction which involves mating and production of gametes.

-**A gamete** is a reproductive cell of an organism.

-In cattle, the male gametes are **sperms** and female gametes are **ova**.

#### **Heat period in cattle**

-Heat period is when a cow is ready for mating and it can become pregnant.

#### **Signs of a cow on heat**

- It becomes restless
- It urinates frequently
- It mounts others
- There is mucus discharged from the vulva
- There is reduction in milk production
- The vulva swells and turns reddish brown. This helps a bull to see it easily
- The cow makes a lot of noise (frequent mooing)
- It stands still when it is mounted by a bull
- Loss of appetite for food (it stops grazing)
- The temperature rises
- It puts its tail on the side so that its vulva can be seen
- It stands while others are lying down

#### **Insemination**

-Insemination is the act of depositing sperms into the female reproductive organ of a cow.

-This is the act of depositing sperms into the cow's vagina.

-It is only done when the female animal is on heat.

#### **Types of insemination/service**

- Natural insemination
- Artificial insemination

### **What is natural insemination?**

-This is the type of insemination where a bull deposits sperms into the cow's vagina.

### **A diagram showing natural insemination in cattle.**



### **Advantages of natural insemination**

- It is easy for a bull to notice signs of heat in a cow.
- It saves time since it is done by the bull.
- It does not bother a farmer to look for an inseminator.

### **Disadvantages of natural insemination**

- Small weak cows can be injured by big bulls.
- It is difficult to control hereditary diseases.
- A lot of sperms are wasted on one cow.
- It is expensive to transport a bull if not in place.
- In breeding is encouraged.
- Venereal diseases (STDs) can easily be spread.
- Once the bull dies, sperms are also lost.

### **Systems/methods of natural insemination**

- Hand mating
- Pasture mating

### **What is hand mating?**

-This is where a bull is kept away from cows and it is only brought when the cow is on heat and ready to be serviced.

### **What is pasture mating?**

-This is where the bull roams about with cows always such that it becomes easy for it to notice the signs of heat in cows.

### **Artificial insemination(A.I)**

-This is where a trained inseminator uses an inseminating syringe to deposit sperms into the cow's vagina.

-This is the introduction of semen into the female reproductive tract of a cow by artificial means.

-This is the introduction of sperms into the cow's vagina by the help of a trained veterinary officer.

### **A diagram showing an inseminator carrying out artificial insemination**



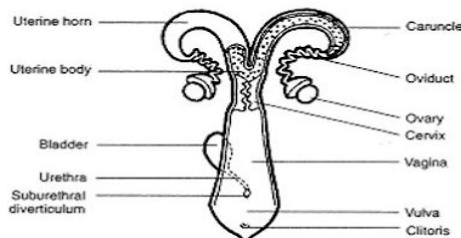
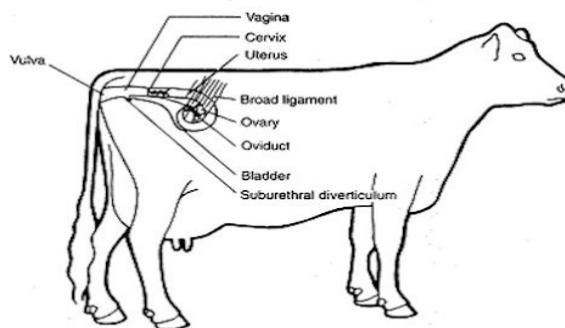
### **Advantages of artificial insemination**

- It controls the spread of venereal diseases/STDs.
- It controls in breeding.
- It is cheaper than buying and maintaining a bull.
- It prevents injuries on weak and small cows.
- It promotes selective breeding.
- It reduces the spread of venereal diseases.
- It prevents unwanted pregnancies.
- It is easy to detect infertility in cows.

### **Disadvantages of artificial insemination**

- Some farmers are not able to detect heat period in cows.
- It requires a trained and experienced inseminator.
- Transportation and storage of sperms may be difficult.
- Artificial insemination may not give good yields if semen from a poor quality bull is used.
- It must only be applied when a cow is on heat to avoid wastage.
- Animals are denied their natural sexual rights.
- An inseminator may not be available when required.

### **The female reproductive system of a cow**



### **Functions of each part**

- **Vulva**

-It receives and guides the penis inside.

-It also discharges urine.

- **Vagina**

-This is where sperms are deposited by the penis during mating.

-It also acts as a birth canal.

- **Oviduct/fallopian tube**

-It is where fertilization occurs.

-It is where conception takes place.

- **Uterus/womb**

-It is where implantation takes place.

-It is where the foetus develops from.

- **Cervix**

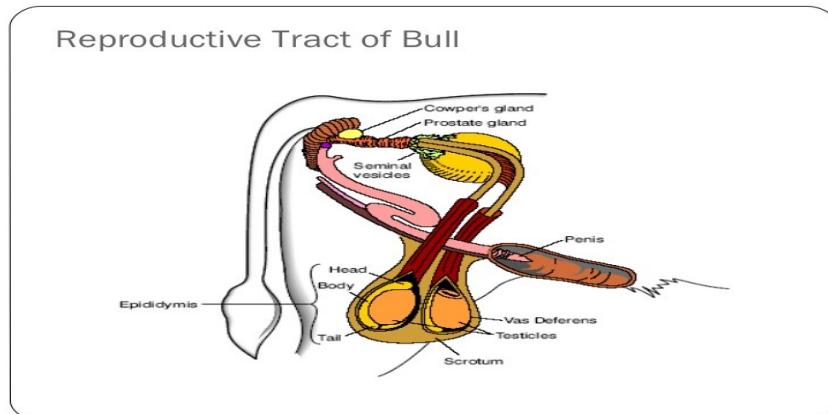
-It closes the lower end of the uterus during pregnancy.

- **Ovary**

-It produces ova.

-It produces oestrogen that control the sexual cycle.

### **The reproductive system of a bull**



### **Functions of each part**

- **Testes**

-They produce sperms

-They produce testosterone which increases sexual desire

- **Scrotum**

-It protects the testes from external injuries

-It regulates temperature around the testes

- **Epididymis**

-It stores sperms produced by the testes

- **Sperm ducts**

-They carry sperms from the testes (epididymis) to the urethra

- **Seminal vesicle**

-It produces semen through which sperms move

- **Urethra**

-It carries both sperms and urine to the penis

- **Penis**

-It deposits sperms in the cow's vagina

-It passes out urine

- **Sheath**

-It protects the penis minor injuries.

## **Fertilization in cattle**

- Fertilization is the fusion/union of male and female gametes to form a zygote.
- The immediate result of fertilization is **formation of a zygote**.

## **Where does fertilization in a cow take place?**

-In the fallopian tube/oviduct

## **Gestation period in cattle**

- Gestation period is the period between the time of conception and birth.
- Gestation period is the time taken from the time of fertilization to birth.
- Gestation period is also called **period of pregnancy**.

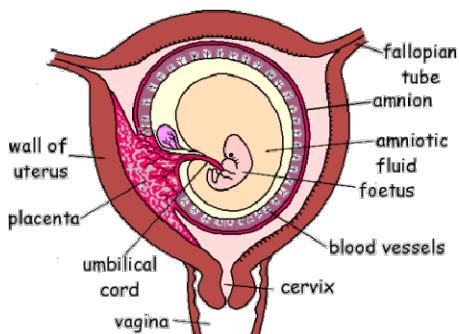
## **What is the gestation period of a cow?**

-9 months/270 days

## **Signs of a pregnant cow**

- It doesn't go on heat 21 days after insemination.
- Its abdomen grows bigger.
- The cervix closes up during pregnancy.
- Foetal movements are observed from 7 months onwards.
- The udder increases in size and fills up with milk after same time.

## **A developing foetus in the uterus**



## **Functions of each part**

- **Placenta**

- It supplies oxygen to the foetus.
- It supplies nutrients (digested food) to the foetus.
- It prevents the mother's blood from mixing the blood of the foetus.

- **Umbilical cord**

- It is a passage of food from the placenta to the foetus.
- It is a passage of oxygen to the foetus.
- It carries waste materials from the foetus.

- **Cervix**

- It closes the lower end of the uterus to prevent the foetus from coming out before the right time for calving.

- **Amniotic fluid**

- It acts as a shock absorber for any external pressure.
- It prevents friction between the foetus and the walls of the uterus.
- It protects the foetus from external injuries or shock.

- **Amnion**

- It is a sac for keeping the amniotic fluid.

## **Steaming up an incalf**

-Steaming up is the act of feeding a pregnant animal on feeds rich in proteins.

## **Reasons why steaming up is carried out in animal husbandry**

- It prevents low birth weight
- It enables the foetus to grow healthy
- It increases milk production
- It lengthens the lactation period in cows
- It builds up the cow's body in preparation for parturition/calving

## **What is lactation period?**

-This is the period when a cow gives milk after calving.

## **What is drying off period?**

-This is a period when a cow stops producing milk.

-This is a period when no milking is done in a cow.

-It is usually 2 months before a cow calves.

## **What is milk letdown?**

This is a practice whereby the cow allows the flow of milk from the udder to the teats.

## **Calving/parturition**

-This is the act of giving birth to a calf by a cow.

## **Signs of calving**

- The incalf isolates itself.
- The incalf stops grazing.
- The vulva enlarges and changes and changes colour.
- There is mucus discharge from the vulva.
- The incalf becomes restless.
- The udder greatly swells.
- The teats open.

## **Exercise**

### **1. Define the following terms as used in livestock management**

- |              |             |
|--------------|-------------|
| a) farrowing | c) kindling |
| b) lambing   | d) kidding  |

### **2. State the gestation period of each of the following animals below**

- |            |               |
|------------|---------------|
| a) goats   | i) elephant   |
| b) pigs    | j) baboon     |
| c) rabbits | k) gorilla    |
| d) sheep   | l) cheetah    |
| e) cows    | m) chimpanzee |
| f) bitch   | n) leopard    |
| g) man     | o) monkey     |
| h) rat     |               |

## **Colostrum**

-Colostrum is the first milk produced by a cow after calving.

## **Importance of colostrum to a calf**

- It opens the digestive tract of a calf.
- It contains antibodies hence boosting the immunity of a calf.
- It provides high quality proteins which help in proper growth of a calf.
- It provides a balanced diet to the calf.
- It contains high quantities of vitamin A.
- It contains calcium and phosphorus that strengthen bones.

## **Routine practices carried out on a cattle farm**

- |                        |                        |
|------------------------|------------------------|
| • Dehorning/disbudding | • Spraying and dipping |
| • Castration           | • Fencing              |
| • De-worming           | • Hoof trimming        |
| • Numbering            |                        |

## **What is dehorning/disbudding?**

-This is the removal of horn buds from a calf to prevent growth of horns.

### **Methods used in dehorning**

- Use of chemicals
- Use of red hot iron
- Use of a spoon dehorner

### **Reasons why cattle farmers carry out dehorning**

- It makes animals humble and easy to handle
- It creates space in the kraal and in vehicles during transportation.
- It prevents animals from hurting each other
- It helps to ensure good hides from animals
- Many animals can be kept on a small piece of land

### **Disadvantages of dehorning**

- It may lead to serious bleeding
- It causes a lot of pain

## **Castration**

-Castration is the removal of the essential sexual organs called testes from a male animal.

-This is the removal of testes from a male animal

### **What is the main aim of castration in animals?**

- To make the bull unable to fertilize the ova of a cow.

### **Methods of castration**

- Open castration/open operation method
- Closed operation method
- Use of a loop/elastrator method

### **Name the farm tool commonly used in closed castration method**

- Burdizzo

### **A diagram showing a burdizzo**



### **Reasons why farmers castrate their animals**

- Castrated bulls grow fatter.
- Castration helps to prevent inbreeding.
- Castration prevents unwanted pregnancies.
- Castrated bulls are humble and easy to handle.
- Castration controls the spread of STDs or venereal diseases.

### **Disadvantages of castration**

- The animals may lose a lot of blood and die.
- The wound may become septic and cause a lot of pain or even death.
- Animals are denied the right of sex.

## **Hoof trimming**

-This is the removal of hooves from animals.

-It is done using a hoof trimming knife or a pair of shears.

### **Why do farmers carry out hoof trimming in animals?**

-To prevent the easy spread of foot rot.

## **Tooth clipping**

-It is the act of cutting out the teeth of a calf in order to preventing them from hurting the cow when suckling.

-It should be done by an experienced veterinary officer.

-Teeth cutters are used in tooth clipping.

## **Fencing**

-Fencing is a method of enclosing cattle using different materials.

### **What is a fence?**

-A fence is a barrier that restricts animal movement on the farm.

### **Examples of materials used in fencing**

- Plants
- Wire nets
- Barded wires
- Bricks
- Chain links
- Treated poles
- Stone walls
- Gates

### **Types of fences**

- Natural fences/live fences
- Artificial fences/constructed fences

### **What are natural or live fences?**

-This is the type of fence where plants are planted a long margin of an area to be fenced.

#### **Illustration.**



### **Examples of plants used in natural fences**

- Bamboo
- Thorny plants
- Sisal
- Conifers
- Cassia

### **What are artificial or constructed fences?**

-This is a type of fence where artificial materials are used to enclose animals.

#### **Illustration**



### **Examples of materials used in artificial fences**

- Barbed wires
- Chain links
- Bricks
- Gates
- Treated poles
- Wire nets
- Stone walls

## **Advantages of fencing**

- It prevents animals from destroying crops.
- It protects animals from thieves and predators.
- It restricts animal movement and reduces the spread of diseases on the farm.
- It makes management and planning easier.
- It ensures proper use of pasture on the farm.
- It makes culling easy.
- Animals cannot get lost.
- It helps to enhance rotational grazing.
- Natural fences control soil erosion.
- There is easy collection of manure on the farm.

## **De-worming**

-De-worming is a practice of giving drugs to animals to kill internal parasites.

### **Methods of de-worming**

- Drenching
- Dozing

#### **What is drenching?**

-This is the act of giving liquid medicine to animal to kill internal parasites.

-A drenching gun is used during drenching.

#### **A diagram show a drenching gun**



#### **What is dozing?**

-This is the act of giving solid medicine to an animal to kill internal parasites.

-It is done using dozing gun.

#### **Illustration.**



#### **Why do farmers carry out de-worming of cattle?**

- To kill internal parasites like liver flukes, hookworms, tape worms and round worms.

## **Spraying and dipping**

-This is the use of acaricides to kill ecto parasites on animals.

### **What are acaricides?**

-These are agro-chemicals used to kill external parasites on animals' body.

## **Numbering**

-Numbering is the act of putting identification marks on animals.

## **Why do farmers carry out numbering of their animals?**

- For easy identification

### **Ways of numbering**

- **Branding**

-This is when a hot iron marked with a symbol for identification is used.



- **Ear notching**

-This is when the animal's ear is cut with marks at the edges.



- **Ear tattooing**

-This is done by marking permanent marks up using pliers carrying a letter that will identify the animal.

- **Tail bobbing**

-Here, the long hair on the animals' tails (switch) is trimmed.

- **Use of number laces**

-This is a wooden or iron piece of plate is put on the animals' necks.

- **Ear tagging**

-Tags having numbers are fixed on the ears of the animals using an applicator.

### **A diagram showing an animal with an ear tag**



### **Disadvantages of numbering in cattle**

- It spoils the quality of the hides.
- Animals feel a lot of pain.
- Animals may lose a lot of blood.

### **Milking**

-This is the way of obtaining milk from the cow's udder through the teats.

-It is the removal of milk from the cow's udder by squeezing the teats.

### **Methods of milking**

- Hand milking
- Machine milking

## **What is hand milking?**

-This is the act of getting milk from a cow's udder using hands.

### **Illustration**



### **Advantages of hand milking**

- It is cheap to maintain.
- The cow's udder cannot get injuries.

### **Disadvantages of hand milking**

- It cannot be used for commercial purpose.
- It is time wasting.
- It can only be applied when a farmer has few animals.

## **What is machine milking?**

-This is the act of obtaining milk from the udder of an animal using a machine.

### **Illustration**



### **Advantage of machine milking**

- It saves time
- Clean milk is obtained.
- It can be used for commercial purpose.
- It can be applied even when a farmer has many animals.

### **Disadvantages of machine milking**

- It needs trained personnel to operate the machine.
- The machine is expensive to buy.
- It can cause injuries to the udder if the machine is faulty.

## **How to obtain clean milk during milking/procedures of obtaining clean milk**

- Prepare the milking place and make it free from dust.
- Wash all containers to be used when milking.
- Wash the udder with warm water.
- Wash your hands before milking.
- Filter the milk after milking to remove any dirt and cover.

## **Why should we wash our hands and containers before milking?**

- To prevent contamination of milk

## **What is the importance of washing the udder of a cow with warm water before milking?**

- To stimulate milk letdown.

## **Examples of equipment used on a dairy farm**

- **Strip cup**

-A strip cup is used to detect mastitis disease in milk.

### **A diagram showing a strip cup**



- **Lactometer**

A lactometer is used to detect whether water has been added to milk.

It is also used to detect whether fats have been removed from milk.

### **A diagram showing a lactometer**



## **Products from cattle**

- **Meat**

-Meat is processed by **sundrying, smoking, salting and refrigeration**

-Meat from cattle is called **beef**.

-It is a very good source of protein for the human body and other animals.

-Meat is prepared by **roasting, deep frying, boiling, and steaming**.

- **Hooves**

-Cattle hooves are used in the manufacturing of buttons and glue.

- **Horns**

-Horns can be shaped into decorations.

-They can be curved into nice handles for knives

-They are also used in the making of buttons and earrings.

- **Hides**

-Cattle hides are the major source of leather used in making shoes, hand bags, suit cases, jackets, gloves and balls.

-It is turned into leather through a process called tanning.

## **Ways of treating hides**

- **Wet salting**



- *Suspension drying*



- **Dung and urine**

-They are rich sources of farmyard manure which is good for improving soil fertility.

-Cow dung is also used to produce biogas.

-Cow dung is also used as a building material for construction of houses.

- **Bones**

-These are used in preparing of bone meal as livestock feeds because they contain calcium.

-Calcium is good for quick and healthy growth of animals especially bones and teeth.

- **Milk**

-Milk is the chief product obtained from dairy cattle.

### **Preservation of milk**

-This is the way of keeping milk for a long time without going bad.

#### **Name the scientist who discovered that bacteria that make milk to go bad**

- Louis Pasteur

#### **Methods of preserving milk**

- |   |  |
|---|--|
| <ul style="list-style-type: none"> <li>• Pasteurization</li> <li>• Sterilization</li> </ul> | <ul style="list-style-type: none"> <li>• Refrigeration</li> <li>• Boiling</li> </ul> |
|---|--|

#### **Pasteurization**

-This is a process of killing micro-organisms in milk by heating at controlled temperatures and cooling it rapidly.

-Heat helps to kill micro-organisms without destroying the nutrients.

-It also helps to increase the quality of milk.

-It does not cause any change in the taste of milk.

-This method was discovered by **Louis Pasteur**.

#### **Sterilization**

-This is a process of making milk free from micro-organisms/germs by maximum boiling followed by cooling, then putting in sterile containers and sealed immediately.

-It prevents entry of germs into milk.

#### **Refrigeration**

-This is where milk is kept in refrigerators at lower temperatures to about 4 °C.

#### **Boiling**

-This is when milk is heated from time to time to kill germs which entered it when cold.

-It is the commonest method of preserving milk in rural areas.

### **Products got from milk**

- Butter
- Yoghurt
- Ice cream
- Whey
- Cheese
- Ghee
- Powdered milk
- Casein

### **Ways of preserving meat**

- Refrigeration
- Smoking
- Sundrying
- Salting
- Boiling
- Caning
- Freezing

### **Methods of preparing meat**

- Roasting
- Deepfrying
- Frying
- Cooking

### **Edible products got from cattle**

- Milk
- Meat
- Blood

### **Exercise**

1. What is milking?
2. Name the two methods of milking
3. Give any two necessary requirements during milking
4. How is a strip cup useful to a dairy farmer?
5. State the importance of a lactometer to a milk man
6. State any four ways of preserving milk
7. Identify any two activities carried out during milking to obtain clean milk
8. What should a milk man do before milking?
9. Briefly describe how the above products of milk are obtained
10. Mention any two indicators of spoilt milk

### **Cattle housing**

-Livestock need to be kept in proper houses. They include the following;

- Cattle shed/kraal
- Calf pens
- Zero grazing units
- Milking parlour
- A spray race
- A dip tank
- Byre
- Farm stores

### **Reasons why the cattle should be kept in the houses**

- To protect them from wild animals.
- To protect them from thieves.
- To protect them from bad weather.
- To provide a resting ground for the animals.
- For easy spraying and dipping of the animals.

### **A spray race**

-A spray race is a confined space in which cattle are sprayed.

-The spray is under pressure and is delivered through a series of pipes.

### **Illustration**



### **Advantages of using a spray race**

- There is less wastage of acaricides.
- Many animals can be sprayed in a short time.
- Animals receive proper coverage of the acaricides.
- Less labour is needed to operate a spray race.

### **Disadvantage of using a spray race**

- It is expensive to construct.

### **Dips and dip tanks**

-A dip tank consists of an entrance, a swim bath, exist ramp and a draining race.

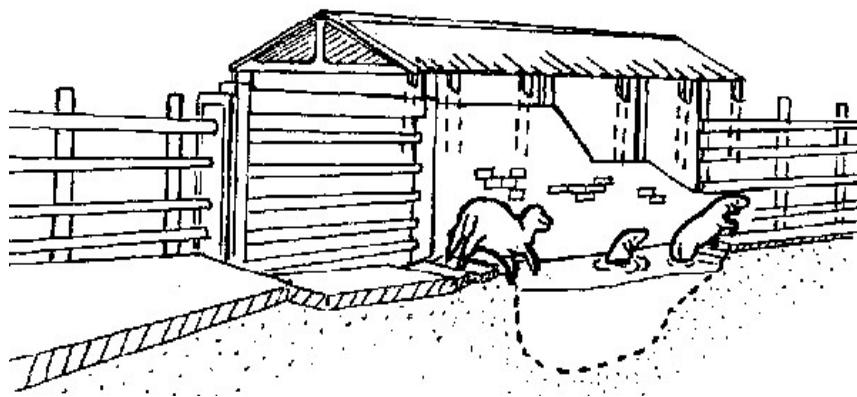
-It is made of concrete.

-Animals enter the dip through an entrance and then move to a foot bath containing clean water.

-The animals should be properly submerged in a swim bath.

-The foot bath enables animals to overcome diseases like foot rot.

### **A diagram of a dip tank**



### **Advantages of using a dip tank**

- It is very useful when a farmer has large herds of cattle, sheep and goats.
- Low labour is needed.
- The acaricides can be used again.
- There is proper coverage of animals with acaricides.
- Dips are cheap to run if communally owned.

### **Disadvantages of using a dip tank**

- The initial capital for making a dip tank is quite high.
- A skilled worker is needed to detect the strength of the acaricides.

### **Qualities of a good byre/kraal**

- It should be well ventilated.
- The floor should be slanting to enable urine drain out easily.
- The floor should be made out of concrete for easy cleaning.
- It should be kept dry and clean.
- It should be roofed to protect animals from bad weather.

## **Feeding cattle**

### **Reasons for feeding cattle**

- To enable animals grow well.
- To enable animals produce enough milk.
- To enable animals give more meat.
- To enable animals get energy to move.
- For building the body and repairing worn out cells.

### **Types of feeds for cattle**

#### **Concentrates**

-These are feeds usually prepared in factories.

#### **Examples of concentrates**

- Maize brand
- Oil seeds
- Seed cakes
- Legume seeds

#### **Pasture**

-Pasture is open grassland where animals graze.

#### **Types of pasture**

- Natural pasture
- Prepared pasture

#### **What is natural pasture?**

-This is grass that grows on its own and can be eaten by cattle

#### **Examples of natural pasture**

- Kikuyu grass
- Alfalfa
- Guinea grass
- Elephant grass
- Nandi grass
- Rhodes grass
- Star grass
- Spear grass

#### **Prepared pasture**

-These are feeds made from fodder crops like;

- Napier grass
- Maize silage
- Millet
- Sorghum
- Sweet potatoes
- Oats

#### **Succulents**

-These are feeds with high moisture content and low fibre content.

#### **Examples of succulent feeds**

- Banana peelings
- Maize stalks
- Potato vines

#### **Forages**

-They include;

- Dry grass or hay
- Dry maize stalks
- Preserved green fodders

#### **Supplements**

-These are added to boost the nutritious value of ordinary feeds.

-They include;

- Proteins
- Mineral salts
- Vitamins

## Additives

-Animal feeds can also be enriched by additives such as drugs and flavour added to feeds.

## Why should animals be given salt?

- To stimulate milk production.
- To control some diseases like milk fever.

## Storing of cattle feeds

-The two common types of storage feeds for cattle are **hay** and **silage**.

-Hay is made from dry grass such as disodium, Lucerne, Rhode grass and star grass.

-They are cut and dried for future use mostly in dry seasons.

-Hay is baled and stored in dry places called barns

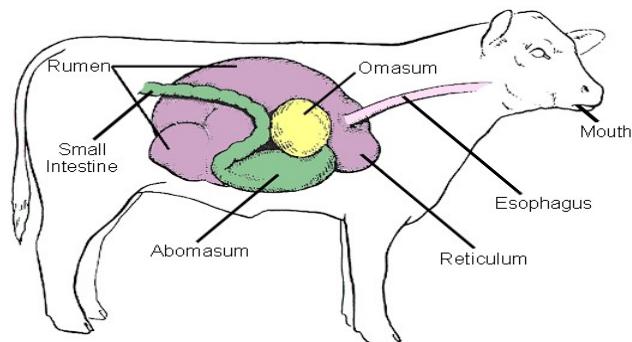
-It should be **protected from rain as bales can get wet and feeds rot**.

-**Silage** is plant materials used to make animal feeds when they still have moisture in them.

-Crops suitable for making silage are maize, sorghum and legumes.

-These green parts of the plants are chopped into small pieces and fed to animals

## The digestive system of a cow



-Cattle are ruminant animals having four stomach chambers, namely;

### Rumen/pouch

-It is the first stomach of a ruminant animal where food is first stored before being sent back to the mouth for rumination.

### Reticulum/honey comb

-It is the second stomach

-It is where stones, sticks, and unchewed grass is separated from well chewed food.

-Bacteria acts on food here.

### Omasum

-This is the third stomach

-It grinds grass to make it fine

-It is where absorption of water takes place

### Abomasums/true stomach

-This is where digestion by enzymes takes place.

### Grazing cattle

#### What is grazing?

-Grazing is the proper use of pasture by animals

#### Systems of grazing

-There are three systems of grazing cattle, these include;

- Zero grazing
- Rotational grazing
- Herding/free range grazing

## **Zero grazing system**

- Zero grazing is a system of grazing cattle where they are kept indoors.
- This is a system where the farmers keep cattle in stalls, grass shelters and feeds are brought to the animals within the stalls.
- It is commonly practiced where there is shortage of land like in **urban areas**.

### **Requirements for zero grazing**

- A well constructed shade
- A feed trough
- Workers to feed the animals and clean the stalls.
- A garden where fodder is grown.
- A place for cleaning equipment.
- Drainage ways to remove water and dung from the stalls.
- Chaff cutter for cutting fodder into pieces.

### **Advantages of zero grazing system**

- It is easy to collect manure.
- Feeds are not wasted.
- It controls the spread of cattle pests and diseases.
- Animals are protected from bad weather.
- It is easy to spot sick animals.
- It is easy to calculate the amount of feeds used.
- There is less risk of getting diseases.
- Animals are more productive because there is no wastage of energy.
- Many animals can be kept in a small area.

### **Disadvantages of zero grazing**

- It is expensive to start and buy feeds for animals.
- It requires a lot of labour.
- Animals don't get physical exercises since they are confined in one place.

### **A diagram showing zero grazing/stall grazing**



## **Herding/Free range grazing**

### **What is herding?**

- Herding is a system where animals are left to move freely and graze as monitored by a herdsman.
- It is **common in rural areas** since there is enough land.

### **Illustration**



### **Advantages of free range grazing**

- It is cheap way of feeding cattle.
- Animals get plenty of physical exercises as they move around.
- It does not require fencing.
- It does not require a lot of labour.

### **Disadvantages of free range grazing**

- Diseases can easily spread from one herd to another as they mix up.
- Animals can move astray and destroy crops.
- It can easily lead to overgrazing due to unrestricted grazing.
- It is a waste of animals' energy as they move for long distances looking for pasture and water.
- It requires a bigger piece of land.
- It is difficult to control inbreeding.
- Animals can easily get lost if not well monitored.
- Pasture is wasted.

### **Rotational grazing**

#### **What is rotational grazing?**

-Rotational grazing is a method where animals graze on one portion of pasture at a time.

-This is a system in which animals are moved from one place to another in the grazing land.

#### **Methods of rotational grazing**

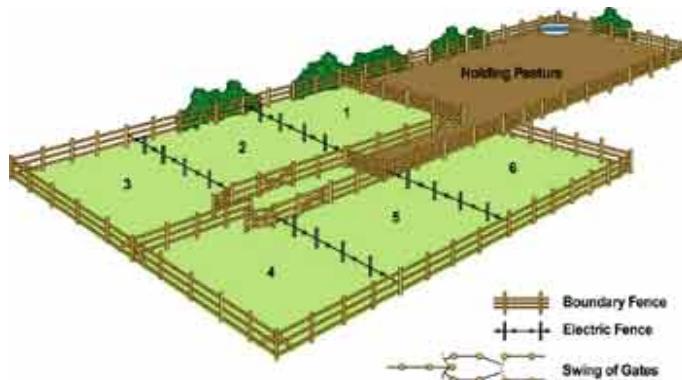
-There are three methods of rotational grazing namely;

- Paddocking/Paddock grazing
- Strip grazing
- Tethering

#### **Paddock grazing**

-This is a method of rotational grazing where a farmer divides grazing land into portions/sections called paddocks using fences.

#### **A diagram showing paddock grazing method**



### **Advantages of paddock grazing**

- Pasture is given time to grow.
- Tick borne diseases are controlled.
- Manure is well distributed on the farm.
- Pasture is not wasted (it ensures maximum use of pasture).
- Overgrazing is controlled.
- It controls soil erosion.
- It is easy to isolate sick animals.
- Animals do not destroy farmers' crops.
- Animals cannot easily get lost.
- It gives a farmer time to do other activities.
- It lessens labour needed to look after animals.

### **Disadvantages of paddock grazing**

- It requires a large piece of land.
- It is expensive to fence the paddocks.
- Animals may not have enough room for physical exercises.
- Animals may not get a balanced diet.
- Barbed wires can easily tear the animals' skins.

### **Exercise**

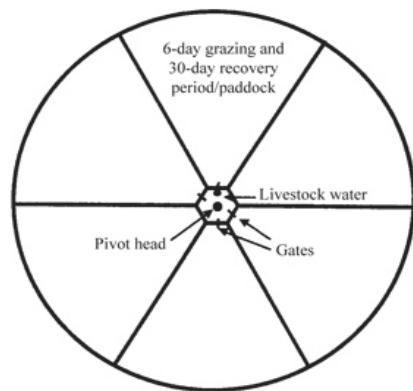
1. Mention the three systems of keeping cattle
2. Which system of grazing cattle is caused by nomadic pastoralists?
3. Give a reason why cattle farmers in towns mainly use zero grazing
4. Identify any two advantages of zero grazing
5. State any three advantages of paddock grazing
6. How does paddock grazing control tick borne diseases on a cattle farm?
7. Why is it difficult to control diseases spread in free range grazing?

### **Strip grazing**

-This is a method where small sectors called strips are created to restrict animal movement.

-Temporary fence or electric fences are used where electric shocks keep the animals in a confined area.

### **A diagram showing strip grazing**



### **Advantages of strip grazing**

- There is no wastage of pasture.
- It prevents overgrazing.
- Diseases and parasites are easily controlled.

### **Disadvantages of strip grazing**

- It requires a lot of labour to move temporary fences.
- Few animals can be kept at a time.
- It requires more watering points if many animals are kept.
- It is expensive to start.
- It requires a large piece of land.

### **Tethering**

-Tethering is a method of grazing which involves tying animals on pegs using ropes to graze in a limited area.

-The animals eat grass in a restricted area whose radius is the length of the ropes.

-Once the grass is finished, the animal is moved to another place.

-Water is brought to the animals in a feeding water container or the animal is tied near a water source.

### **A diagram showing a tethered animal**



### **Advantages of tethering**

- It is cheap and easy to maintain.
- A farmer chooses the best pasture for the animal.
- No fencing is required.
- Animals get a balanced diet.
- There is proper distribution of manure.
- The farmer gets time to rest.
- Animals cannot easily destroy crops.

### **Disadvantages of tethering**

- It encourages overgrazing which causes soil erosion.
- Few animals are kept.
- Animals can easily be strangled by the ropes.
- Many ropes are needed, thus expensive to the farmer.
- Animal feeding is only limited to areas around the peg.
- Animals do not get physical exercises.
- It is tedious to transfer animals from one place to another when pasture is over in a particular place.
- It requires much labour to supply water to the animals.
- Animals are exposed to several risks such as bad weather, predators and thieves.

## Cattle parasites and diseases

### Cattle parasites/cattle pests

-A parasite is an organism which depends on a host for food and shelter without killing it.

### Types of cattle parasites

- Ecto parasites
- Endo parasites

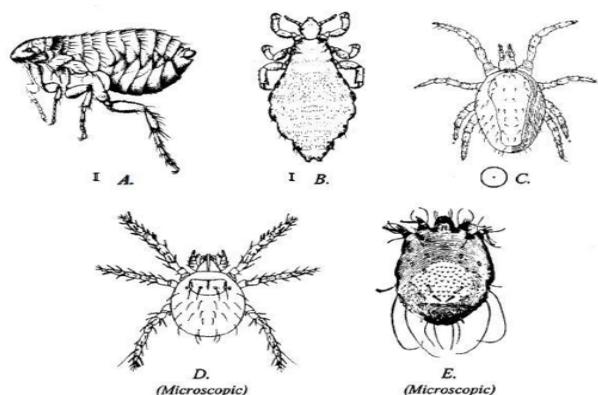
### What are ecto parasites?

-These are parasites that live outside the body of an animal (a host).

### Examples of ecto parasites

- Ticks
- Fleas
- Tsetse flies
- Lice
- Mites

### Diagrams of some ecto parasites



### How can we control ecto parasites in cattle?

- By spraying using acaricides.
- By dipping animals in dip tanks.
- By practising rotational grazing especially paddock grazing.
- Bush clearing, controls tsetse flies.
- Fencing the farm.

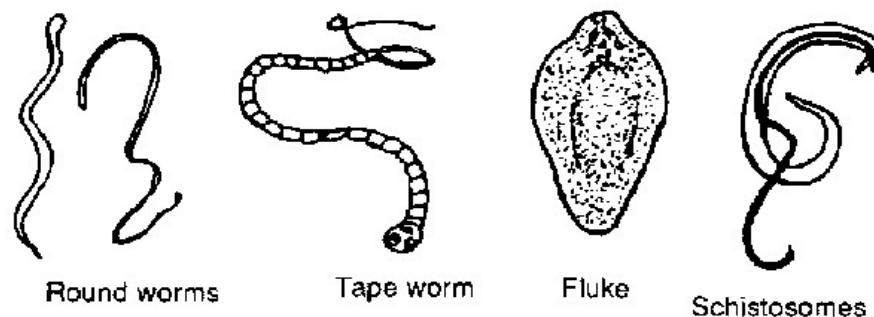
### What are endo parasites?

-These are parasites that live inside the body of the animal.

### Examples of endo parasites

- Tape worms
- Round worms
- Hook worms
- Liver flukes

### Illustration



Round worms

Tape worm

Fluke

Schistosomes

### Note

- Tape worms feed on digested food.
- Hook worms suck blood from an animal.
- Liver flukes live in the bile duct or liver.

### How can a farmer control endo parasites in cattle?

- By de-worming animals
- Destruction of infected meat by burning
- Keeping animal houses clean by using soap, water and disinfectants to wash the feeding and milking equipment.

### Dangers of parasites to animals

- They suck blood from animals
- They transmit disease-causing germs to animals
- They cause damage to the skin of the animal making it uncomfortable.

### Cattle diseases

#### Factors that lead to cattle diseases

- Lack of some nutrients in the feeds (poor feeding)
- Failure to observe proper hygiene
- Physical injuries
- Infections by micro-organisms

#### Signs of sickness in cattle

- Loss of appetite
- Dullness
- Passing out urine with strange colour
- Diarrhea
- Change in body temperature
- Coughing
- Difficulty in breathing
- Restlessness

#### Groups of cattle diseases

-There are three groups of cattle diseases namely;

- Viral diseases
- Bacterial diseases
- Protozoan diseases

#### Viral cattle diseases

These are cattle diseases caused by viruses.

#### Examples of viral cattle diseases

- Rinderpest
- Foot and mouth diseases

#### Rinderpest

-It is a viral cattle disease which is also spread through body contact with infected animals.

#### Signs and symptoms of Rinderpest

- High fever
- Diarrhea with blood stains
- Nasal discharge
- Loss of appetite to graze
- Sores in the mouth
- Tears of the eyes
- Severe dullness

#### Control of Rinderpest

- By isolation of infected animals
- Regular vaccination
- Slaughter all infected animals
- Apply quarantine

## **What is quarantine in animal management?**

- This is the restriction of animal movement when there is outbreak of a contagious disease.
- Quarantine is a law that restricts the movement of animals and their products in case of an outbreak of a contagious disease.

## **Foot and mouth disease**

-It is a contagious viral cattle disease.

### **-It is spread through:**

- Sharing feeding containers with infected animals.
- Sharing grazing areas and water sources with infected animals.
- Body contact with infected animals.

## **Signs and symptoms of foot and mouth disease**

- |   |   |
|---|---|
| <ul style="list-style-type: none"><li>• Blisters on the mouth and hooves</li><li>• Lameness</li><li>• Loss of appetite to graze</li><li>• Wounds on the tongue and hooves</li></ul> | <ul style="list-style-type: none"><li>• Swollen hooves</li><li>• Dullness</li><li>• High temperature</li><li>• Reduction in milk production</li></ul> |
|---|---|

## **Control of foot and mouth disease**

- By isolating infected animals.
- By vaccinating every after six months.
- By applying quarantine method.
- Observing proper hygiene.

## **Bacterial diseases**

-These are diseases caused by bacteria.

## **Examples of bacterial diseases in cattle**

- |   |   |
|---|---|
| <ul style="list-style-type: none"><li>• Tuberculosis</li><li>• Black quarter</li><li>• Anthrax</li><li>• Mastitis</li></ul> | <ul style="list-style-type: none"><li>• Foot rot</li><li>• Calf scour</li><li>• Pneumonia</li><li>• Brucellosis</li></ul> |
|---|---|

## **Mastitis**

-It is a bacterial disease which affects the cow's udder.

-It mainly spreads through body contact with infected animals.

## **Signs and symptoms of mastitis**

- Milk with blood stains or pus
- Swollen painful udder and teats
- The cow does not allow milking or suckling

## **Control of mastitis**

- Early treatment using antibiotics
- Always use a strip cup when milking
- Milk out the teats and massage with hot water
- Strict cleanliness and use of disinfectants

## **Anthrax**

-It is an infectious cattle disease caused by bacteria called **bacilli anthracis**.

## **How it is spread**

- Through body contact with infected animals.
- Through contaminated feeds.

## **Signs and symptoms of anthrax**

- High fever of over 40 C
- Loss of appetite to graze

- Dullness
- Excessive blown up stomach
- Blood stained dung
- Watery blood from body openings
- Sudden death

### **Control of anthrax in cattle**

- Report suspected anthrax cases to the veterinary authorities as soon as possible
- Separate the infected animals
- Vaccinate animals yearly
- Burry deeply the dead carcass
- Burn the carcass of animals
- Never touch the carcass of animal that dies of anthrax

### **Tuberculosis**

-It is a bacterial cattle disease **spread in the following ways;**

- Through breathing in air contaminated with tuberculosis germs
- Through milk from infected cows to calves

### **Signs and symptoms of tuberculosis**

- Chronic cough
- Loss of appetite to graze
- Loss of weight
- Decrease in milk production

### **Prevention and control of tuberculosis**

- Isolate infected animals
- Slaughter infected animals
- Early treatment using antibiotics on the infected ones
- Observing good hygiene

### **Pneumonia**

-It is also a bacterial cattle disease.

-It is **spread through contaminated and living in dirty pens.**

### **Signs and symptoms of pneumonia**

- Difficulty in breathing
- Nasal discharge
- Loss of appetite to graze
- High fever
- Coughing

### **Prevention and control of pneumonia**

- Keeping animals in well ventilated clean and dry pens
- Treating animals with antibiotics in early stages
- Keeping animals in warm places

### **Brucellosis (contagious abortion)**

-It is a contagious bacterial disease

-It **affects the cow's reproductive system.**

### **How it is spread in cattle**

- From infected bulls during mating
- Through eating materials contaminated with discharge from infected cattle
- Through contact with infected animals

### **Signs and symptoms of brucellosis**

- Abortion followed by brownish vaginal discharge
- Retention of the placenta

- The cow may not appear sick

### **Prevention and control of brucellosis in cattle**

- Slaughter all infected animals
- Regular vaccination
- Don't touch aborted foetus with bare hands
- Milk from infected animals must be boiled

### **Foot rot**

-It is a bacterial cattle disease which affects the hooves of cattle.

### **Signs and symptoms of foot rot**

- Animals become lame
- Swollen painful hooves
- Hooves contain pus and have bad smell

### **Prevention and control of foot rot**

- Use of foot bath of copper sulphate
- Treat with antibiotics early enough
- Regular trimming of hooves
- Isolate the sick animals

### **Black quarter**

-It is an acute infectious cattle disease caused by bacteria.

### **Signs and symptoms of black quarter**

- High fever and shivering
- Swollen and painful muscles
- Lameness

### **Prevention and control of black quarter**

- Vaccinate every year
- Treat with antibiotics early enough
- Dispose off the carcass

### **Contagious Bovine Pleuro Pneumonia (CBPP)**

-It is a contagious acute cattle disease caused by bacteria.

### **Signs and symptoms of CBPP**

- High temperature
- Loss of appetite to graze
- Hard painful coughing
- Rapid breathing

### **Prevention and control of CBPP in cattle**

- Slaughter all infected cattle
- Apply quarantine
- Regular vaccination
- Isolation of infected cattle

### **Calf scour**

-It is a bacterial disease that affects calves

### **Signs and symptoms of calf scour**

- Diarrhea with yellow faeces
- High temperature
- General body weakness

### **Prevention and control of calf scour**

- Maintain proper hygiene
- Isolate infected ones
- Proper ventilation of calf pens
- Proper feeding

## **Protozoan diseases**

-These are cattle diseases caused by protozoa.

### **Examples of protozoan diseases in cattle**

- Nagana (Trypanosomiasis)
- Heart water
- Red water
- Anaplasmosis
- East Coast Fever

### **Nagana**

-It is a protozoan cattle disease spread by tsetse flies.

-It is caused by trypanosome protozoa

### **Signs and symptoms of nagana**

- High fever
- Dullness
- Running eyes which leads to blindness
- Loss of weight
- Anaemia
- Swollen lymph nodes
- Loss of appetite to graze

### **Prevention and control of nagana in cattle**

- By spraying with insecticides to kill adult tsetse flies
- Clearing bushes
- Using tsetse fly traps to kill adult tsetse flies

### **East Coast Fever (E.C.F)**

-It is a protozoan tick borne disease.

-It is spread through bites by infected brown ear ticks.

### **Signs and symptoms of East Coast Fever**

- Loss of appetite to graze
- High fever
- Diarrhea
- Nasal discharge
- Loss of weight
- Difficulty in breathing
- Swollen legs and lymph glands

### **Prevention and control of E.C.F**

- By dipping cattle in dip tanks.
- By spraying using acaricides.
- By practicing paddock grazing.

### **Heart water (Rickettsiosis)**

-It is a tick borne disease spread through bites of infected brown ear ticks.

### **Signs and symptoms of heart water**

- High fever
- Dullness
- Animals move in circles
- Convulsions
- Animals place their heads against hard objects

### **Prevention and control of heart water**

- Dipping animals in dip tanks
- Spraying with acaricides
- Treat early cases with tetracycline antibiotics

## **Red water (Babesiosis)**

-It is a tick borne disease spread through bites of infected red ticks.

### **Signs and symptoms of red water**

- Fever
- Constipation
- Dullness
- Yellow mucus membranes
- Red urine
- Swollen lymph glands
- The animal licks soil

### **Prevention and control of red water**

- Spraying with acaricides
- Dipping animals in dip tanks

## **Anaplasmosis (Gall sickness)**

-It is a protozoan cattle disease transmitted through blue ticks.

### **Signs and symptoms of anaplasmosis**

- Anaemia
- Constipation
- Blood in urine and faeces
- Temperature may fall

### **Prevention and control of anaplasmosis**

- Spraying with acaricides
- Dipping animals in dip tanks
- Treat early with tetracycline

## **Practices that harm cattle and other domestic animals**

- Making them walk long distances.
- Brutal way of killing the animals.
- Bestiality (human beings have sexual intercourse with cows).
- Constantly hitting animals when being used for ploughing.
- Overloading the animals as they carry goods to and fro.
- Piercing them to get blood.
- Cattle are always transported very badly by overloading them in a small means of transport that may lead to suffocation.
- Some farmers do not give enough feeds to the animals leading to starvation and gradual death.
- Neglecting the animals when they are sick.
- Unhealthy housing facilities.
- Castration and dehorning.

## **Farm records**

-These are written information on various activities on the farm.

### **Types of farm records**

- Feeding records

-They show the type of feeds bought, amount of feeds given to animals.

- Breeding records/Flock records

-They show when mating took place, using artificial insemination or calving.

- Health records

They show records such as the date of vaccination and treatment.

- Inventory records

-They show the property of the farmer e.g. livestock, land, buildings, farm equipment, etc.

- Production records

-They show yields in the farm, e.g. amount of milk produced by a cow.

- Sales and expense/income and expenditure records

-These contain information on sales, amount of money used in buying feeds, medicine and paying workers

### **Importance of farm records**

- They enable farmers to calculate his losses and profits.
- They enable farmers to know the sales and expense.
- They enable government to tax the farm fairly.
- They enable farmers to get loans from banks.
- They help in proper planning for the farm.
- They enable farmers to make decisions on the farm.
- They enable farmers to know the past events or to follow the history of the farm.

### **Requirements for starting a livestock farm**

- **Land**

-Land can be acquired by buying or inheriting.

- **Capital**

-Capital refers to the money used to start a farm.

-A farmer can get capital by getting loans from a bank.

-Capital can be used to pay workers, pay utility bills, buy livestock, buy machines and animal feeds.

- **Labour**

-Labour means manpower.

### **Types of labour**

- *Skilled labour*
- *Unskilled labour*

-Skilled labour is got from trained personnel while unskilled labour is got from those who have not gone through training processes but can provide services.

- **Management**

-A farmer is able to manage the farm by himself/herself.

-He/she may employ somebody who is more knowledgeable in farm management in order to plan and guide the rest of the workers on how to carry out their duties in a more organized way to raise profit to the farm.

### **Problems affecting cattle keeping in Uganda**

- Climatic changes e.g. drought.
- Lack of enough capital.
- Lack of drugs for the animals.
- Lack of reliable market for the animal products.
- Animal pests and diseases.
- Lack of skilled labour and management.
- Shortage of land.
- Poor quality animals.

## **THEME: THE ENVIRONMENT**

### **TOPIC: RESOURCES IN THE ENVIRONMENT**

#### **What is a resource?**

-A resource is something that man uses to satisfy his needs.

-A resource is something in the environment that man uses for a certain purpose.

#### **Examples of resources in the environment**

- Plants
- Animals
- Water
- Fuels
- Soil
- Air/wind
- Minerals
- The sun
- Rocks

#### **Types of resources in the environment**

-There are two types of resources in the environment namely;

- Renewable resources
- Non-renewable resources

#### **What are renewable resources?**

-These are resources which can be naturally replaced when used up.

#### **Examples of renewable resources**

- Plants
- Soil
- Animals
- Air/wind
- Water
- The sun

#### **Plants as resources in the environment**

#### **How are plants useful to man as resources in the environment?**

- Some plants provide food to man.
- Some plants provide herbal medicine to man.
- Plants are a source of wood fuel e.g. charcoal and firewood.
- Plants provide man with oxygen during photosynthesis.
- Plants provide man with timber for making furniture.
- Plants provide raw materials for agro-based industries like cotton, tobacco, sugar canes, tea and sisal.

#### **Examples of resources got from plants**

- Food
- Oxygen
- Medicine
- Plant fibre
- Wood fuel

#### **Why are plants called resources?**

- Plants can be used to satisfy man's needs

#### **Why are plants regarded as renewable resources?**

- Plants can be naturally replaced when used up

#### **How can plants be replaced when used up?**

- By practicing afforestation
- By practicing re-afforestation
- By practicing agro forestry

#### **Animals as resources**

#### **Why are animals called resources?**

- Animals can be used to satisfy man's needs.

#### **How are animals as resources useful in the environment?**

- Animals provide food to man e.g. milk, eggs, meat and honey.
- Animals are used for transport e.g. oxen, donkey, camel and horses.

- Animals provide man with labour e.g. oxen are used for ploughing.
- Animal dung is used as manure.
- Animal wastes are used in the making of bio gas.
- Animals provide skins and hides used for making leather items.
- Animals provide animal fibre e.g. silk, mohair and wool.
- Animals are used for protection e.g. dogs.

### **Examples of resources got from animals**

- |  |   |
|--|---|
| <ul style="list-style-type: none"> <li>• Food</li> <li>• Labour</li> <li>• Animal fibre</li> </ul> | <ul style="list-style-type: none"> <li>• Manure</li> <li>• Transport</li> </ul> |
|--|---|

### **Why are animals regarded as renewable resources?**

-Animals can be naturally replaced when used up

### **How can animals be replaced when used up?**

- Through reproduction and growth

### **Water as a resource**

#### **Why is water regarded as a resource?**

-Water can be used to satisfy man's needs

### **Uses of water as a resource in the environment**

- Fast flowing water is used to generate hydro electricity
- Water is used for irrigation
- Water is used in industries to cool machines
- Water is used for domestic purposes like washing, drinking, cooking and bathing

### **Why is water regarded as a renewable resource?**

-Water can be naturally replaced when used up through a rain cycle.

### **The sun as a resource**

#### **Why is the sun regarded as a resource in the environment?**

-The sun can be used to satisfy man's needs

### **Uses of the sun as a resource in the environment**

- The sun provides sunlight needed during photosynthesis
- The sun's heat helps to preserve foodstuffs
- The sun's heat helps to dry our clothes when washed
- The sun's heat helps in rain formation
- The sun helps in production of solar electricity
- The sun provides light that enables man to see
- The sun's heat enables our bodies to make vitamin D

### **Air/wind as a resource**

-Air is a mixture of gases in the atmosphere.

-Wind is moving air/air in motion.

- **How is wind useful as a resource in the environment?**

Wind is used in winnowing.

- Wind helps in pollination of man's crops.
- Wind helps in seed dispersal.
- Wind helps in drying our clothes.
- Wind helps in sailing dhows.
- Wind helps to move kites, paper planes, air bubbles, boat racing and parachute games.
- Wind is used to run windmills to generate electricity.

## A diagram showing a windmill



### Uses of air in the environment

- Oxygen is used for respiration in all living things.
- Oxygen also supports burning and helps seeds to germinate.
- Carbon dioxide is used to preserve soft drinks.
- Carbon dioxide is used in extinguishing fire.
- Argon and nitrogen are used in electric bulbs.

### Components of air

#### Nitrogen

- It occupies the largest percentage of (78%).
- It is used in electric bulbs.
- It is added to the soil to improve on its fertility.

#### Oxygen

- It occupies 20% of the atmosphere.
- It is used for respiration.
- It helps in seed germination.
- It is used in burning.

#### Name the processes that need oxygen to occur

- Germination
- Respiration
- Burning/combustion
- Rusting

#### Name the natural process that adds oxygen in the atmosphere

- Photosynthesis

#### How does photosynthesis add oxygen to the environment?

- Oxygen is given out as a bi-product during photosynthesis.

#### Carbon dioxide

- It occupies the least percentage (0.003%).
- It is used in extinguishing fire.
- It is used in preservation of soft drinks and tinned foods.
- It is used as a raw material by plants to make starch.

#### Why is carbon dioxide used in fire extinguishers?

- Carbon dioxide stops fire from burning.
- It does not support burning.

#### Why is carbon dioxide used in preservation of soft drinks?

- It doesn't allow multiplication/breeding of germs

#### Name the process which adds carbon dioxide to the environment

- Respiration
- Burning/combustion
- Rusting

#### Which process in the environment reduces carbon dioxide in the environment?

- Photosynthesis

### **Examples of rare gases**

- Xenon
- Argon
- Neon
- Helium
- Krypton
- Hydrogen

### **How is argon gas useful to man?**

-It is used in electric bulbs.

### **Soil as a resource**

#### **What is soil?**

-Soil is the top layer of the earth's surface.

#### **Why is soil regarded as a renewable resource?**

-Soil can be replaced naturally when used up.

#### **Name two process by which soil can replaced when used up.**

- Weathering of rocks.
- Decomposition of organic matter.

### **Uses of soil as a resource in the environment**

- Soil is used for making bricks.
- Soil is used for pottery.
- Soil is used for building houses.
- Sand soil is used for making glasses.
- Soil is used for making tiles, cups, plates.
- Soil is used in crop growing.
- Sand soil is used for extinguishing petrol fire.
- Sand soil can be sold for money
- Sand soil is used for washing saucepans at home.

### **Non - renewable resources**

-Non - renewable resources are resources that cannot be naturally replaced when used up/exhausted.

### **Examples of non - renewable resources in the environment**

- Minerals
- Rocks
- Coal
- Petroleum
- Natural gas
- Sand
- Clay

### **Minerals as resources in the environment**

-A mineral is an inorganic chemical compound found underground in form of crystals.

### **Examples of minerals**

- Gold
- Copper
- Diamond
- Soda ash
- Tin
- Aluminium
- Uranium
- Silver
- Phosphates
- Limestone, etc.

### **Why are minerals called resources?**

-Minerals can be used to satisfy man's needs.

### **Why are minerals regarded as non - renewable resources?**

-Minerals cannot be naturally replaced when used up.

**The table below shows some minerals and their uses**

Mineral	Use
Iron	<ul style="list-style-type: none"> <li>Making axes, hoes, nails, iron bars, spare parts of motor vehicles, etc.</li> </ul>
Gold	<ul style="list-style-type: none"> <li>Making earrings, watches, necklaces, trophies, etc.</li> </ul>
Copper	<ul style="list-style-type: none"> <li>Making electrical wires, bullets, freezers, refrigerators, coins, etc.</li> </ul>
Aluminium	<ul style="list-style-type: none"> <li>Making tins, aeroplane bodies, spare parts of motor vehicles, roofing sheets, sauce pans, kettles, etc.</li> </ul>
Wolfram	<ul style="list-style-type: none"> <li>Tungsten metal is extracted from it. Tungsten is used to make filaments of electric bulbs</li> </ul>
Mercury	<ul style="list-style-type: none"> <li>Used in thermometers as temperature indicator.</li> <li>It is also used to make some insecticides and materials used to fill dental caries.</li> </ul>
Tin	<ul style="list-style-type: none"> <li>Used to make food cans, pipes, etc.</li> </ul>
Lead	<ul style="list-style-type: none"> <li>Used to make accumulators, batteries, water and sewage pipes.</li> </ul>
Uranium	<ul style="list-style-type: none"> <li>Used to produce heat energy which is changed into electricity.</li> </ul>
Sodium	<ul style="list-style-type: none"> <li>Used to produce common salt.</li> </ul>
Diamond	<ul style="list-style-type: none"> <li>Used in cutting of glass and drilling of rocks.</li> </ul>
Asbestos	<ul style="list-style-type: none"> <li>Used in the making of roofing sheets/tiles.</li> </ul>
Phosphates	<ul style="list-style-type: none"> <li>Used in the making of fertilizers.</li> </ul>

## Rocks as resources in the environment

### What is a rock?

-A rock is a hard substance which is formed on the earth's surface.

-An ore is a rock containing minerals.

### What is geology?

-Geology is the scientific study about rocks.

### Who is a geologist?

-A geologist is a person who studies about rocks.

### Why are rocks called resources?

-Rocks can be used to satisfy man's needs

### Give a reason why rocks are classified as non - renewable resources

-Rocks cannot be naturally replaced when exhausted.

### How are rocks useful as resources in the environment?

- They provide raw materials for making cement
- They are used for construction of houses and roads
- They are used for scientific research
- They are a source of tourist attraction
- They are weathered to form soil

### Types of rocks

-There are three types of rocks namely;

- Igneous rocks
- Metamorphic rocks
- Sedimentary rocks

### Igneous rocks

-These are rocks formed when magma pours outside the earth as lava.

-They are **impervious** because they don't allow water to pass through them.

### Examples of igneous rocks

- Basalt
- Granite

- Obsidian
- Pumice
- Feldspar
- Quartz
- Vesicular

### **Sedimentary rocks**

-These are rocks formed from broken particles of sand, clay and mud, settling in different layers called strata under water in seas, lakes and river deltas.

-Sedimentary rocks are soft and porous.

### **Examples of sedimentary rocks**

- |  |   |
|--|---|
| <ul style="list-style-type: none"> <li>• Sandy rocks</li> <li>• Clay</li> <li>• Shale</li> <li>• Limestone</li> <li>• Flint</li> </ul> | <ul style="list-style-type: none"> <li>• Mineral ore</li> <li>• Sandstone</li> <li>• Mudstones</li> <li>• Conglomerate</li> </ul> |
|--|---|

### **Metamorphic rocks**

-These are either igneous or sedimentary rocks that have been changed due to heat and pressure over time.

### **Examples of metamorphic rocks**

- |   |   |
|---|---|
| <ul style="list-style-type: none"> <li>• Marble</li> <li>• Graphite</li> <li>• Quartzite</li> </ul> | <ul style="list-style-type: none"> <li>• Slate</li> <li>• Gneiss</li> <li>• Schist</li> </ul> |
|---|---|

### **Fossil**

-Fossils are remains of dead plants and animals which were buried millions of years ago in the earth's crust.

### **Groups of fossils**

-Fossils from animals

-Fossils from plants

### **Uses of fossils**

- They contain valuable minerals
- They tell about the earth's history
- Geologists use fossils to determine the age of a place
- They enable geologists to tell the species of animals and plants that lived many years ago
- Fossils help us to how land looked before

### **Fuels**

-A fuel is anything that can be burnt to produce heat energy.

### **Examples of fuels**

- |  |   |
|--|---|
| <ul style="list-style-type: none"> <li>• Charcoal</li> <li>• Firewood</li> </ul> | <ul style="list-style-type: none"> <li>• Oil</li> <li>• Coal</li> </ul> |
|--|---|

### **What type of electricity is formed when coal is burnt?**

-Thermal electricity

### **Name any three examples of fuels used in your school.**

- |  |   |
|--|---|
| <ul style="list-style-type: none"> <li>• Firewood</li> <li>• Charcoal</li> </ul> | <ul style="list-style-type: none"> <li>• Kerosene/paraffin</li> </ul> |
|--|---|

### **Name the products got from crude oil.**

- |  |   |
|--|---|
| <ul style="list-style-type: none"> <li>• Kerosene</li> <li>• Diesel</li> <li>• Petrol</li> </ul> | <ul style="list-style-type: none"> <li>• Tar</li> <li>• Grease</li> </ul> |
|--|---|

### **Note:**

-These products are got from crude oil in a refinery through different stages of fractional distillation.

### **Fossil fuels**

-Fossil fuels are fuels that were formed from dead plants and animals that were buried underground million years ago.

### Name any two examples of fossil fuels

- Coal
- Petroleum
- Crude oil
- Natural gas

-Petroleum was formed from animal remains buried million years ago while coal was formed from plant remains buried million years ago.

### Uses of fossil fuels

- They are used for lighting e.g. in kerosene lamps, pressure lamps and lantern lamps
- They are used in stoves and generators to produce heat energy.
- They are used to run power saws, lawn mowers, water pumps and vehicles.

## Alloys

### What is an alloy?

-An alloy is a mixture of two or more metals.

### Reasons for making alloys

- To make metals harder.
- To lower the melting point of metals.
- To increase electric resistance of metals.
- To make metals resistant to corrosion (wear and tear).

### Examples of alloys

An alloy	Combination
Brass	Copper and zinc
Bronze	Copper, zinc and tin
Solder	Lead and tin
Steel	Carbon and iron
Stainless steel	Chromium and steel
Cobalt steel	Cobalt and steel
Dentist amalgam	Mercury, gold and copper
Manganese steel	Manganese and steel
Nickel steel	Nickel and steel
Gold	Gold and copper Gold, copper and mercury

## Fibre

### What is a fibre?

-A fibre is a mass of thread-like structure got from plants and animals.

### Types of fibre

- Natural fibre like plant fibre and animal fibre
- Artificial/synthetic fibre

### What are nature fibres?

-Nature fibres are types of fibres got from plant and animal tissues.

### What is plant fibre?

-This is fibre got directly from plant tissues.

### Examples of plant fibre

- Cotton
- Sisal
- Jute
- Papyrus
- Palm leaves
- Banana fibres
- Linen

### What is animal fibre?

-This is fibre got from animal tissues.

### **Examples of animal fibre**

- Wool
- Fur/mohair
- Silk
- Hides
- Skins

### **What is artificial fibre?**

-This is fibre got from plant and animal materials after being processed artificially.

### **Examples of artificial fibre**

- Nylon
- Rayon
- Orlan
- Acrilon
- Terylene
- Polyester
- Silk
- Cashmilon

### **Materials made from nylon**

- Ropes
- Fishing nets
- Mosquito nets
- Clothes

### **Uses of fibre in the environment**

- It is used for making ropes.
- It is used for making fishing nets.
- It is used for making mosquito nets.
- It is used for making clothes.

### **Harvesting resources from the environment**

<b>Resources</b>	<b>How they are harvested</b>
Minerals	<ul style="list-style-type: none"> <li>• Heavy machinery is used to extract them from the ground.</li> </ul>
Rain water	<ul style="list-style-type: none"> <li>• Tanks and drums are used to collect water from roofs of houses.</li> <li>• Farmers dig pits in the garden to trap run off water.</li> </ul>
Ground water	<ul style="list-style-type: none"> <li>• Boreholes are used to pump water from underground.</li> <li>• Fetching water from well, with containers like jerry cans, buckets, etc.</li> </ul>
Plants	<ul style="list-style-type: none"> <li>• Felling trees with axes.</li> <li>• Uprooting and digging tubers from soil.</li> <li>• Practicing pollarding, coppicing and lopping.</li> <li>• Harvesting with knives, pangas, power saws</li> </ul>
Fish	<ul style="list-style-type: none"> <li>• Using fishing nets, hooks, baskets, etc.</li> </ul>
Wild birds	<ul style="list-style-type: none"> <li>• Trapping and hunting.</li> </ul>
Soil (clay, sand and marrum)	<ul style="list-style-type: none"> <li>• Digging it out with hoes and spades.</li> </ul>
Salt	<ul style="list-style-type: none"> <li>• Scooping it out of lakes with spades.</li> <li>• Breaking rock salt with pick axes.</li> </ul>

### **Conservation of resources**

#### **What is conservation?**

-Conservation is the protection and preservation of resources in the environment.

#### **What is the main reason for conserving resources in the environment?**

-To prevent extinction of resources OR to keep resources for future use.

**Name some resources in the environment that should be conserved**

- Animals
- Water
- Plants/forests
- Soil
- Rocks
- Minerals

**Why is it necessary to conserve wildlife?**

- Some animals and plants provide food to man
- Plants balance the amount of carbon dioxide and nitrogen in the environment
- Wildlife attracts tourists
- Trees help in rain formation
- Plants provide wood fuel, timber and poles to man
- Forests act as habitats of animals
- Some animals and plants are valued for cultural heritage by some countries, tribes and clans

**Ways of conserving wildlife**

- By caring for animals in game arks and reserves
- By banning the hunting of endangered animals like rhinos and elephants
- Through controlled fishing to conserve fish
- By breeding rare animals in wildlife educational centres and later game parks

**How to conserve animals**

- Avoiding overstocking.
- Providing good pasture and water to animals.
- Avoiding over-fishing.
- Guarding against poaching.
- Vaccinating animals.
- Controlling parasites like ticks, tsetse flies, mites and worms.

**How to conserve plants**

- Controlled harvesting.
- Replacing harvested plants through afforestation and re-afforestation.
- Using heat energy saving equipment for heating or cooking.
- Using electricity and biogas for cooking, heating, lighting instead of wood fuel.

**How to conserve water**

- Protection of wetlands/swamps.
- Planting trees.
- Protecting wells and springs.
- Avoid releasing industrial wastes in water bodies.

**How to conserve soil**

- Practicing mulching
- Controlled burning
- Practicing crop rotation
- Practicing bush fallowing
- Applying manure
- Through controlled grazing and stocking of animals
- Practicing strip cropping, contour ploughing and terracing on hilly areas
- Avoiding over cultivation and deforestation

## **How to conserve non-renewable resources like minerals, fossil fuels and rocks**

- By using other alternative sources of energy e.g. biogas, solar energy and hydro - electricity.
- By applying energy saving technology e.g. use of charcoal saving stoves.
- By mixing metals to form alloys helps to control mineral exhaustion.
- By painting metals to avoid rusting.
- By recycling metal scraps, garbage and plastic materials instead of using new ones.
- All petroleum products should be used wisely and sparingly to prevent over exploitation.
- By using renewable resources to provide heat and light instead of non-renewable resources.

### **The 5Rs in resource conservation**

- **Recycling wastes**

-Metal wastes, garbage and plastic materials (non - biodegradable materials) can be recycled into new materials to satisfy man's needs.

- **Reduction**

-Use of plastics in place of metals in the manufacture of radios, televisions and car parts, cuts down on the amount of metal consumption.

- **Rejection or refusing**

-The use of materials which are difficult to dispose of eg polythene bags and plastics

- **Return**

-This involves returning bottles and containers to the manufacturers eg bottles of soda and beer.

- **Re-using**

-Some residues from plant material and animal wastes can be exploited as resources to provide fuel, light and heat energy.

-Sugar cane residues, cow dung and sewage sludge can be used to produce methane gas that is used for cooking and heating houses, while their remains are used as manure.

### **Exercise**

1. State any three non - living things used as resources in our environment
2. How is the sun useful in the environment?
3. Give any four uses of water in our environment
4. State two uses of wind in the environment
5. Give two examples of plant fibre
6. Mention any two examples of synthetic fibre
7. Mention any two resources got from bees
8. What is the difference between renewable and non-renewable resources?
9. Give two ways in which we can care for animals.
10. How does the use of hydro - electricity and biogas conserve forests?
11. Name the animal fibre got from merino sheep.

## THEME: THE HUMAN BODY

### TOPIC: THE RESPIRATORY SYSTEM

#### What is respiration?

-Respiration is the process by which oxygen burns food in the body to produce energy.

-Respiration is a chemical process in which absorbed food and oxygen in the body cells react to produce energy.

-Oxygen + glucose = heat energy + carbon dioxide + water vapour

#### Types of respiration

- Aerobic respiration
- Anaerobic respiration

#### Raw materials for respiration

- Oxygen
- Food/carbohydrates

#### By-products of respiration

- Carbon dioxide
- Water vapour

#### Name the main product of respiration

-Energy

#### How is respiration important in the body?

- It helps the body to produce energy
- It helps the body to excrete carbon dioxide and water vapour

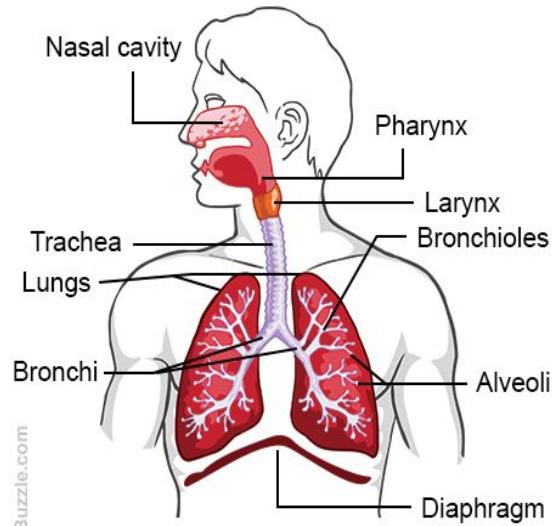
#### How do plants benefit from respiration?

-Plants get carbon dioxide for photosynthesis

#### Where in the body does respiration take place?

-In the body cells.

#### A diagram showing parts of the respiratory system



#### Functions of each part of the respiratory system

##### Nose

-The nose has tiny hair called cilia that trap dust, dirt and germs.

-The nose also has mucus which moistens the air we breathe in.

##### What happens to air as it passes through the nose?

- Air is warmed
- Air is filtered
- Air is moistened

## **Why is it important to breathe through the nose?**

-The nose has cilia and mucus that help to warm, filter and moisten the air we breathe in.

## **Trachea**

-The trachea is made up of rings of cartilage that help to keep it open all the time.  
-It allows continuous flow of air in and out of the lungs.

## **Epiglottis**

-It prevents food from entering the trachea during swallowing.

## **Larynx**

-It contains vocal cords which vibrate when air passes over them and produce sound.

## **Lungs**

-These are the two brown body organs found in the chest cavity. It is where gaseous exchange takes place in the body.

-They are used for breathing  
-They also excrete carbon dioxide and water vapour.

## **Air sacs/alveoli**

-This is where gaseous exchange takes place in the lungs.  
-The releasing of carbon dioxide from blood and gaining of oxygen is called gaseous exchange.

## **Diaphragm**

-It separates the chest cavity from the abdominal cavity.

## **Rib cage**

-It protects the lungs and the heart from damage.

## **Pleural membrane**

-It produces a pleural fluid.

## **Pleural fluid**

-It lubricates the lungs and ribs and so reduces friction.

## **Exercise**

1. What is respiration?
2. Mention any two types of respiration
3. Give any two advantages of breathing through the nose
4. Why is it not advisable to breathe through the mouth?
5. Which part of the skeleton protects the lungs and heart?
6. How is the epiglottis useful in the body?
7. How is the trachea adapted to allowing continuous flow of air in and out of the lungs?
8. Why is the trachea made up of rings of cartilage?
9. How are cilia useful during breathing?
10. Where in the lungs does exchange of gaseous take place?

## **Breathing**

-Breathing is the act of taking in and out of air.

-Breathing is the act of taking in air into the lungs and taking out air from the lungs.

## **Types of breathing**

-There are two types of breathing namely;

- Inhalation (inspiration)
- Exhalation (expiration)

## **What is inhalation/inspiration?**

-Inhalation is the act of drawing in air into the lungs.

-The air we breathe in contains more oxygen than carbon dioxide because much of it is used by the body for respiration.

## **Why do we breathe in air?**

-We breathe in to increase oxygen supply in the body.

## **How is oxygen useful in the body?**

-Oxygen is used for respiration in the body

### **Events that occur during inhalation/breathing in**

- The diaphragm contracts and flattens.
- The lungs expand.
- The ribs move upwards and outwards.
- The chest increases in volume.
- The inter-coastal muscles contract.

### **Why do the diaphragm contract and the ribs move upwards and outwards during inhalation?**

-To create more space for the lungs as they expand.

### **Why do lungs expand during inhalation?**

-The lungs expand to receive incoming air.

## **What is exhalation/expiration?**

-Exhalation is the act of taking out air from the lungs.

### **Why do we breathe out?**

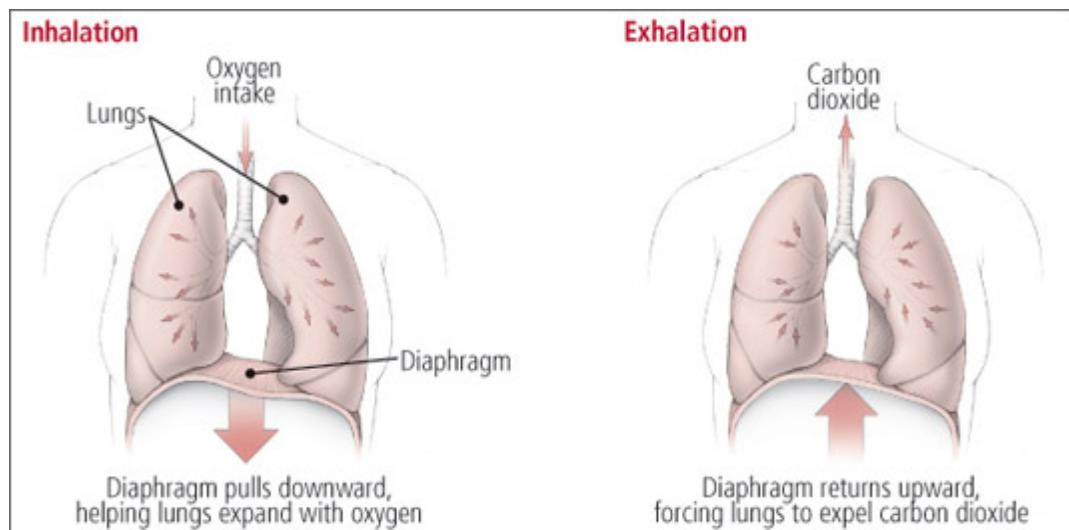
-To reduce carbon dioxide in the body.

-During exhalation, we also lose excess heat and water vapour from the body.

### **Events that occur during exhalation**

- The diaphragm relaxes.
- The ribs move downwards and inwards.
- The lungs reduce in size.
- The chest reduces in volume.
- The inter-coastal muscles relax

## **Position of the diaphragm during inhalation and exhalation**



## **Components of the air we breathe out**

- Carbon dioxide

- Water vapour

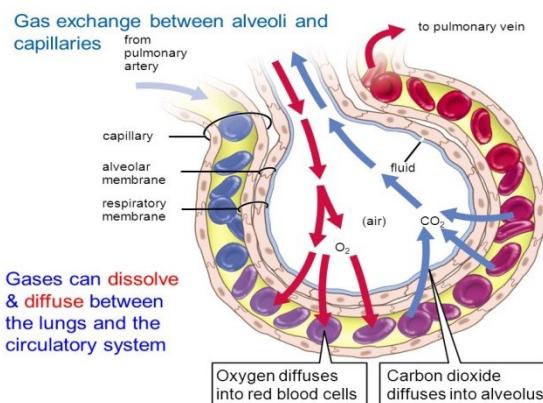
### Gaseous exchange in the lungs

-Gaseous exchange takes place in the air sacs/alveoli.

-When blood reaches the lungs, oxygen is added to it and carbon dioxide is lost.

-This takes place by the process called **diffusion**.

### A diagram showing gaseous exchange in the alveoli



### How are air sacs adapted to their function of gaseous exchange?

- Air sacs are thin walled to allow easy diffusion.
- They are surrounded by a network of blood capillaries.
- They are very many in number to create a large area for gaseous exchange.

### Composition of inhaled and exhaled air

Component of air	Percentage inhaled	Percentage exhaled
Oxygen	21%	16%
Carbon dioxide	0.003%	4%
Nitrogen	78%	78%
Rare gases	0.97%	0.97%
Water vapour	Less	More

### Note:

-We breathe out less oxygen than we breathe in because **some of it is used by the body during respiration**.

-We breathe out more carbon dioxide than we breathe in because **it is expelled by the body cells during respiration**.

-The percentage of nitrogen and rare gases do not change because **they are not necessary in the body**.

-The volume of water vapour during exhalation is more than during inhalation because **water vapour is given out as a by - product of respiration**.

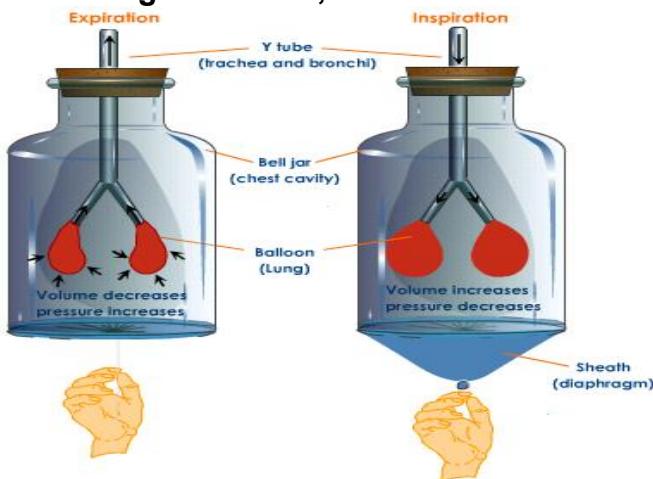
**An experiment to show how breathing occurs in the body**

**Things needed**

- 1 litre plastic bottle
- Two balloons of equal size
- Rubber sheet
- Two drinking straws
- Stopper or air tight lid

### Steps taken

- Remove the bottom of the plastic bottle to make one end open.
- Place the rubber sheet at the open end then tie it firmly onto the bottle.
- Insert two straws into the bottle through a tight fitting lid.
- Each straw should be connected to a balloon.
- Check the arrangement of materials; it should be **as shown in the diagram below;**



- Pull the rubber sheet at the bottom of the plastic bottle.
- Push the rubber sheet inwards.

### Observation

- Whenever you pull down the rubber sheet, the balloons swell up with air.
- The balloons expand when more air draws into them.
- When the rubber sheet goes back to its position, the balloons contract and air gets out.

### Conclusion

- The lungs work in the same way as the balloons.

### Exercise

1. Which body system does the diagram represent?
2. Name the parts of the above named system represented by the following;
 

a) pipe	d) rubber sheet
b) straws	e) plastic bottle
c) balloons	
3. What will happen to the balloon when air is blown through the pipe?
4. What will happen to the rubber sheet when air is blown into the balloon?
5. Name the three end products of respiration
6. Give two reasons why breathing is important to the body.

### Diseases of the respiratory system

#### Tuberculosis

-This is an airborne disease caused by bacteria.

#### Signs and symptoms of tuberculosis

- Chronic cough with sputum production
- Sneezing
- Difficulty in breathing

- General body weakness
- Loss of weight
- Excessive sweating at night

### **Prevention**

- Treating the patient in isolation to avoid spread to other people using antibiotics
- Immunization of children

### **Pneumonia**

-It is a serious lung infection caused by bacteria.

### **Signs and symptoms**

- Difficult breathing
- Sharp pain in the chest
- High fever

### **Prevention**

- Immunization of infants
- Treat using antibiotics

### **Diphtheria**

-It is caused by bacteria spread through air by coughing of an infected person

### **Signs and symptoms**

- Sore throat
- Swollen neck
- High fever

### **Prevention**

- Immunization of children

### **Whooping cough/pertussis**

-It occurs mostly in children.

-It is caused by bacteria spread through air.

### **Signs and symptoms**

- Coughing that ends in vomiting
- Gasp for breath
- Running nose

### **Prevention**

- Immunization of children

### **Bronchitis**

-This disease affects the air passage.

-It is caused by bacteria.

### **Signs and symptoms**

- Productive cough
- Wheezing
- There may not be fever

### **Prevention**

- Avoiding smoking.
- Avoiding dusty places.

### **Influenza (flu)**

-It is caused by a virus and is an airborne disease.

### **Signs and symptoms**

- Running nose
- Fever
- Sore throat
- Weakness

### **Prevention**

- Avoid cold conditions or drinks as they worsen the problem
- Avoid crowded places
- Cover your mouth with a handkerchief whenever you sneeze to avoid spreading it to others.

### **Lung cancer**

-It is caused by tobacco smoking and destroys the cell lining of the lungs.

## **Signs and symptoms**

- Abnormal growth of cells in the lungs
- Abnormal cells destroy the normal ones

## **Prevention**

- Avoid smoking

## **Asthma**

-It is a non – infectious disease inherited from parents.

## **Signs and symptoms**

- Wheezing
- Difficult breathing

## **Prevention**

- Avoiding dust, sprays, pollen, chemical fumes and pesticides to reduce its occurrence.

## **Emphysema**

-It is an incurable condition of cough which is caused by tar in smoke.

## **Signs and symptoms**

- Difficult breathing

## **Prevention**

- Avoid smoking

## **Common colds**

-It is caused by a virus spread through air.

## **Signs and symptoms**

- |                              |                           |
|------------------------------|---------------------------|
| • Sneezing from time to time | • Headache                |
| • Cough                      | • Watery eyes             |
| • Running nose               | • Congestion of the lungs |

## **Prevention**

- Avoid being near a person with the infection.
- Living in a house with enough space for its members.
- Having good ventilation.

## **Non infectious diseases of the respiratory system**

- Lung cancer
- Emphysema
- Asthma

## **Respiratory diseases caused by smoking**

- Lung cancer
- Emphysema

## **Respiratory diseases worsened by smoking**

- Tuberculosis
- Bronchitis
- Asthma
- Whooping cough

## **Immunisable diseases of the respiratory system**

- Diphtheria
- Whooping cough/pertussis
- Influenza type B

## **Disorders of the respiratory system**

- Choking
- Coughing
- Accumulation of mucus in air sacs
- Nasal congestion with mucus
- Fixing foreign bodies in the nose
- Hiccups

## **Ways of promoting the proper functioning of the respiratory system**

- Feeding on food rich in a balanced diet.
- Having regular physical body exercises.

- Avoiding tobacco smoking.
- Immunization of babies with vaccines like BCG vaccine and DPT vaccine.
- Avoid staying in the dusty environment.
- Breathing in through the nose but not the mouth.

**Exercise**

1. Where in the body does respiration takes place?
2. Name the structures in the nose which help to filter air.
3. How is the cause of tuberculosis different from that of lung cancer?
4. Why does the body of a dead person become cold?
5. Why does carbon dioxide turn lime water milky?
6. What is another name of trachea?
7. Name one organ of respiration.
8. Mention any two disorders of the respiratory system.
9. Which muscle separates the chest cavity from the abdomen?
10. State any three things that happen to air when it reaches the nose
11. Name any one viral disease that affects the lungs.
12. In which body organ is oxygen absorbed in blood

**LORENCIA JUNIOR SCHOOL  
PRIMARY SIX SCIENCE LESSON NOTES, TERM THREE, 2022**

**THEME: SCIENCE IN HUMAN ACTIVITIES AND OCCUPATION**

**TOPIC: SCIENCE AT HOME AND IN OUR COMMUNITIES**

**What is science?**

-Science is the study of living and non living things.

**What is a home?**

-A home is a place where we live or stay.

**Water**

-Water is a colourless liquid substance made up of hydrogen and oxygen gases.

-These gases are in the ratio 2:1 (H<sub>2</sub>O)

**General properties of water**

- It takes the shape of a contained vessel
- It exerts pressure
- It is a solvent
- It finds its own level

**Properties of pure water**

- It is colourless
- It is tasteless
- It is odourless (it has no smell)
- It does not contain germs
- It boils at 100 °C and freezes at 0 °C

**What is the main natural source of water on earth?**

- Rain

**Mention any five sources of water in our environment.**

- Lakes
- Rivers
- Springs
- Dams
- Rain

**Types of water**

- Hard water
- Soft water

**What is soft water?**

-Soft water is the type of water that forms lather (foam) easily with soap.

**Examples of soft water**

- Rain water
- Distilled water
- Spring water

### **Advantages of using soft water to wash clothes**

- It does not waste soap
- It removes dirty stains on clothes

### **What is hard water?**

-Hard water is the type of water that doesn't form lather easily with soap.

### **Examples of hard water**

- Borehole water
- Sea water
- Ocean water
- Muddy water
- Water got from lakes and rivers

### **How can you make hard water soft?**

- By boiling hard water
- By distilling hard water
- By adding calcium bi-carbonate to hard water

### **Disadvantages of using hard water to wash clothes**

- It wastes a lot of soap
- It leaves dirty stains on clothes

### **Why is borehole water safe for drinking?**

- It cannot easily be contaminated by germs.

### **Preparation of safe water for drinking**

-Safe water is water that is free from germs/pathogens.

### **Mention the two ways of making water safe for drinking**

- Boiling
- Chemical treatment of water

### **Boiling**

-Boiling is a method of making water safe for drinking by heating to kill germs.

-It is the commonest way of making water safe for drinking.

-It is commonly done in rural areas.

### **Why do we boil water for drinking?**

- To kill germs

### **Why is boiled water good for drinking?**

- Boiled water is free from germs

### **Why should boiled water be kept in clean containers?**

- To avoid contamination of water

### **Chemical treatment of water**

-This is a method of making water safe for drinking by using chemicals.

### **Examples of chemicals used for treating water**

- Chlorine
- Potassium permanganate
- Iodine
- Fluorine
- Calcium chloride

**Note:** **Chlorination** is the putting of chlorine into water.

**Why should the chemicals be applied in small amounts?**

- To avoid contamination of water

**Advantage of chemical treatment of water**

- Chemicals kill germs easily

**Disadvantages of chemical treatment of water**

- Chemicals are expensive to buy
- Chemicals do not make water clear
- Chemicals add a certain smell and taste to water

**Methods of obtaining clean water from muddy water or dirty water**

- Filtration
- Decantation
- Distillation

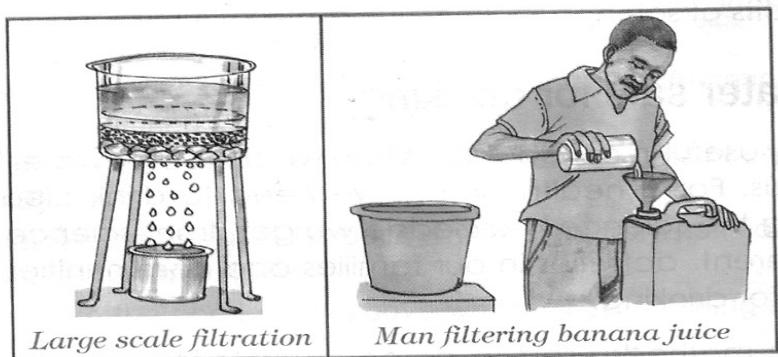
**Filtration method**

-Filtration is a process of separating solid particles (impurities) from water using a filter.

**Materials used for filtering water**

- A filter paper
- A sieve
- Cotton wool
- Banana fibre
- Sisal
- Grass
- Charcoal paste
- Ash
- A clean piece of cloth

**A diagram showing filtration process**



**Note.**

-**Residue** refers to the solid particles (impurities) trapped by a filter.

-**Filtrate** is a clear desired liquid substance got using filtration method.

### **Uses of filtered water**

- For washing
- For bathing
- For mopping
- For cooking food

### **Why is filtered water not good for drinking?**

- Filtered water still contains germs.

### **Why should filtered water be boiled before drinking?**

- To kill germs

### **How is filtration important in our daily life?**

- It helps in separating seeds from fruit juice.
- It helps in separating tea leaves from tea.
- It helps in separating husks from local brew (malwa).
- It helps in obtaining clean water from dirty water.

### **Making local salt from ash at home using filtration**

#### **Things needed**

- Ash from burnt dry banana peelings or bean husks.
- Two plastic containers
- Water
- Banana leaf
- A sharp knife

#### **Steps taken**

- Get ash from burnt dry banana peelings or bean seeds.
- Use a knife to make holes at the bottom of a container
- Make slits in the middle of a piece of a banana leaf.
- Put the leaf at the bottom of the container with holes. This helps to filter the water from ash.
- Put the ash in the container, press it hard and pour some water on it.
- Put the container with the contents into another one where the dripping salt will collect. The liquid obtained is called **a filtrate** and is brown in colour.

#### **Uses of local salt made from ash**

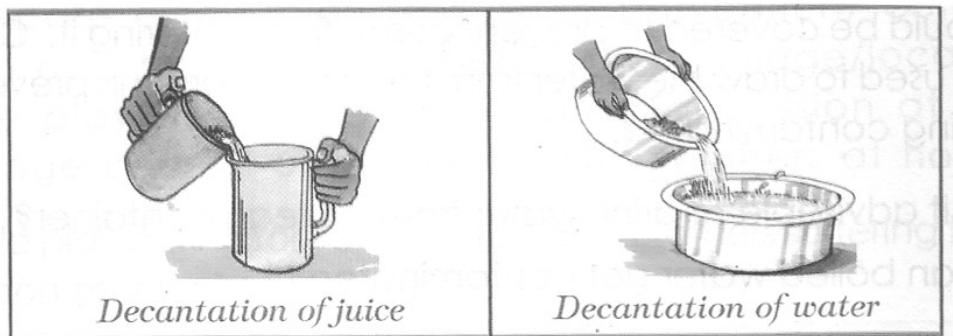
- It is used for preparing beans, peas and some vegetables such as leaves of peas and pumpkins.
- It is used as medicine to cure stomach upsets.

#### **Decantation method**

-This is a method of making water clean by putting in a container to allow the impurities to settle at the bottom.

-It is also called **settling method/ three pot system of water purification**.

## **Decantation using two containers**



### **Uses of decanted water**

- For washing
- For bathing
- For mopping
- For cooking

### **Why is decanted water not safe for drinking?**

Decanted water still contains germs

### **Why should decanted water be boiled before drinking?**

- To kill germs

### **How is decanted water in our daily life?**

- It helps in separating seeds from fruit juice
- It helps in separating tea leaves from tea
- It helps in separating husks from local brew
- It helps in obtaining clean water from dirty water

### **Distillation method**

-Distillation is a method of obtaining pure water from muddy water by boiling to form vapour and condensing it to form a distillate.

### **Why is distilled water not recommended for drinking?**

- Distilled water lacks mineral salts

### **Uses of distilled water in hospitals**

- It is used for dissolving powdered medicine.
- It is used for diluting drugs.
- It is used for cleaning wounds and medical equipment.
- It is added to blood in the body through drips.

### **Water pollution**

-Water pollution is the contamination of water with harmful substances.

### **Ways in which water is polluted/contaminated**

- Using dirty containers to fetch or keep water
- Discharging of untreated sewage into water sources
- Releasing industrial wastes into water sources
- Dumping household refuse into water sources
- Sharing water sources with domestic animals
- Urinating, defecating, bathing, swimming, washing in or near water sources
- Silt from soil erosion

### **Water pollutants/water impurities**

-Water pollutants are substances that make water unsafe for human consumption

### **Examples of water impurities or pollutants**

- Human wastes like faeces and urine
- Animal wastes like dung and urine
- Silt from erosion
- Industrial wastes like used oils
- Agricultural chemicals like pesticides, acaricides, fungicides, artificial fertilizers, herbicides

### **Dangers of water pollutants**

- They lead to water contamination
- They lead to death of aquatic animals
- They lead to outbreak of water borne diseases

### **What are water borne diseases?**

-Water borne diseases are diseases spread through drinking contaminated water.

### **Examples of water borne diseases**

- |  |  |
|--|--|
| <ul style="list-style-type: none"> <li>• Cholera</li> <li>• Typhoid</li> <li>• Diarrhoea</li> <li>• Dysentery</li> </ul> | <ul style="list-style-type: none"> <li>• Bilharziasis</li> <li>• Polio</li> <li>• Hepatitis B</li> </ul> |
|--|--|

### **State any two ways of preventing water borne diseases in a community**

- Through proper disposal of human excreta like faeces and urine
- Through boiling drinking water

### **How does boiling of water help to prevent cholera?**

- Boiling of water kills vibrio cholerae germs that cause cholera.

### **Uses of water in the human body**

- It regulates body temperature
- It dissolves digested food
- It forms blood plasma
- It maintains the shape of blood cells
- It helps to reduce friction at the joints
- It helps in the formation of body fluids like tears, urine, saliva and sweat

### **Uses of water in the environment**

- For domestic use like washing, drinking, cooking and mopping
- For industrial use like cooling machines, washing machines and being used as a raw material
- For irrigation in agriculture
- It is used in production of hydro electricity.
- It is needed during germination and photosynthesis by plants

### **Cleaning clothes**

#### **Why do we put on clothes?**

- Clothes keep us warm
- Clothes protect our bodies from minor injuries
- Clothes make us look nice

### **Laundry**

Laundry refers to activities of getting clothes cleaned and ironed.

#### **Steps in cleaning clothes**

- |   |  |
|---|--|
| <ul style="list-style-type: none"> <li>• Sorting clothes according to colour and intensity of dirt</li> <li>• Soaking clothes</li> <li>• Washing clothes</li> </ul> | <ul style="list-style-type: none"> <li>• Rinsing clothes</li> <li>• Wringing clothes</li> <li>• Drying clothes</li> <li>• Ironing clothes</li> </ul> |
|---|--|

#### **Why do we soak clothes before washing?**

- To soften and dissolve dirt from clothes
- To make washing of clothes easier
- **Why do we wash clothes?**  
To remove dirt
- To avoid a bad smell from clothes

#### **Why do we iron our clothes?**

- To kill germs
- To kill external parasites like lice, bedbugs, ticks, etc
- To promote smartness

### **Why should little moisture be left in clothes to be ironed?**

- To make ironing easy
- To save on the electricity or charcoal used

## **THEME: HUMAN HEALTH**

### **TOPIC: ACCIDENTS AND FIRST AID**

#### **What is an accident?**

-An accident is a sudden happening that may cause injury or death to the body.

#### **Places where accidents may occur**

- On roads
- At school
- At home
- On the pitch
- At places of work like construction sites

#### **Dangers of accidents**

- They lead to death
- They lead to lameness
- They lead to loss of body parts
- They result into serious bleeding

#### **Examples of accidents**

- |                   |                 |                         |
|-------------------|-----------------|-------------------------|
| • Cuts and wounds | • Near drowning | • Foreign bodies        |
| • Burns           | • Dislocation   | • Fainting              |
| • Scalds          | • Sprains       | • Fever and convulsions |
| • Fractures       | • Strains       | • Poisoning             |
| • Bruises         | • Nose bleeding | • Snake bites           |

#### **What is first aid?**

-First aid is the first help given to a casualty before he/she is taken to a nearest hospital.

#### **Who is a casualty?**

-A casualty is an accident victim.

#### **Who is a first aider?**

-A first aider is a person who gives first aid to a casualty

#### **Why do we administer first aid?**

- To save life
- To reduce pain

- To promote quick recovery
- To stop bleeding if any

**What is the main reason for giving first aid to a casualty?**

- To save life

**Mention any four responsibilities of a good first aider**

- Should assess the situation of a casualty and find out what happened
- Should give first aid if needed
- Should make a report about the casualty
- Should take a casualty to the nearest hospital

**State any six qualities of a good first aider**

- Should be kind and merciful
- Should be knowledgeable
- Should be gentle and tactful
- Should be sympathetic
- Should be quick in decision making
- Should have common sense
- Should have first aid kit

**First aid box**

A first aid box is a container where materials for giving first aid are kept.

**A diagram showing a first aid box**



**Name any four places where we can find a first aid box**

- Clinics
- Sick bays
- Buses
- Homes

**How is a first aid box important in our school buses?**

-It contains materials used for giving first aid incase of an accident

**First aid kit**

-First aid kit refers to the materials used for giving first aid to accident victims.

**Materials for giving first aid and their uses**

**Safety pins**

- For pinning bandages

### **Adhesive plaster**

- For covering cuts and wounds to keep away germs and dirt

### **Iodine solution**

- For cleaning cuts and wounds
- For killing germs at the wound/ for disinfecting wounds

### **Cotton gauze**

- For absorbing pus from a wound
- For protecting the wound

### **Cotton wool**

- For cleaning a wound or a cut

### **Tweezers**

- For picking tiny things like hair from a wound
- For removing bee stings from a casualty's body

### **Pair of scissors**

- For cutting cotton gauze, bandages, cotton wool or pieces of cloth
- For shaving hair around the injured part on the head

### **Razor blade**

- For shaving hair around the injured part on the head
- For cutting bandage, plaster or cotton gauze
- For cutting finger and toenails to expose the wound

### **A stretcher**



-A stretcher is a special bed on which a casualty who can not walk is carried

### **How is a stretcher useful when offering first aid?**

- It is used for carrying casualties who can not walk

### **Tourniquet**

- For tying above the bitten spot to prevent flow of blood with poison to the heart
- For tying above the injured part to stop loss of blood from a cut

### **Splints**

- For holding the broken bones in one position

### **Arm sling**

- For holding the broken arm motionless
- For supporting the broken arm in one position

### **Bandages**

- For tying splints around the fractured part
- For wrapping sprained joints
- For wrapping fractured bones under treatment

### **Black stone**

- For sucking poison from a wound incase one has been bitten by a poisonous organism like a snake.
- For absorbing snake venom from a casualty

### **Antiseptics**

- For preventing infection at the wound by killing bacteria

### **Spirit**

- For cleaning a wound or a cut
- For killing germs present at the wound

### **Pain killers**

- For reducing pain

### **Clinical thermometer**

- For measuring human body temperature of a casualty

## **Burns and scalds**

### **What is a scald?**

-A scald is a wet heat injury

-A scald is an injury caused by wet heat

### **Sources of wet heat**

- |                |            |             |
|----------------|------------|-------------|
| • Steam        | • Hot soup | • Hot water |
| • Hot porridge | • Hot milk |             |

### **Causes of scalds**

- Contact with steam
- Contact with hot liquids/fluids

### **First aid for scalds**

- Dip the injured part in clean cold water
- Put ice blocks at the affected part

### **Why should the affected part dipped in clean cold water when one have got a scald?**

To reduce the temperature of the affected part

- To reduce pain

### **Ways of preventing scalds**

- Avoid telling young children to cook food boil water
- Always cook from raised places
- Always handle hot liquids with much care
- Keep children away from cooking places

### **What is a burn?**

-A burn is a dry heat injury

-A burn is an injury caused by dry heat

### **Sources of dry heat**

- Acids
- Flames of fire
- Hot iron box
- A burning charcoal
- Hot lava
- Hot saucepan
- Hot metals

### **Causes of burns**

- Contact with acids
- Contact with fire
- Contact with hot places
- Contact with naked electric wires of high voltage
- Touching hot metals with bare hands
- Too much expose to sun's rays

### **Degrees of burns**

-Burns are described using degree to tell how severe they are, i.e.

- First degree burns
- Second degree burns
- Third degree burns

### **First degree burn**

-A first degree burn is a minor burn in which blisters are not formed at the burnt area.

### **What is a blister?**

-A blister is a raised skin with a liquid underneath.

### **Signs of a first degree burn**

- Blisters are not formed
- The skin is unbroken
- Pain at the burnt part
- The skin becomes soft and tender

### **First aid for first degree burns**

- Put the burnt part in clean cold water
- Put blocks of ice at the burnt area

### **Why should the burnt part be put in clean cold water?**

- To reduce temperature of the burnt part

### **Second degree burn**

-A second degree burn is a more severe burn in which blisters are formed on the skin at the burnt area.

### **Signs of a second degree burn**

- Blisters are formed on the skin at the burnt part
- The skin is slightly damaged
- Swelling and painful feeling for a long time

### **First aid for a second degree burn**

- Put the burnt part in clean cold water for at least 15 minutes
- If blisters are formed, do not burst them
- If blisters are broken, wash the area with clean water and soap and cover the skin with a clean cloth to keep away germs

### **Why is it dangerous to burst or break blisters?**

- It causes more pain
- It exposes the wound to germ infection

### **Third degree burn**

-A third degree burn is the most severe burn in which the skin is deeply burnt and there is total destruction of body tissues.

### **Signs of a third degree burn**

- |  |                                |
|--|--------------------------------|
| • The skin is deeply burnt                   | • The skin appears shiny white |
| • There is total destruction of body tissues |                                |

### **First aid for third degree burn**

- Put the burnt part in a clean cold water for at least 15 minutes
- Cover the burnt part with a clean piece of cloth or bandage to prevent germ infection
- Encourage the casualty to drink plenty of fluids

### **Why should casualties of third degree burn be encouraged to drink plenty of fluids?**

- They might cause serious infection
- They might attract germs leading to infection.

### **Why is it dangerous to put sugar at the burnt part?**

- Sugar absorbs water from the body leading to dehydration
- Sugar attracts bacteria

### **Why is it bad to apply salt at the burnt part?**

Salt absorbs water from the body leading to dehydration

## **Prevention of burns**

- Keep hot objects out of children's reach
- Cook from raised places
- Use insulators to lift hot objects from fire
- Teach young children the dangers of fire at an early stage
- Avoid leaving candles or wick lamps burning in rooms where there are many clothes
- Do not keep petal in houses where lighting equipment with fire flames are used
- People who distill alcohol should handle distillation equipment with care

## **Fever and convulsions**

### **What is fever?**

-Fever is a condition in which one's body temperature rises beyond the normal one.

-Fever is not an illness but a symptom which shows that one is infected with a disease like malaria, typhoid or measles.

### **Signs of fever**

- Excessive sweating
- Frequent urinating
- High temperature
- Shivering
- A foaming mouth

### **Effects of fever**

- It leads to convulsions

### **First aid for fever**

- Remove the clothes of a casualty
- Carry out tepid sponging using a clean cloth dipped in warm water.
- Give the victim plenty of fluids like soup, milk and fruit juice to prevent dehydration
- Take the victim to the nearest health centre

### **What is tepid sponging?**

-This is the act of putting a warm wet cloth on a casualty's body.

### **Why do we apply tepid sponging to a victim with high fever?**

- To lower the temperature of the victim

### **What are convulsions?**

-Convulsions are violent body movements which cannot be controlled.

### **Signs of convulsions**

- A forming mouth
- Sudden body movement

### **Causes of convulsions**

- High fever
- Epilepsy (fits)

### **First aid for convulsions**

- Chase away the by-standers to provide fresh air
- Remove all tight clothes and loosen others
- Clear the place where the victim is convulsing from
- Put a spoon in the mouth of the victim
- Carry out tepid sponging
- If conscious, give the victim plenty of fluids
- Seek medical attention if convulsion persists

### **Why do we put a spoon in the mouth of a convulsing victim?**

- To prevent the victim from biting the tongue

### **Prevention of fever and convulsions**

- Controlling mosquitoes to prevent easy spread of malaria
- Have children immunized
- Early treatment of any infections
- Maintaining proper hygiene
- Pregnant women should deliver from health centers

## **Near drowning**

### **What is drowning?**

-Drowning is the dying as a result of lungs being filled with water  
-Drowning has no first aid since the victim is already dead

### **What is near drowning?**

-Near drowning is the temporary loss of breath due to lungs being filled with water  
-This is a condition when one stops breathing due to having lungs filled with water

### **Places where near drowning may occur**

- Swimming pool
- Bath tubs
- Lakes
- Rivers
- Septic tanks
- Unprotected wells
- Fish ponds
- Irrigation ditches

### **Possible causes of near drowning**

- Playing near water bodies
- Swimming without experience.

- Sending young children to fetch water from unprotected wells
- Playing in bath tabs at home
- Accidents on water as a result of rapture of the boat
- Leaving babies to play in basins full of water
- Leaving septic tanks uncovered
- Failure to cover irrigation ditches and pits dug by builders

### **First aid for near drowning**

- Shout out/call/yell for help
- Remove the victim from water as soon as possible
- Lay the person on his or her back
- Apply mouth to mouth breathing /apply kiss of life or artificial respiration as shown below.



### **What is meant by the term kiss of life?**

- Kiss of life means mouth to mouth breathing

### **Why do we give kiss of life to a person who has near drowned?**

- To enable the victim, regain his/her breath

### **What first aid can a p.1 girl give to her mother who has near drowned in a nearby well?**

- She should shout for help

### **State the first aid for near drowning**

- Apply kiss of life

### **Write ABC in relation to first aid**

A- Airway passage

B- Breathing

C- Circulation of blood

### **Prevention of near drowning**

- Acquire swimming skills
- Cover all septic tanks
- Do not leave bath tubs filled with water
- Put on a life jacket when traveling on water
- Do not leave babies playing in basins filled with water
- Fence all irrigation ditches and pits dug by builders

### **Why should septic tanks be covered?**

- To prevent near drowning

### **Why should passengers on water be provided with life jackets?**

- To prevent near drowning incase of boat rapture

### **Fainting**

- Fainting is the brief loss of consciousness

### **What is the main cause of fainting?**

- Lack of enough oxygen supply to the brain

### **Conditions which lead to fainting**

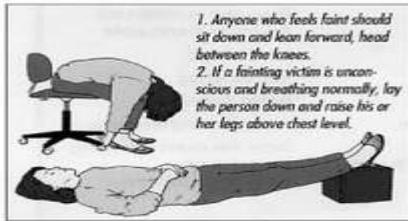
- |  |  |
|--|--|
| <ul style="list-style-type: none"><li>• Prolonged hunger</li><li>• Standing in sunshine for a long time</li><li>• Severe pain</li><li>• Extreme excitement</li><li>• Doing heavy exercises</li></ul> | <ul style="list-style-type: none"><li>• Fear</li><li>• Fright (being afraid)</li><li>• Heart problems</li><li>• Anger</li><li>• Alcoholism</li></ul> |
|--|--|

### **Signs of fainting**

- |   |   |
|---|---|
| <ul style="list-style-type: none"><li>• Loss of body senses</li><li>• Unconsciousness</li><li>• Unable to stand on two legs</li></ul> | <ul style="list-style-type: none"><li>• Breathing very fast or very slowly</li><li>• Excessive sweating</li></ul> |
|---|---|

### **First aid for fainting**

- Put the victim in an open place
- Lay the victim on his/her back
- Remove tight clothes around the neck to enable the victim get enough oxygen
- Raise the legs of the victim higher than the head, **as shown below;**



- Fan the person under the shade to one who has fainted due to standing in sunshine
- Give glucose to someone who has fainted due to prolonged hunger after becoming conscious
- Never give a drink to a fainted person until complete consciousness has been gained because it can cause choking

### **Why shouldn't we allow by-standers around a fainted person?**

- To allow the victim to get enough fresh air

### **Why should we give glucose to someone who has fainted due to prolonged hunger?**

To provide the victim with energy

- **Give a reason why legs of a fainted person should be raised higher than the head?**

To allow blood with oxygen to flow to the brain

### **Nose bleeding**

-Nose bleeding is the flow of blood from the nose

### **Causes of nose bleeding**

- Headache
- Accidents
- Over inhalation of dry air
- Over blowing of the nose
- Eating foods one is allergic to
- Prolonged medication e.g. taking aspirins for a long time

### **How does over inhalation of dry air cause nose bleeding?**

- It dries and breaks blood vessels in the nostrils

### **How does over blowing of the nose cause nose bleeding?**

- It over strains and breaks blood vessels in the nostrils

### **How does prolonged medication cause nose bleeding?**

- It prevents normal blood clotting incase blood vessels in the nostrils are damaged

### **First aid for nose bleeding**

- Let the casualty sit and bend forward
- Pinch the soft part of the nose
- Encourage the casualty to breathe through the mouth

- Keep the head of the casualty higher than the heart
- Put ice wrapped in a towel on the nose

**What is the importance of pinching the soft part of the nose of a victim bleeding through the nose?**

- To allow blood to clot

**Why should we encourage a person nose bleeding to breathe through the mouth?**

- To prevent over straining and breaking of blood vessels in the nostrils

**What is the importance of putting blocks of ice on the nostrils of a person nose bleeding?**

- To make the lining of blood vessels in nostrils moist

**State the first aid for nose bleeding**

- Pinch the soft part of the nose and allow the casualty to breathe through the mouth

**Prevention of nose bleeding**

- Keep the nostrils moist
- Eat foods your body is not allergic to
- Avoid playing rough games like boxing each other
- Eat citrus fruits like oranges and lemons to strengthen the lining of blood vessels in the nostrils

**Foreign bodies**

**What are foreign bodies?**

-Foreign bodies are external objects that can enter our bodies through natural openings.

**What is a foreign body?**

-A foreign body is an external object that can enter the body through natural opening.

**Examples of natural openings**

- |        |         |                 |
|--------|---------|-----------------|
| • Eyes | • Nose  | • Anus (rectum) |
| • Ears | • Mouth | • Vagina        |

**Foreign bodies in the eyes**

**Examples of foreign in the eyes are:**

- |         |                 |
|---------|-----------------|
| • Dust  | • Soil          |
| • Smoke | • Small insects |

- Tiny pieces of meat and bones

### **Signs and symptoms of foreign bodies in the eyes**

- Pain and itching of the eye
- Flow of tears from the eyes
- Swelling of the eyelids
- Loss of proper sight
- The eye turns reddish or pinkish

### **First aid for foreign bodies in the eye**

- Incase of light objects like dust, insects and smoke, wash the eye with plenty of clean flowing water
- Some insects can be removed using a piece of cloth as the victim opens up the eye widely
- Also the victim can open the eye widely and you blow air strongly into it
- If the foreign body remains there, take the casualty to the nearest hospital

### **What first aid can you give to a p.6 boy with dust in his eyes?**

- Wash the eyes with plenty of clean flowing water

### **Foreign bodies in the ears**

#### **Examples of foreign bodies in the ears**

- Small insects
- Small seeds
- Small stones
- Soil
- Beads
- Pieces of wood

### **First aid for foreign bodies in the ear**

- Make the victim sit and bend on one side
- If it is an insect, pour clean water for the insect to float and come out
- If the foreign body is not an insect, do not attempt to remove but just take the casualty to the hospital

### **Foreign bodies in the nose**

#### **Examples of foreign bodies in the nose are;**

- Small seeds
- Beads
- Small stones
- Small insects
- Buttons

### **First aid for foreign bodies in the nose**

- Tell the victim to blow the nose hard and fast
- If the foreign body is not an insect, do not attempt to remove it because you may push it further. Just take the casualty to the nearest hospital

### **What advice can you give to your friend with an insect in the nose?**

- I would advice my friend to blow the nose hard and fast

### **Foreign bodies in the mouth (throat)**

- Food
- Coins
- Buttons
- Small stones

-The main foreign body in the throat is **food**

### **Dangers of foreign bodies in the throat**

- They lead to choking
- They lead to death

### **Causes of foreign bodies in the throat**

- Bad eating habits
- Swallowing large lumps of food
- Playing with objects like coins and buttons
- Eating bony meat and fish carelessly

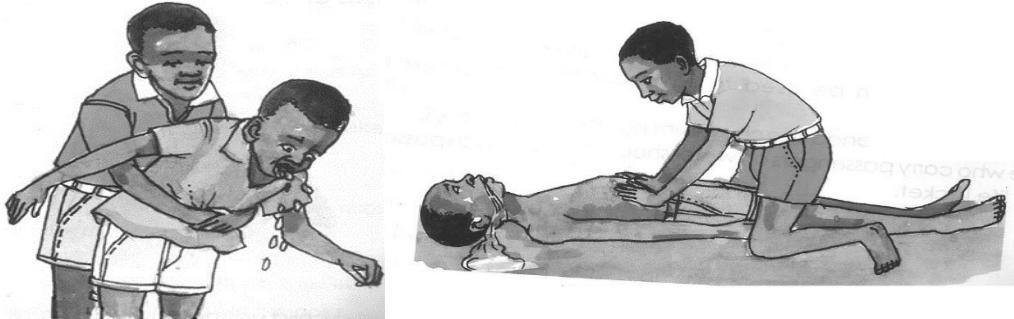
### **First aid for foreign bodies in the throat**

- Give the victim a number of sharp blows at the back
- If choking continues, wrap your arms around his/her waist
- Put your fist against his/her belly just between the navel and the ribs
- Press the belly with sudden strong upward push
- Do this several times; the foreign body will be forced out by air from the lungs.

### **If the choking person is unconscious or a big person;**

- Let the victim lay on his/her back
- Put the heels of your hands on the belly
- Make several sudden pushes on the belly into the chest cavity
- If the victim does not breathe, try to apply mouth to mouth breathing

### **Illustrations showing a choking person being given first aid**



### If the choking person is a smaller person;

- Kneel down on one leg and fold the other
- Put the child upside down over the folded leg
- Give the child several sharp blows at the back to force out the foreign body
- Also hold the child upside down by the legs and give sharp blows at the back

### What first aid can you give to a p.6 boy with a large piece of meat stuck in his throat?

- Give a number of sharp blows at the back

### Foreign bodies in the rectum (anus)

- |                |                |
|----------------|----------------|
| • Soil         | • Seeds        |
| • Small stones | • Toilet paper |
| • Dust         | • Leaves       |

### First aid for a foreign body in the rectum (anus)

- Wash the anus with plenty of clean flowing water and soap
- Foreign bodies like stones, may be difficult to remove so just take the casualty to the nearest hospital for proper management

### Foreign bodies in the vagina

-Young girls who climb trees often risk getting foreign bodies in the vaginas

-Foreign bodies can also enter their vagina if they sit carelessly wherever they find

-Girls who use toilet papers and cotton wool during menstruation periods get small pieces of these things entering their vaginas

### Examples of foreign bodies in the vagina

- |                |          |                |
|----------------|----------|----------------|
| • Toilet paper | • Sand   | • Seeds        |
| • Cotton wool  | • Stones | • Dust or dirt |
| • Grass        | • Sticks |                |

### First aid for foreign bodies in the vagina

- Use hands to remove a foreign body from the vagina
- Wash the vagina with plenty of clean flowing water
- If a foreign body is stuck there, take the casualty to the nearest hospital

### **Prevention of accidents caused by foreign bodies**

- Chew food properly
- Don't talk or laugh when eating
- Keep buttons, beads, coins, soil and seeds in their eyes, ears, nose or mouth

## **Poisoning**

### **What is poison?**

-Poison is any substance once taken into the body damages body organ or cause death.

### **How is poison introduced into the body?**

- Through contaminated food and water
- Through contaminated air
- Through injections
- Through swallowing (orally)
- Through animal bites (snakes and dog bites)

### **Examples common household poison**

- |              |                |              |
|--------------|----------------|--------------|
| • Rat poison | • Acaricides   | • Herbicides |
| • Paraffin   | • Jik          | • Pesticides |
| • Petrol     | • Insecticides |              |
| • Diesel     | • Fungicides   |              |

### **Signs of poisoning**

- |                      |                        |
|----------------------|------------------------|
| • Coma               | • Vomiting             |
| • Rapid breathing    | • Mental confusion     |
| • Fever and sweating | • Loss of body balance |
| • Feeling thirsty    |                        |

### **First aid poisoning**

- Give the casualty plenty of fluids

### **Why should we give plenty of fluids to a person who has taken poison?**

- To dilute poison in the stomach
- To make the victim vomit

### **How to make a victim of poisoning vomit**

- Give the victim raw eggs

- Give the victim water mixed with soap
- Push the fingers in the mouth towards the throat

**NB:** If the victim has taken petrol, jik, paraffin or diesel, do not make him/her to vomit.

**Why should we make a victim who has swallowed paraffin, petrol or jik to vomit?**

- It causes more damage to the stomach and the gullet

### **Prevention of poisoning**

- Keep petrol, paraffin or jik out of children's reach
- Keep drugs out of children's reach
- Follow the doctor's prescription when taking drugs
- Dispose expired drugs
- Avoid drug misuse
- Buy drugs from recommended pharmacies

## **Fractures**

### **What is a fracture?**

A fracture is a broken or cracked bone in the body.

### **Causes of fractures**

- Playing rough games
- Getting involved in a motor accident
- Falling from a tree or a tall building
- Falling in a ditch accidentally

### **Signs of a fracture**

- The injured part swells
- The broken limb appears crooked

### **Symptoms of a fracture**

- Pain at the injured part
- Failure to move the affected part

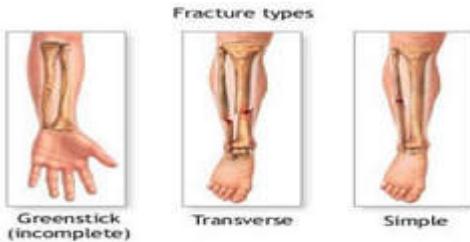
### **Types of fractures**

- Simple fractures
- Compound fractures
- Greenstick fractures

### **What is a simple fracture?**

-A simple fracture is a type of fracture where the broken bone remains inside the flesh.

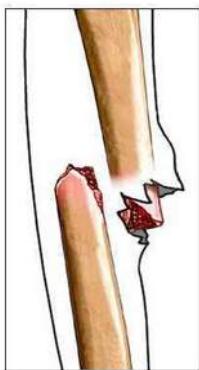
### **A diagram showing a simple fracture**



### **What is a compound fracture?**

-A compound fracture is a type of fracture where the broken bone tears the flesh and comes out of the skin.

### **A diagram showing a compound fracture**



### **What is a greenstick fracture?**

-A greenstick fracture is a type of fracture where the bone just bends but does not completely break.

### **Why are greenstick fractures common among young children?**

- Young children have weak bones with less calcium and phosphorus

### **What is the first aid for fractures?**

- Tie splints with a bandage at the affected part

### **How are splints useful in giving first aid to a casualty with a fracture?**

- Splints keep the broken bones in one position

### **Name the injury that requires the use of splints when giving first aid**

- A fracture

### **Dislocations**

#### **What is a dislocation?**

-A dislocation is the movement of a bone from its normal position.

#### **What is the first aid for dislocations?**

- Massage the affected part with liniment

#### **Which parts of the body are affected by dislocations?**

- Joints

## **Sprains**

### **What is a sprain?**

- A sprain is a twisted or torn ligament
- A sprain is an overstretched ligament

### **What is a ligament?**

-A ligament is tissue that joins a bone to bone at a joint.

### **How are ligaments useful in the body?**

- Ligaments hold bones together
- Ligaments join bones together

### **Causes of sprains**

- Walking down steps
- A leg slipping into a ditch or a hole accidentally

### **Signs and symptoms of sprains**

- One feels a lot of pain
- Swelling at the affected part
- Difficulty in moving the joint

### **First aid for sprains**

- Keep the joint in a resting position
- Apply ice at the sprained joint
- Tie the joint with a bandage and keep it motionless

## **Strains**

### **What is a strain?**

-A strain is an overstretched or torn muscle.

-A strain is an injury on the tendon.

### **What is a tendon?**

-A tendon is a tissue that joins a bone to a muscle

### **How are tendons useful in the body?**

- Tendons help to join bones to muscles

### **Causes of strains**

- Hitting your face against a hard object
- Over working of muscles e.g. playing football, netball, basketball, etc

### **Signs and symptoms of strains**

- A lot of pain at injured part
- Sudden sharp pain in the muscle
- The muscle may appear swollen

### **First aid for strains**

- Massage the affected part with liniment
- Place blocks of ice at the affected part

### **How is a sprain different from a strain?**

-A sprain is a twisted or torn ligament while a strain is an overstretched or torn muscle.

### **How is the function of a ligament different from that of a tendon in the body?**

-A ligament joins a bone to a bone while a tendon joins a bone to a muscle at the joint.

## **THEME: HUMAN HEALTH**

### **TOPIC: SANITATION**

#### **What is sanitation?**

-Sanitation is the general cleanliness of the place where we stay or live.

-Sanitation is the keeping of our environment clean.

#### **Elements of a clean home/school**

- Latrine/toilet
- Plate stand/rack
- Dustbin/rubbish pit
- Bathroom
- Kitchen

#### **Importance of each of the above elements**

##### **Latrine**

- For proper disposal of human excreta (faeces and urine)

##### **Rubbish pit/dustbin**

- For proper disposal of rubbish

##### **Kitchen**

- This is where food is prepared from and stored after cooking.

##### **Plate stand/rack**

- It is where utensils are put to dry after washing.
- It prevents contamination of utensils after washing

##### **Bathroom**

- This is a bathing place

#### **Activities carried out to promote sanitation in the environment**

- Draining stagnant water
- Sweeping rubbish in the compound and house
- Slashing tall grass
- Collecting and burning rubbish

- Constructing latrines for proper disposal of faeces and urine
- Smoking latrines to prevent bad smell
- Digging rubbish pits for proper disposal of rubbish
- Scrubbing and mopping houses and classrooms
- Picking rubbish from the compound

### **Importance of proper sanitation in the environment**

- It controls the spread of diarrhoeal diseases
- It controls the breeding of disease vectors
- It helps to prevent food and water contamination
- It helps to control bad smell in the environment
- It also helps to reduce pollution in the environment

### **Diseases that may breakout due to poor sanitation**

- |             |            |                 |
|-------------|------------|-----------------|
| • Cholera   | • Polio    | • Yellow fever  |
| • Typhoid   | • Diarrhea | • Elephantiasis |
| • Dysentery | • Malaria  |                 |

## **Latrines**

### **What is a latrine?**

-A latrine is a place for urination and defecation.

-It is a place used for proper disposal of faeces and urine.

### **Why are latrines considered to be important elements in our homes?**

- Latrines are used for proper disposal of urine and faeces which lowers the spread of diarrhoeal diseases.

### **Types of latrines**

- |                |           |
|----------------|-----------|
| • Pit latrines | • Toilets |
| • Ecosan       | • Potties |

### **Pit latrines**

-A pit latrine is a pit dug in the ground for proper disposal of faeces and urine.

### **Qualities of a good pit latrine**

- It should be big enough to hold faeces for a long time
- It should have a strong floor to avoid accidents
- The hole should be big enough to allow faeces through but small enough to prevent small children from falling into it.
- It should have walls and doors for privacy
- It should be well roofed
- Its floor should be smooth to allow easy cleaning

- It should have a lid on the squat hole to keep away bad smell and houseflies

### **Types of pit latrines**

- Ventilated improved pit latrine (VIP latrine)
- Ordinary pit latrine (convectional pit latrine)

### **VIP latrine**

#### **What is VIP in full?**

- Ventilated improved pit latrine

#### **What is a VIP latrine?**

-A VIP latrine is a type of latrine with a vent pipe and a screen on it.

#### **Characteristics of VIP latrines**

- They have vent pipes to let out bad smell from the pit
- They have screens to trap houseflies until they die
- They have spiral walls for privacy
- They don't have lids/covers on the squat holes to allow free air circulation in the pits.

#### **Why is a VIP latrine said to be ventilated?**

- It has a vent pipe to drive out bad smell

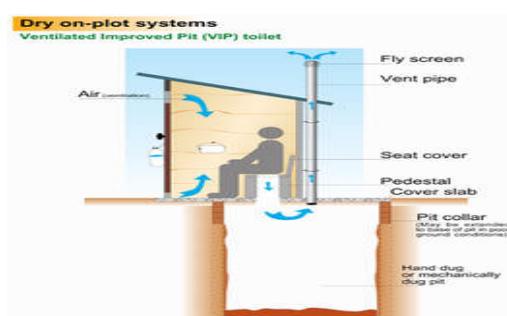
#### **Why is a VIP latrine said to be improved?**

- It has a screen to trap houseflies until they die

#### **Why shouldn't one put a lid on the squat hole of a VIP latrine?**

- To allow free air circulation in the pit

### **A structure of a VIP latrine**



#### **Functions of each part**

##### **Screen**

- To trap houseflies until they die

### **Vent pipe**

- To let out bad smell from the pit latrine

### **Spiral walls**

- To give an obstruction for privacy

### **How to maintain a VIP latrine**

- By sweeping/mopping/scrubbing its floor
- Never put a cover on the hole to allow free air circulation in the latrine
- Slashing bushes around the latrine
- Pushing faeces and urine into the pit

### **Advantages of a VIP latrine**

- It doesn't smell badly because it has a vent pipe to let out bad smell
- It has no houseflies because the screen traps and kills them

### **Disadvantage of a VIP latrine**

- It is expensive to construct

### **Ordinary/convectional pit latrine**

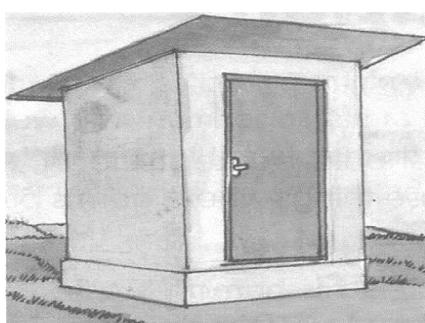
#### **Characteristics of ordinary pit latrines**

- They have covers or lids on the holes to keep away bad smell and houseflies.
- They have no vent pipes
- They have no screens

#### **Why should one put a cover or a lid on the hole of an ordinary pit latrine?**

- To prevent a bad smell from the pit latrine

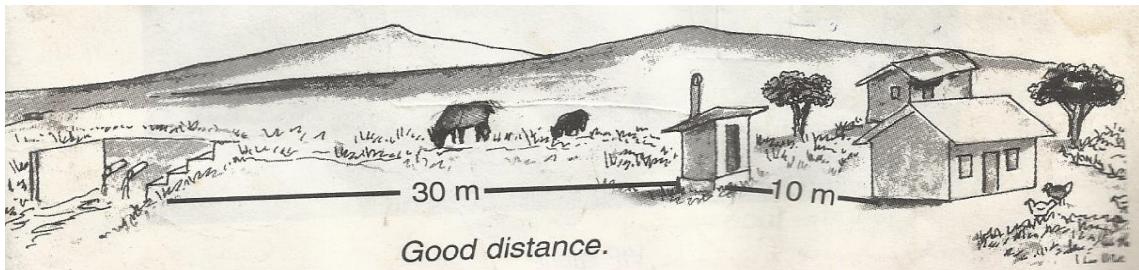
#### **A structure of an ordinary pit latrine**



### **Factors considered when choosing a site for a pit latrine**

- It should be downhill (lower altitude) than a water source to prevent water contamination/water pollution
- It should be **30 meters** away from a water source. This prevents water contamination
- It should be at least **10 meters** away from a house, school, hospital, market and kitchen to prevent bad smell.

### **Recommended distance of a latrine from a water source and a house**



### **Differences between VIP latrines and ordinary pit latrines**

- VIP latrines have spiral walls while ordinary pit latrines have doors for privacy
- VIP latrines have vent pipes while ordinary pit latrines have no vent pipes
- VIP latrines have screens while ordinary pit latrines have no screens

### **How to keep a pit latrine clean**

- By sweeping, scrubbing or mopping the floor
- By regular smoking at avoid bad smell and kill houseflies
- Cutting brushes around the pit latrine
- Always push the faeces through the hole

### **Ecosan latrines**

The features of an Ecosan latrine include the following;

- It has a shallow pit.
- The pit is made shallow because after defecating, a mug of ash is poured into the pit.
- The pit is constructed in such a way that faeces and urine go to different portions.

### **Why is ash put on faeces in an Ecosan latrine?**

- Ash dries up the faeces

### **Advantages of Ecosan latrines**

- They do not produce any bad smell since the faeces dry by the help of ash and are not mixed with any liquid
- The faeces are used as manure which is good for plant growth
- Urine is collected and used both as an insecticide and fertilizer

### **Maintenance of an Ecosan latrine**

- Ash must be used to cover the faeces after defecating
- Keep the floor clean by avoiding dirtying it with ash
- When the pit is full, it should be closed for six months which faeces are removed and used as fertilizers or manure in crop farms

### **Toilets/water closet**

-A toilet is a type of latrine which uses water to flush human faeces and urine into a septic tank.

-It is also called **a water borne toilet**.

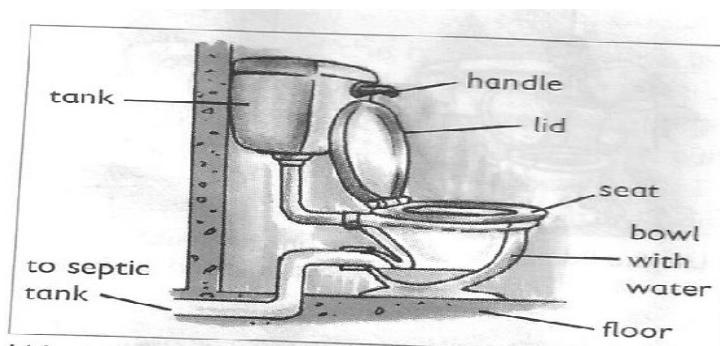
-They are found in many residential houses, houses, schools, shops, hospitals and banks.

-They are called **flush toilets** because **they use water to carry away faeces and urine**.

### **Why do we flush a toilet after use?**

- To keep it clean so that it does not attract flies

### **Parts of a toilet**



### **Functions of each part**

#### **Water tank/cistern**

- To hold water for flushing wastes into the septic tank.

#### **Handle**

- It is pulled or pushed to flush.

#### **Bowl**

- This is a container where human wastes are deposited.

### **Seat**

- This is where a person sits during urination or defecation.

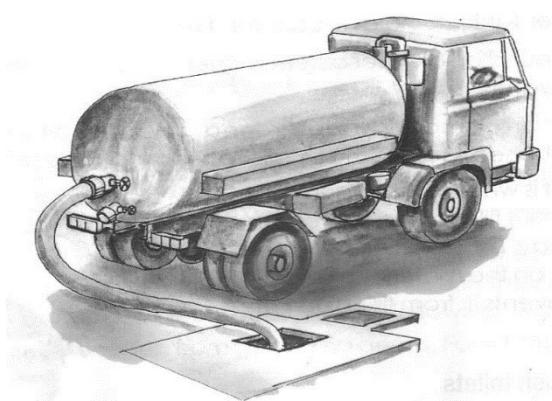
### **Pipe**

- It leads faeces and urine to the septic tank

### **Septic tank**

- To hold/store faeces before emptied by the emptier vehicle

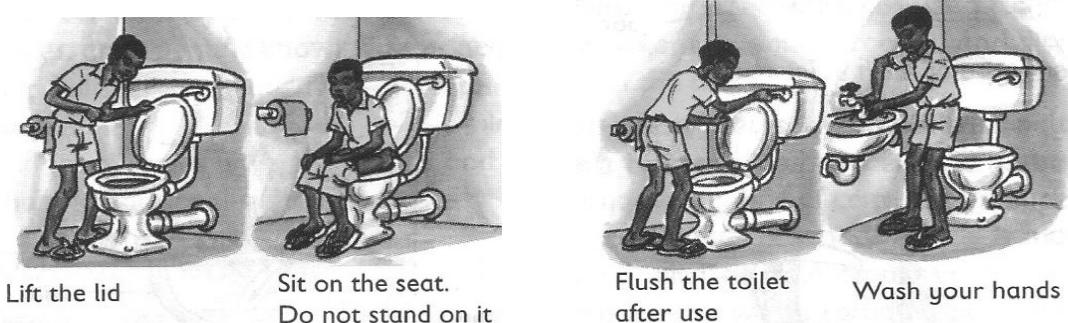
### **A diagram showing a cesspool emptier**



### **What is the importance of a cesspool emptier in a community?**

- It is used in emptying sewage from septic tanks in the community.
- It is used for emptying faeces from septic tanks.

### **Proper use of a toilet**



- Always sit or squat during urination or defecation

- Always flush after use
- Use toilet paper which is soft to clean yourself after use
- Avoid using hard materials like stones or polythene papers which can block the pipes
- Always place back the lid/cover after use
- Scrub the floor with a floor brush and the bowl brush
- Wash the bowl, seat and rim with clean water and disinfectants
- Always brush the corners of the room

**Mention any two materials used in cleaning ourselves after visiting a latrine or toilet**

- Water
- Soap

**Why should we wash our hands after visiting a latrine or toilet?**

- To wash away germs
- To remove germs

**Why should we wash hands with soap after visiting the latrine or toilet?**

- To kill germs

**Name two disinfectants used in toilets to kill germs**

- Jik
- Vim

**Write down any three advantages of using toilets or latrine in the community**

- It promotes sanitation
- It promotes development in a community
- It controls out break of diarrhoeal disease

**Name any four diseases which spread through faeces**

- Cholera
- Dysentery
- Diarrhoea
- Typhoid

**Identify any two problem faced by urban toilets**

- Lack of water for flushing
- Lack of toilet papers

**The potties**

**What is a potty?**

-A potty is a small portable latrine for babies.

-A potty is a small container shaped in form of a seat of a toilet.

-It is usually used by toddlers who are being trained to use toilets or latrines.

-Potties should be cleaned soon after use and kept well.

-In some cases, potties are used by very sick people.

**THEME: THE HUMAN BODY**

## **TOPIC: THE REPRODUCTIVE SYSTEM**

### **Growth, development and reproduction**

#### **What is growth?**

-Growth is increase in size of an organism.

#### **What is development?**

-Development is increase in maturity of an organism.

#### **What is reproduction?**

-Reproduction is the process by which living things produce young ones similar to themselves.

-Reproduction is the ability of living things to produce and increase in number.

#### **Types of reproduction**

- Sexual reproduction
- Asexual reproduction

#### **What is asexual reproduction?**

-Asexual reproduction is the type of reproduction which does not involve reproductive cells (gametes).

#### **Examples of asexual reproduction**

- Binary fission in bacteria and amoeba
- Spore formation in fungi and some non flowering plants
- Budding in yeast and coelenterates
- Vegetative reproduction e.g. stem cuttings,budding,grafting and use of suckers

#### **What is sexual reproduction?**

-Sexual reproduction is the type of reproduction which involves reproductive cells (gametes).

-This is the type of reproduction where the male and female gametes unite to form a zygote.

#### **What are gametes?**

-Gametes are reproductive cells of organisms.

#### **Name the male gametes of plants**

- Pollen grains

#### **Name the male gametes of animals**

- Sperms

#### **Mention the female gametes of plants**

- Ovules

#### **Mention the female gametes of animals**

- Ova

**What is a gonad?**

-A gonad is a special part of an animal where reproductive cells are produced.

**Name the male gonads in animals**

- Testes

**State the female gonad in animals**

- Ovary/ovaries

**Which part of a bean flower plays the same role as testes of a man?**

- Anther

**What are hermaphrodites?**

-Hermaphrodites are organisms which have both the male and female reproductive organs.

**Examples of hermaphrodites**

- Earthworms
- Tapeworms
- Snails
- Slugs

**Sexual reproduction in man****Adolescence and puberty****What is adolescence?**

-Adolescence is a transitional stage between childhood and adulthood.

**Who is an adolescent?**

-An adolescent is a person between childhood and adulthood.

**NB:**

-In girls, adolescence begins at 12 years and ends at 21 years while in boys, it starts at 15 years and ends at 21 years.

**What is puberty?**

-Puberty is a stage of sexual maturity in an individual.

-Puberty is a period during adolescence when a person becomes sexually mature.

**Types of changes that occur during adolescence**

- Primary sex characteristics/basic sex changes
- Secondary sex characteristics/physical sex changes
- Psychological changes/emotional changes
- Out step adolescent changes

**Primary sex characteristics**

-These are changes that take place in sex organs to prepare them for their function in reproduction.

-They are also called **basic sex changes**.

### **Primary sex changes in boys**

- Enlargement of the penis and testes
- Testes begin producing sperms
- Wet dreams are noticed

### **Primary sex changes in girls**

- Development of ovaries and uterus
- Ovulation begins
- Menstrual periods begin

### **What is ovulation?**

-Ovulation is the release of a mature ovum by the ovary into the oviduct.  
-Ovulation is the process by which the ovary releases a mature ovum into the oviduct.

### **What is menstruation?**

-Menstruation is the monthly out flow of blood from the uterus through the vagina.  
-Menstruation is the monthly shedding of blood by the uterus walls when fertilization does not occur.

### **Secondary sex characteristics**

-Secondary sex characteristics are changes related to physical features that distinguish a grown up male from a grown up female.

### **Secondary sex characteristics in boys**

- Sweat glands become more active
- Hair grows in the armpits
- Growth of pubic hair around the penis
- The voice breaks and deepens
- Growth of hair on the face as beards
- General muscular structure showing masculine features

### **Secondary sex characteristics in girls**

- Sweat glands become more active
- Growth of pubic hair
- Growth of hair in the armpits
- Enlargement of breasts
- The girl's face becomes smooth and good looking
- Widening and rounding of hips
- The voice becomes soft and attractive
- Pimples may appear on the face

### **Secondary characteristics common among adolescent boys and girls**

- Sweat glands become more active
- Growth of pubic hair
- Hair growth in the armpits

### **Psychological/emotional changes in adolescent**

-These are changes that take place in the minds but they are not seen and may not be realized by the adolescent.

### **Examples of psychological changes among adolescents**

- Adolescents become interested in members of the opposite sex
- They always move in peer groups
- They always want to be recognized as mature
- They want a lot of freedom
- They react quickly to different situations
- They become angry and disappointed quickly
- They reject rules and orders from elders

### **Out step adolescent changes**

-These are changes which occur differently to different individuals in the same age group.

### **Examples of out step adolescent changes**

- Sudden increase in weight
- Sudden increase in height

### **Problems faced by adolescents**

- They develop anti social behaviours
- Sexual conflicts wanting to experience the forbidden
- Conflicts between adolescents and culture/religion
- They begin fornication due to sexual maturity
- They are never satisfied with demands made on them
- Conflicts between adolescents and parents/teachers

### **Terms used in reproduction**

#### **Copulation**

- This is the act of playing sex in human beings.

#### **Ejaculation**

- This is the act of releasing of sperms into the vagina through the penis.

#### **Fertilization**

- This is the fusion of the male and female gametes to form a zygote.

#### **Conception**

- This is the process by which the fertilized ovary divides and implants itself on the walls of the uterus.

#### **Implantation**

- This is the process by which a foetus gets attached on the uterus walls.

### Foetus

- Foetus is a developing baby between 8 weeks and before birth.

### Zygote/embryo

- A zygote is a developing baby from conception to 8 weeks.

### Gametes

- These are reproductive cells of an organism.

### Ova

- These are female reproductive cells of animals.

### Sperm/spermatozoa

- These are male reproductive cells of animals.

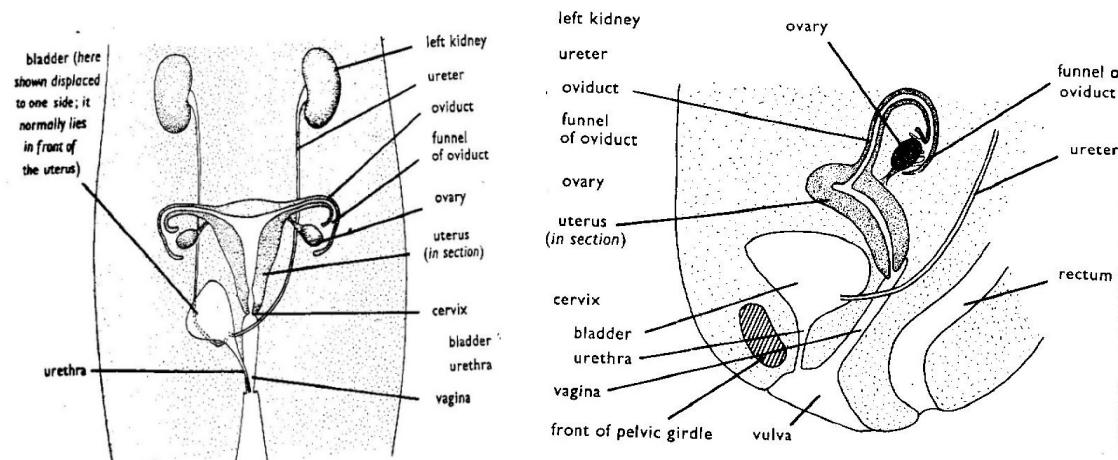
### Hermaphrodites

- Hermaphrodites are organisms with both the female male reproductive organism.

### Ovulation

- Ovulation is the process by which the ovary releases a mature ovum into the oviduct.

## The female reproductive system of a woman



## Functions of each part

### Ovary

- To produce ova
- To produce hormone called oestrogen which controls secondary sex characteristics in females

### Oviduct/fallopian tube

- This is where fertilization takes place.
- It allows passage of the ovum to the uterus

### **Uterus/womb**

- It is where conception/implantation takes place.
- It provides suitable conditions for the growth of the baby (foetus)

### **Cervix**

- It closes the lower end of the uterus during pregnancy

### **Vagina**

- It is where sperms are deposited during mating.
- It also acts as the birth canal.

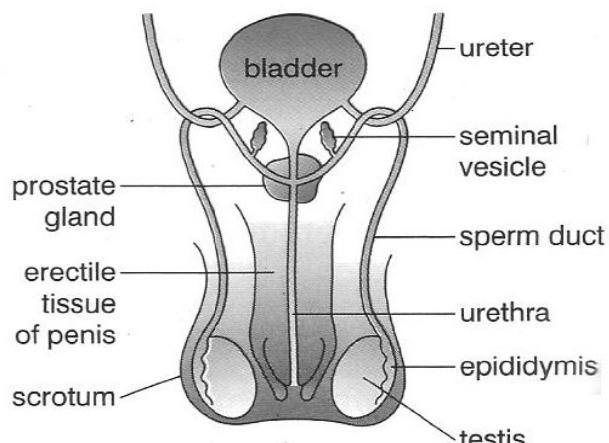
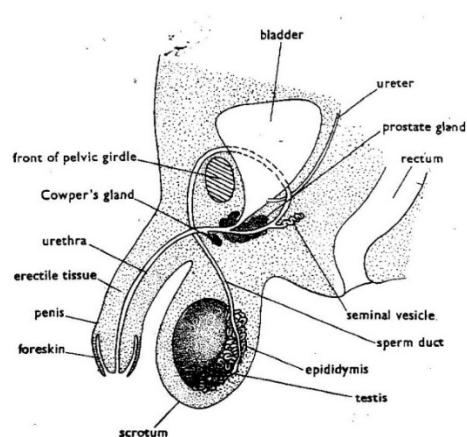
### **Vulva**

- It is an opening to the vagina which directs the penis during mating.

### **Funnel of the oviduct**

- It helps to direct the ovum into the oviduct

## **The male reproductive system of a man**



### **Function of each part**

#### **Scrotum**

- To protect the testes from external injuries
- To regulate temperature around the testes

#### **Testes**

- To produce sperms
- To produce a hormone called **testosterone**

#### **How is testosterone hormone important in males?**

- It is responsible for secondary sex characteristics (libido)
- It increases sexual desire

#### **Epididymis**

- To store manufactured sperms

### **Sperm duct**

- It is a passage of sperms from the testes or epididymis to the urethra.

### **Seminal vesicle**

- To produce semen through which sperms move

### **Urethra**

- It is a passage of sperms from the sperm duct.
- It is also a passage of urine from the bladder.

### **Penis**

- To deposit sperms into the vagina during sexual intercourse

### **Foreskin**

- To cover and protect the head of the penis from injuries

### **Prostate glands**

- To produce a fluid that closes the urinary bladder during sex to prevent urine from mixing with sperms

### **Fertilization in humans**

-Fertilization is the union/fusion of the male and female gametes to form a zygote.

### **Types of fertilization**

- Internal fertilization
- External fertilization

### **What is internal fertilization?**

-This is the type of fertilization which takes place inside the female's body.

### **Name five examples of animals which undergo internal fertilization**

- |          |        |
|----------|--------|
| • Woman  | • Goat |
| • Cow    | • Ewe  |
| • Monkey | • Hen  |

### **What is external fertilization?**

-This is the type of fertilization which occurs outside the body of a female.

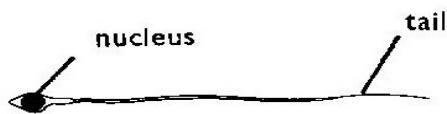
### **List down four examples of animals that undergo external fertilization**

- |         |               |
|---------|---------------|
| • Toads | • Salamanders |
| • Newts | • Fish        |
| • Frogs |               |

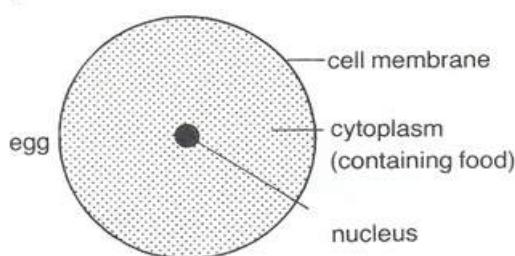
### **What is the immediate result of fertilization?**

-A zygote is formed/formation of a zygote.

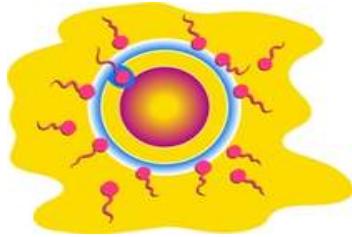
### **A structure of a sperm cell**



### A structure of an ovum



### Stages of fertilization



### Gestation period/pregnancy

- Gestation period is the time taken from conception to birth.
- The gestation period in man is **9 months/270 days**.

### Formation of a baby boy and a baby girl

#### What determines the sex of a child?

- The sex of a child is determined by the sex chromosomes contained by the reproductive cells.
- All ova contain **XX** chromosomes representing female sex.
- All sperms contain **XY** chromosomes representing male sex.
- During fertilization, an ovum contributes only **X** chromosomes but a sperm cell which contributes either **X** or **Y** chromosome.
- It is the sperm cell which determines the sex of a child by either contributing **X** to form **XX** for a girl or **Y** to form **XY** for a boy.

### What are chromosomes?

-Chromosomes are tiny substances found in the nucleus of a reproductive cell which determines the sex of the offspring.

### **How is a baby boy formed?**

-A baby boy is formed when the **Y** chromosome of a sperm unites with the **X** chromosome of an ovum to form **XY**.

### **How is a baby girl formed?**

-A baby girl is formed when the **X** chromosome of a sperm unites with one of the **X** chromosome of an ovum to form **XX**.

### **Twins**

-Twins are two children born at the same time by the same mother.

#### **Types of twins**

- Identical twins
- Fraternal twins
- Siamese twins

#### **Identical twins**

-These are twins formed when one fertilized ovum splits into two parts and each develops into an independent baby.

#### **Characteristics of identical twins**

- They physically look alike/they resemble each other
- They are of the same sex

#### **Fraternal twins**

-Fraternal twins are twins formed when two ova fertilized by two different sperms and each develops into an independent baby.

#### **Characteristics of fraternal twins**

- They don't resemble each other
- They are always not of the same sex

#### **Siamese twins**

-These are twins when one fertilized ovum divides but fails to separate fully.

-They are born when joined together and may share some vital body organs.

#### **Multiple births**

-This is when more than two children are produced at the same birth by the same mother.

-They are either triplets or more children at the same birth.

#### **Signs of pregnancy**

- Menstruation stops
- The breast grow bigger
- The abdomen enlarges and hardens

- Morning sickness in the first three months
- Loss of appetite for certain type of food
- Frequent spitting of saliva
- Passing out urine more frequently than normal
- Increased appetite for a particular type of food

### **Dangerous signs of pregnancy**

- Vomiting a lot and often
- Bleeding or coloured discharge from the vagina
- Prolonged anaemia
- Severe tiredness and weakness
- Swelling of legs, hands and face
- Severe headache or difficulty in seeing
- Severe painful abdomen
- Heartburn

### **Teenage pregnancy**

-This is pregnancy acquired by a girl below 20 years of age.

### **Who is a teenage?**

-A teenage is a person between 13 years and 19 years of age.

### **Causes of teenage pregnancy**

- Peer pressure
- Defilement
- Rape
- Desire for luxury or material things
- Failure to provide enough basic needs to a girl child
- Drug abuse

### **Consequences/effects of teenage pregnancy**

- Loss of school education
- Obstructed labour
- Difficult delivery
- Attempt to have an abortion
- Rejection by parents
- Lack of financial support

### **How to care for a pregnant woman**

#### **List down the requirements of a pregnant woman**

- Antenatal care
- Good nutrition
- Adequate rest and sleep
- Physical exercises
- Appropriate clothing like maternity dresses and brassier
- Proper personal hygiene

#### **Responsibilities of family members to a pregnant mother**

- Relieve her of house work, farming etc
- Give her psychological support by expressing pride, understanding and sympathy kindness
- Give health care like advice and take her to antenatal care clinics

### **What is antenatal care?**

-Antenatal care is the special care given to pregnant woman in hospitals before giving birth.

### **Write ANC in full**

- Antenatal care

### **Services provided to pregnant women during antenatal care visits**

- Immunization against tetanus with tetanus toxoid vaccine (TT vaccine)
- HIV tests are carried out
- Diagnosing problems associated with pregnancy
- Teaching them how to maintain good health during pregnancy
- Sensitizing them about proper feeding
- Teaching them how to care for the newly born babies
- They are provided with hygienic and modern delivery services with Trained birth attendants (Tba)

### **Materials needed for delivery and care of the baby**

#### **For the baby**

- Clean clothing
- Bedding
- Cot
- Sterilized delivery equipment

#### **For the mother**

- Mat
- Towel
- Cloth for delivery
- Money for transport

#### **For the family**

- Water
- Food
- Medical care

### **Why is reproductive health important to people in the community?**

- It prevents the spread of sexually transmitted diseases
- It promotes the proper functioning of people's reproductive organs

### **Young mothers**

#### **Who is a young mother?**

-A young mother is a girl who gives birth when she is below the age of 18 years.

#### **Problems faced by young mothers**

- Obstructed labour due to small pelvic
- Miscarriages
- Abortion
- Premature births
- Low birth weight
- Dropping out of school

- Inability to care for their babies and themselves
- Loss of respect in their families and parental love
- Forced marriages

### **Problems faced by children born by young mothers**

- They lack enough basic needs e.g. clothes and food
- They get many diseases since young mothers lack the knowledge of preventing such infections
- Lack of parental love
- They are abandoned as a result of lacking basic needs
- High infant mortality rate

### **Abortion**

-Abortion is the intended removal of the foetus before the actual time of birth.

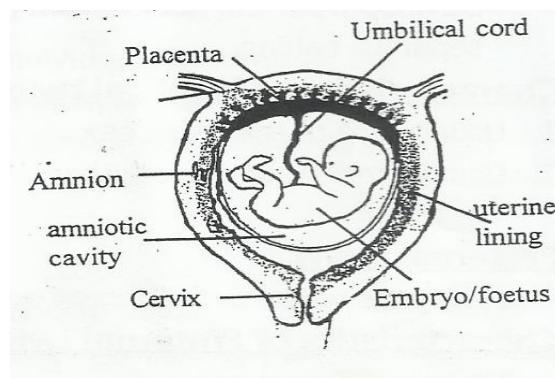
### **Reasons why some women abort**

- To stay in school
- They fear responsibilities
- Forced pregnancy due to rape
- Some fear to lose parental love
- Being abandoned by the people responsible for the pregnancy
- Failure to tell the right owner of the pregnancy

### **Effects of abortion**

- It causes maternal anaemia
- It can lead to death
- It can lead to loss of the uterus
- It leads to sterility

### **Position of the foetus during pregnancy**



### **Functions of each part**

## **Placenta**

- It attaches the embryo to the uterus
- It supplies the foetus with food and oxygen
- It prevents the mixing of the mother's blood with that of the foetus
- It protects the foetus from dangerous chemicals
- It prevents bursting of tiny blood vessels in the foetus
- It diffuses wastes from the foetus into the mother's blood streams

## **Umbilical cord**

- To transport food nutrients and oxygen from the placenta to the foetus
- To carry waste materials from the foetus to the placenta

## **Amniotic cavity/amniotic sac**

- To keep amniotic fluid

## **Amniotic fluid**

- To protect the foetus from shock/harm
- To reduce friction between the foetus and uterus walls

## **Family planning and child spacing**

### **What is family planning?**

-Family planning is the use of birth control methods to plan when to have and not to have a baby in a family.

### **What is child spacing?**

-Child spacing is the provision of regular intervals of time between the births of children in a family.

### **Advantages of family planning**

- It controls rapid population growth
- It enables the mother's body to rest and prepare for the next pregnancy
- It helps to prevent maternal anaemia
- It enables the children to get proper care
- It enables children to get adequate love from parents
- It prevents the producing of underweight babies
- It reduces infant mortality rate
- It prevents unwanted pregnancies
- It prevents frequent births

### **Methods of family planning**

- Natural methods of family planning
- Artificial methods of family planning

### **Natural methods of family planning**

-These are methods of family planning which don't involve use of drugs or operation.

### **Examples of natural methods of family planning**

- Prolonged breast feeding
- Abstinence/abstaining from sex
- Withdrawal method
- The rhythm method/use of safe days
- Cervical mucus method
- Basal body temperature method

### **How is breast feeding helpful during family planning?**

- Breast feeding delays ovulation after pregnancy and giving birth

### **Withdrawal method/coitus interrupts**

-This is where the man removes the penis from the vagina during sex as soon as he notices that he is about to ejaculate.

### **The rhythm**

-This involves studying the menstrual cycle sex is only restricted on days when the ovum is absent in the oviduct.

### **Abstinence**

-This method involves avoiding sex completely for sometime.

-It is the best method for school going pupils.

### **Cervical mucus method**

-During a woman's menstrual cycle, there are changes in the amount and the type of mucus that is produced by the cervix.

-The changes in the mucus correspond with ovulation. Hence one can use them to find out when it is safe to have sex and when it is not.

-Women can be taught to identify them and then decide when they should or should not have sex to avoid pregnancy.

### **Basal body temperature method**

-In this method, a thermometer is used to measure a woman's daily temperature when she is resting.

-She is required to observe the changes everyday.

-The temperature changes when one is not sick are related to ovulation.

-This information is used to decide when to have or not to have sex so as avoid pregnancy.

### **Advantages of natural family planning methods**

- They are cheap and easy to use

- They have no side effects

### **Disadvantages of natural family planning methods**

- They are risky and may not be very effective
- They need a lot of cooperation between the male and female partner which may not be available
- They don't control the spread of STDs except abstinence

### **Artificial methods of family planning**

-These are methods of family planning which involve the use of drugs or artificial materials to prevent pregnancy.

### **Examples of artificial family planning methods**

- Use of birth control pills
- Use of birth control injections
- Tubal ligation
- Vasectomy
- Norplant
- Use of foams and jellies
- Diaphragm
- Use of condoms
- Looping method/coils/IUDs or IUCDs

### **Birth control pills (contraceptive pills)**

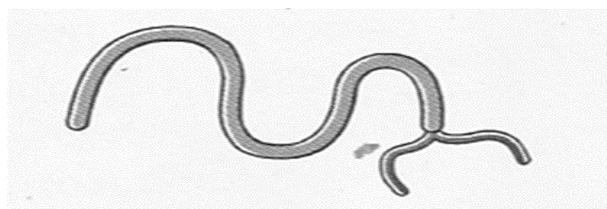
-These are small tablets containing chemicals which prevent pregnancy by not allowing ovulation to take place.

-One tablet is taken per day

### **Birth control injections**

-This is when hormones which prevent pregnancy are given through injection after a special period.

### **Looping method (IUDs or IUCD)**



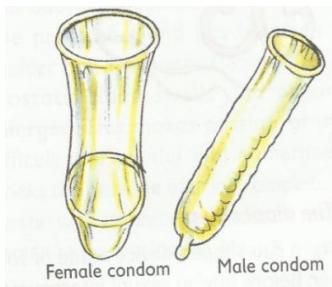
### **Write in full**

**-IUDs** -Intra Uterine Devices

**-IUCDs** -Intra Uterine Contraceptive Devices

-IUDs/IUCDs are plastic or metallic devices (coils) inserted into the uterus by a well trained health worker to prevent pregnancy.

## Condom use



### What is condom?

- A condom is a thin rubber bag-like material that is worn on a man's erect penis before sexual intercourse.
- Condoms hold semen and prevent it from getting into a woman's body during sexual intercourse.
- Today, there are also female condoms known as **femidoms**.
- A woman fits it into her vagina before sexual intercourse
- It holds sperms and prevents them from getting into her uterus

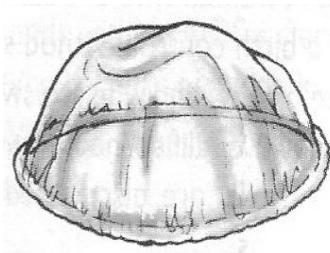
### Name the commonest artificial method of family planning

- Condom use

### Foams and jellies (spermicides)

- These are chemicals put in the vagina before having sex to kill sperms.
- A woman has to apply the chemical in the vagina before sexual intercourse.
- The chemical kills the sperms and pregnancy cannot take place.

### Diaphragm/cap



- A diaphragm is a shallow cup made of soft rubber and fitted inside a woman's vagina before having sex.
- The diaphragm must be fitted by a health worker in the woman's vagina.

-To be more effective, some contraceptive cream should be smeared on it.

-The device prevents sperms from reaching the uterus.

### **Advantages of diaphragm method of family planning**

- It is easy to use
- It is very effective when consistently and correctly used

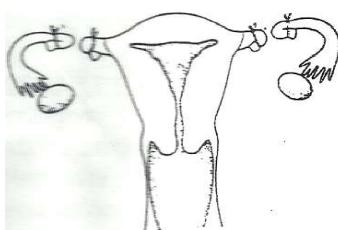
### **Tubal ligation**

-This involves cutting and tying of the oviduct in a simple surgical operation to block the passage of ova from the ovaries.

-The method does not stop a woman from getting her menstrual periods.

-The sexual desire and ability remain strong but she can never bear children again.

### **Diagram showing tubal ligation**

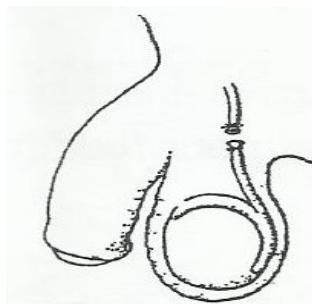


### **Vasectomy**

This is the cutting of sperm ducts and tying them through a simple surgical operation.

It blocks the sperms such that they cannot come to the penis during the sexual intercourse.

### **Diagram showing vasectomy**



### **Name the two permanent methods of family planning**

- Tubal ligation
- Vasectomy

### **Advantages of artificial methods of family planning**

- They are very effective
- They are commonly available

### **Disadvantages of artificial methods of family planning**

- They are expensive to maintain
- They can cause health problems to the woman's body
- They should be used under the supervision of a health worker

### **Myths and misconceptions about family planning**

- Women can grow fat when they take pills
- Young boys below 12 years cannot make a girl pregnant
- A girl cannot get pregnant the first time she has sexual intercourse
- If a girl or woman washes with cocoa cola, she cannot become pregnant
- If a girl jumps up and down after having sex, she cannot become pregnant
- If a girl has sex while standing up, she cannot get pregnant
- Continued taking of family planning pills also affect the men's ability to erect
- Using birth control pills or injection can cause cancer
- Family planning increases fornication and adultery among people
- Vasectomy is castration of men

### **Reasons why people produce very many children**

- Ignorance about family planning. There is now an organization called the Family Planning Association of Uganda (FPAU) which has made it possible for most people to learn about and have family planning.
- The myth of male strength
- High infant mortality rate
- Desire for a certain sex of children
- Religious belief that children are a gift from God

### **Dangers of having many children in a family**

- Lack of enough food in the family
- Children cannot have proper dressing
- Lack of proper medical care
- Children don't get adequate love and attention from parents
- Children may not get proper education

### **Dangers of frequent births**

- It leads to maternal anaemia
- It results to underweight babies
- It increases infant mortality rate
- It leads to premature birth
- It leads to miscarriages
- The mother's body is weakened and can be easily attacked by diseases

### **What is infant mortality rate?**

-This is the rate at which children die before the age of 5 years.

### **How to reduce infant mortality rate**

- Breast feeding children thoroughly
- Using family planning methods
- Immunization of children against killer diseases
- Treating and preventing dehydration

### **Diseases and disorders of the reproductive system**

-The diseases of the reproductive system are STDs.

### **Write the following in full**

- **STD** – Sexually Transmitted Disease
- **STI** – Sexually Transmitted Infection
- **V.D** – Venereal Disease

### **What are STDs?**

-STDs are diseases spread through having unprotected sex with an infected person.

-These are diseases spread from one person to another through unprotected sexual intercourse with infected one.

### **Examples of STDs/diseases of the reproductive system**

- |   |  |
|---|--|
| <ul style="list-style-type: none"> <li>• HIV/AIDS</li> <li>• Gonorrhea</li> <li>• Syphilis</li> <li>• Candidiasis/thrush</li> <li>• Trichomoniasis</li> </ul> | <ul style="list-style-type: none"> <li>• Genital herpes</li> <li>• Cancer of the cervix</li> <li>• Penis cancer</li> <li>• Genital warts</li> <li>• Chancroid</li> </ul> |
|---|--|

### **HIV /AIDS**

#### **Write in full**

-HIV- Human Immunodeficiency Virus

-AIDS- Acquired Immune Deficiency Syndrome

#### **What causes AIDS?**

- AIDS is caused by Human Immunodeficiency Virus (HIV).

#### **How is HIV/ AIDS spread?**

- Through unprotected sex with an infected person
- By sharing sharp unsterilized piercing objects with infected people
- Through transfusion of unscreened blood
- From the mother to her baby at birth through blood contact

### **Social practices that increase the risks of contracting HIV /AIDS**

- |   |   |
|---|---|
| <ul style="list-style-type: none"> <li>• Circumcision</li> <li>• Adultery</li> <li>• Fornication</li> <li>• Polygamy</li> </ul> | <ul style="list-style-type: none"> <li>• Defilement</li> <li>• Rape</li> <li>• Inheriting widows</li> <li>• Drug abuse</li> </ul> |
|---|---|

### **Practices through which AIDS cannot be spread**

- Sharing food with infected people
- Sharing a handshake with infected people
- Hugging infected people
- Sharing combs, bedding, towels, toilets or cup with an infected person
- HIV cannot be spread through bites of mosquitoes, bedbugs or any other insect or animal

### **Signs and symptoms of HIV/ AIDS**

- |   |  |
|---|--|
| <ul style="list-style-type: none"> <li>• Persistent fever</li> <li>• Persistent/chronic cough</li> <li>• Prolonged diarrhoea</li> <li>• Sudden loss of weight</li> <li>• Skin rash</li> </ul> | <ul style="list-style-type: none"> <li>• Herpes zoster/kisipi</li> <li>• Loss of hair on the head</li> <li>• White coating in the mouth</li> <li>• Mental disturbance</li> </ul> |
|---|--|

### **Effects of HIV/AIDS on an individual.**

- It leads to loss of immunity
- It leads to loss of weight.
- It makes a person lose income since he/she is weak and unable to work.
- It leads to worries
- It leads to death

### **Effects of HIV/AIDS to a family**

- It leads to loss of family members.
- It leads to loss of income on medication.
- It leads to sorrow in a family.

### **Categories of people at a risk of contracting HIV /AIDS**

- |  |   |
|--|---|
| <ul style="list-style-type: none"> <li>• Youth involved in<br/>fornication</li> <li>• Sex workers/prostitutes</li> </ul> | <ul style="list-style-type: none"> <li>• Bar maids</li> <li>• People raped</li> </ul> |
|--|---|

- Youths who run for sugar daddies and sugar mummies
- Doctors treating AIDS patients
- Unborn babies in wombs of AIDS patients
- Long distance travelers

### **Care for HIV/AIDS patients**

Give the patients food rich in a balanced diet

They should be given treatment for the secondary infections

Their wounds should be dressed

Their beddings should be kept clean

### **Ways of controlling the spread of HIV /AIDS**

- Abstaining from sex until marriage
- Be faithful to your sexual partner
- Proper use of condoms during sexual intercourse
- Avoid sharing unsterilized sharp piercing objects with infected people
- Blood used for transfusion should be well screened
- Pregnant women who are HIV positive should go for antenatal care in order to avoid infecting their unborn babies.

### **Write ABC in full as used in protection against HIV/AIDS**

**A** – Abstain from sex

**B** – Be faithful to your sexual partner

**C** – Condom use during sexual intercourse

### **Gonorrhoea**

-Gonorrhoea is caused by bacteria called neiseria gonorrhoeae (gonococcus).

### **How is gonorrhoea spread?**

- Through unprotected sex with an infected person

### **Signs and symptoms of gonorrhoea**

#### **In men/males**

- Pain during urination
- Passing out urine with pus or blood stains
- Pus discharge from the penis or urethra

#### **In females/women**

- Pain in the lower abdomen
- Passing out smelly urine with pus
- Pain during menstruation
- Itching in the vagina

### **Signs of gonorrhoea in babies**

- Pus discharge from eyes
- Blindness of newly born babies
- Swollen eyes of newly born babies

### **Effects of gonorrhoea**

- Painful joints in both men and women
- Blockage of urethra in both men and women
- Blockage of oviducts in women
- Pain in the lower abdomen
- Barrenness due to blocked oviducts
- Blindness (sterility) and pus in eyes of newly born babies
- Sterility in men due to blocked sperm ducts

### **Ways of controlling the spread of gonorrhoea**

- Abstaining from sex
- Proper use of condoms during sexual intercourse
- Be faithful to your sexual partner
- Both the husband and wife should get treatment together in order to avoid re-infection in case one tests positive.

## **Syphilis**

-Syphilis is a bacterial disease caused by **treponema pallidum**

### **How is syphilis spread?**

- Through unprotected sex with an infected person
- Through transfusion of unscreened blood

### **Signs and symptoms of syphilis**

- A painless sore on the penis or inside the vagina
- Itching body rash
- Sores on the lips, fingers, anus or mouth
- Mild fever
- Swellings on sexual organs which disappear without any treatment

### **Effects of untreated syphilis**

- It leads to heart diseases
- It causes madness

### **How to protect ourselves from contracting syphilis**

- Abstaining from sex
- Proper use of condoms during sexual intercourse
- Be faithful to your sexual partner
- Blood should be well screened before transfusion

## **Candidiasis**

-Candidiasis is a sexually transmitted disease caused by a fungus.

### **How is candidiasis spread?**

- Through unprotected sex with an infected person
- Through dirty toilets and urinals
- By sharing knickers with infected people

### **Signs and symptoms of candidiasis**

- Smelly discharge from vagina
- Burning pain during urination
- Sore genital organs
- Itching of penis or vagina

### **How to control and prevent the spread of candidiasis**

- Abstain from sex
- Be faithful to your sexual partner
- Use condoms during sexual intercourse
- Keep reproductive organs clean
- Wash the vagina with warm water mixed with lemon juice or vinegar
- Keep toilets clean

### **Which fungal STD can be transmitted to women through dirty toilets?**

- Candidiasis

## **Chancroid**

-This is caused by bacteria and its incubation period is about 10 days.

-It can easily be treated if realized early.

## **Genital warts and genital herpes**

-This can affect both the male and the female reproductive organs.

### **Sign of genital warts**

- A small, hard brownish skin growth with rough surfaces appear on the penis, scrotum, vagina or near the anus

### **Sign of genital herpes**

- Small but very painful blisters on the penis, vagina, or pubes, anus and buttocks

### **Prevention, control and treatment**

- Keep sex organs clean
- Apply some Vaseline around the wart
- Get treatment from a health worker

## **Trichomoniasis**

-This is a common STD caused by **protozoa** and common in women.

### **Signs and symptoms**

- Smelly discharge from the vagina
- Itching in the vagina

### **Prevention, control and treatment**

- Keep reproductive organs clean
- Get early treatment

### **Disorders of the reproductive system**

- Ectopic pregnancy
- Impotence
- Fistula
- Barrenness
- Low sperm count
- Fibroids
- Enlargement of prostate glands
- Ovarian tumours
- Inflammation of the oviducts

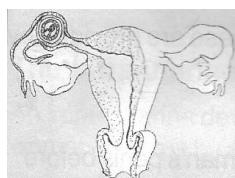
### **Ectopic pregnancy**

-This is a condition in which the zygote implants itself in the oviduct and develops from there.

-It causes a lot of pain and can lead to death if the affected woman does not see a doctor early enough

-Ectopic pregnancy is corrected with surgery

### **A diagram showing ectopic pregnancy**



### **Impotence**

-Impotence is the inability of a man's penis to erect.

### **Causes of impotence**

- Excessive drinking of alcohol
- Accidents that affect the spinal cord
- Some are born impotent

### **How to care reproductive organs**

- Abstaining from sex until marriage
- Keep reproductive organs clean by regular washing and bathing

- Avoid alcoholism
- Observe proper personal hygiene during menstruation
- Avoid fornication
- Keep water borne toilets clean
- Use appropriate family planning methods
- Eating a balanced diet
- Having regular physical exercises

### **PIASCY messages about adolescence and reproduction**

#### **What is PIASCY in full?**

-Presidential Initiative on AIDS Strategy for Communication to Youth

#### **PIASCY messages**

- Abstain from sex until marriage
- Everybody has AIDS apart from me
- Virginity is healthy for both boys and girls
- Don't accept lifts and gifts from strangers
- Fornication/pre-mature sex is dangerous
- Early sex affects reproductive organs
- Let us start an HIV/AIDS society
- AIDS is a deadly disease which has no cure
- Body changes are not a sign to start sex
- Avoid lonely places
- Stay in school and complete at least primary seven

#### **Importance of PIASCY messages**

- They prevent unwanted pregnancies
- They protect children from STDs
- They prevent school drop outs
- They prevent teenage pregnancy
- They prevent early marriages
- They help to keep adolescents and their reproductive organs safe

#### **Exercise**

1. Write the following in full

- |             |           |
|-------------|-----------|
| a). HIV     | f) TASO   |
| b). AIDS    | g) A.I.C  |
| c). F.P.A.U | h) ACP    |
| d). STD     | i) WHO    |
| e) STI      | j) PIASCY |

2. Identify any three roles played by **TASO**

3. State the best way of protecting yourself from **HIV/AIDS**

4. State two ways married people can protect themselves from contracting **STDs**
5. Write down any two signs of gonorrhoea in newly born babies
6. Why is bad for a school girl to get pregnant?

**COMPILED BY; BONIFACE MANYURU**



